THE CANADIAN TARIFF AND PRODUCTIVITY OF THE CANADIAN MANUFACTURING INDUSTRIES

A Thesis

Submitted to

The Faculty of Graduate Studies and Research

University of Manitoba

In Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

by

Harshendra Kumar Singh

August, 1972

THE CANADIAN TARIFF AND PRODUCTIVITY OF THE CANADIAN MANUFACTURING INDUSTRIES

(Harshendra Kumar Singh)

ABSTRACT

The hypothesis that tariffs (both the Canadian and American) have caused lower labour productivity levels in the Canadian manufacturing industries relative to the United States is tested in this thesis. The thesis initially examines the existing productivity differences between Canada and the United States and then proceeds to investigate the validity of the hypothesis. Data for periods 1949-52, 1962-65 and 1965 are utilized to facilitate the analysis. The industry samples for evaluation are broken down into three categories - export, domestic and protected. Value added is used as a measure of output. After appropriate adjustments or approximations have been made to ensure comparability of the published value added measure in the two countries, the resulting productivity measures - value added per production worker, per employee and per production man-hour - are calculated in both current and constant (1961) U.S. dollars to facilitate inter-temporal comparisons.

The labour productivity measure used in this study is a partial productivity measure and as such has a number of limitations. However, because the two countries compared are broadly at similar levels of economic development, with industrial and technological structures pretty much alike, there is reason to suppose that this measure provides meaningful and analytically useful conclusions.

With product mix considerations taken into account, the factual

evidence derived from alternative computations based on published as well as adjusted data indicates that the average level of labour productivity in the Canadian manufacturing industries is significantly below the comparable levels in the United States. By and large, the annual rate of growth of productivity in Canada has been comparable or slightly higher than that achieved in the United States.

To evaluate the extent to which these productivity differences could be atrributed to tariffs in Canada and the United States, four different comparisons are made. First, average productivity levels in Canadian export, domestic and protected industries are examined to see whether protected industries have lower productivity levels than is true for the other two categories. Second, the average productivity levels in these same industry groups in Canada are compared with their counterpart industries in the United States to see whether the productivity differences in Canadian protected industries are greater than for the other two categories. Third, correlation and regression analysis is used to see if tariffs and the relative United States-Canada productivity differentials are significantly related variables. Finally, a comparison is made between changes in Canadian tariffs and changes in average productivity levels to see whether these two variables are related in a significant fashion. All these tests use the same three sets of adjusted data and are carried out with respect to both nominal and effective tariffs.

The first test indicated that, with variations from sample to sample and period to period, productivity levels in the Canadian protected industries ranged between 41 to 76 percent of levels in her domestic industries and 51 to 70 percent of levels in the export industries. Although these results apparently support the hypothesis, it cannot be conclusively established that tariffs are a differentiating factor in the relative productivity performance levels in the three Canadian industry categories, because the evidence on relative productivity levels in the three industry categories derived from alternative industry samples is conflicting and inconsistent. The second test showed that, with variations from one period to another, productivity levels in the Canadian export, domestic and protected industry categories ranged between 76 to 95, 67 to 95 and 34 to 70 percent respectively, relative to the counterpart industries in the United States. These results are apparently consistent with the hypothesis. However, such a pattern of productivity, save for the domestic industries, will be expected from the principle of comparative advantage as well from either country's point of view, even if there were no tariffs. It, therefore, appears that the results do not explain adequately the relative United States-Canada productivity differences in the three industry categories.

The correlation and regression analysis indicated that while productivity is related to the Canadian nominal tariffs, it is not significantly associated with the effective tariff levels. For lack of adequate data, the relationship between the American tariffs and the United States-Canada productivity gap could not be evaluated precisely. Thus the evidence that we found regarding the possible relationship between tariff levels and the United States-Canada productivity differentials is inconclusive.

ACKNOWLEDGMENTS

The author wishes to express his sincere appreciation and gratitude to all those who helped in the production of this paper through their writings, advice or help.

In particular, the author is deeply indebted to his supervisors, Professors C. L. Barber and R. Simkin, whose numerous comments and suggestions have undoubtedly shaped the outcome of this paper. Sincere thanks are also due to Professor R. E. Olley for his detailed comments on an earlier draft of this paper. I also wish to express my thanks to Professors C. W. Ekstrand and James Seldon who read the entire manuscript twice and offered criticisms for its improvement. I extend my thanks to Professors P. S. Dhruvarajan and J. I. Vorst and to my colleague Ram Sahi for helping me in statistical and computational problems.

Much credit is also due to my wife Anita. But for her continual patience and encouragement, the completion of this paper would not have been a pleasant task.

Finally, I am grateful to the Faculty of Graduate Studies and Research for the award of Graduate Fellowship and the Department of Economics for the Teaching Assistantship which made this study possible.

Winnipeg
August, 1972

H. K. S.

TABLE OF CONTENTS

Page

LIST OF TABLES

CHAPTER I

INTRODUCTION

More than a century ago David Ricardo developed the theory of comparative advantage or comparative costs to claim that under conditions of free trade each country will specialize in and export those commodities in which it has a comparative advantage (or relative costs are low) and import those commodities in which it has a comparative disadvantage.[1] Ricardo showed how, through an efficient resource allocation, a country, without any increase in resources or technological change, is able to enjoy expanded output and higher real income by specializing in production and trading according to comparative advantage, and by implication, how a tariff will make a country less productive by distorting the efficiency inherent in the optimum pattern of resource allocation, specialization and division of labour. Writing about two centuries ago Adam Smith also showed unhampered international trade as a dynamic force which, by widening the extent of the market and the scope for division of labour, permits greater and better use of machinery, stimulates innovation, overcomes technical indivisibilities, raises the productivity of labour and enables the trading country to enjoy increasing returns and economic development.[2] A similar recognition was given to specialization by Marshall in his "Industry

---

[1] David Ricardo: Principles of Political Economy and Taxation, Richard D. Irwin, Homewood, Illinois, 1963.

[2] Adam Smith: An Enquiry into the Nature and Causes of Wealth of Nations, Modern Library Edition by Random House, London, 1937, pp. 1-20.

and Trade".[3]

According to the above doctrine, one would have expected Canada (or any other country for that matter) in her strategy of international trade and development, to opt for structuring manufacturing production patterns to take advance of scale and specialization, larger markets and longer production runs. But instead of moving in the direction of such a pattern of manufacturing production, Canadian manufacturing development took an opposite course. The Canadian policy makers and politicians, in fulfillment of broad national objective of maintaining independence from the United States, cementing the country's national unity, as well as under other economic considerations and political pressures, with full disregard for the above closely reasoned doctrine, decided to the use the tariff as an instrument of national policy to create an integrated national economy on the basis of product diversification in Canadian manufacturing.[4] This policy has been a continuing element of Canadian economic development since 1879.[5]

It has been argued by a number of economists that the result of

---

[3]Alfred Marshall: Industry and Trade, London, Macmillan, 1923. pp. 16-23.

[4]J. H. Young: "Comparative Economic Development: Canada and the United States", American Economic Review, May 1955, pp. 80-93. This is not to deny other reasons for the 1879 moves which may have been valid under the circumstances, but the policy of tariff protection has been widely accepted as one of the important factors in the price to be paid for a measure of political unity and independence.

[5]For development of Canadian tariff, see J. H. Young: Canadian Commercial Policy, Royal Commission on Canada's Economic Prospects, Ottawa, Queen's Printer, 1957, pp. 19-40 and pp. 3-10, also see D. H. Fullerton and H. A. Hampson: Canadian Secondary Manufacturing Industry, Royal Commission on Canada's Economic Prospects, Ottawa, Queen's Printer, 1957, particularly pp. 3-10.

such a decision on the part of Canadian policy makers, along with the United States' decision at the time of confederation to adopt a higher tariff policy, has been to confine Canadian producers to their relatively small domestic market and thus prevent them from obtaining economies of mass production and specialized operations.[6] The arguments advanced are that the United States' tariff denies Canadian manufacturers access to their potential markets and thereby constrains the ability of Canadian manufacturers to realize the advantages of larger scale prodcution. On the other hand, the Canadian tariff, by limiting competition and allowing producers high domestic prices behind the tariff wall, encourages product diversification and shorter production runs and thus offers no incentive to producers to acquire scale economies of specialized operations and longer production runs.

It has long been argued by a number of economists and research groups that this inefficient production pattern has been an important factor accounting for lower labour productivity levels in the Canadian manufacturing industries relative to the United States[7] and therefore,

---

[6] There is an impressive amount of evidence on this. See for example: Daly, Keys and Spence: Scale and Specialization in Canadian Manufacturing Industries, Economic Council of Canada, Staff Study No.21, Ottawa, Queen's Printer, 1967; Eastman and Stykolt: "A Model for Studies of Protected Oligopolies," Economic Journal, June, 1960; Fullerton and Hampson: Canadian Secondary Manufacturing Industries, Royal Commission on Canada's Economic Prospects, Queen's Printer, Ottawa, 1957; Eastman and Stykolt: Tariff and Competition in Canada, Macmillan, Toronto, 1967; Wonnacott and Wonnacott: Free Trade Between United States and Canada, The Potential Economic Effects, Harvard Univ. Press, Cambridge, 1967.

[7] See for example Daly, Keys and Spence, op.cit., p. 23; Fullerton and Hampson, op.cit., p. 159 and Economic Council of Canada: Fourth Annual Review, Queen's Printer, Ottawa, 1967, p. 150.

an important factor in real income differentials per employed person and hence in average standards of living between the United States and Canada.[8]

The purpose of this thesis is to test the hypothesis that tariffs have caused lower labour productivity levels in Canadian manufacturing industries relative to those in the United States.[9] The study first establishes a theoretical relationship between the tariff and the relative United States-Canada productivity differences. This is presented at some length in Chapter II, along with a discussion of other hypotheses and factors advanced to explain United States-Canada productivity differentials. Then it measures and compares numerically the productivity differences between the two countries. Following this, an attempt is made to test the hypothesis whether this productivity gap can be explained through the existence of Canadian tariffs.

The model used in the study to examine the effect of the tariff on the United States-Canada manufacturing productivity differentials belongs to the familiar genus of static partial equilibrium models which assumes no cross-effects with respect to third countries. In other words, the noise that might be introduced into the results by the inclusion of third country's tariffs and markets is ignored. If a third country

---

[8]Output per worker is lower in all sectors of the economy. Since manufacturing is one of the most important of these sectors in its contribution to gross national product, lower productivity in this sector is one of the important causes of lower standards of living in Canada.

[9]A detailed statement by the hypothesis can be found in Chapter II, pp. 26-30.

were to be included, the analysis may be expected to change substantially. Consequently, this study should be strictly interpreted as the study of the effect of tariffs on the relative United States-Canada productivity differentials involving only Canada and the United States.

The productivity measure used in this study is a partial productivity measure i.e., the net output (value added) per unit of labour input. A measure of productivity based on a single input has a number of limitations. In addition, the output measure itself is a very involved statistic, and consequently conceptual and practical difficulties arise in its interpretation. Chapter III is, therefore, largely devoted to an examination of the properties of the input and output measures and to assessing what productivity is and what it measures in inter-country and inter-industry comparisons. After an examination of these problems a model for the interpretation of the value added measure is presented and it is concluded that in the context of United States-Canada comparisons these conceptual problems are not of great practical significance and the labour productivity measure will adequately express and provide meaningful comparisons of the relative performance of industries between Canada and the United States.

Since the productivity ratio is altered by changes in the value of both the numerator and the denominator, even small errors in the components of the ratio can conceal or distort true relative productivity performance of industries. It is, therefore, necessary that the measure should be precise. Since the basic output and input data, in the form in which they are available, are not designed for, and are not readily adaptable for over time productivity comparisons, they generally require adjustment as to concept and coverage before they can be regarded as mutually consistent. Chapter IV is, therefore, devoted to an examination of sources and changes in statistical concepts, methods and definitions over time in the two countries, ascertaining their comparability and the direction and magnitude of possible relative bias in the productivity ratios.

The validity of the hypothesis positing a relationship between the tariffs and productivity is tested with respect to both nominal and effective tariffs. The need to consider effective tariffs arises because it is argued that the nominal tariffs do not give a correct indication of the amount of protection afforded a particular industry. Nominal tariffs are simply the schedule rates applied to goods which are imported into Canada. Effective rates, on the other hand, measure the protection for an industry as it adds value to purchased inputs in processing its products and thus takes into account the differences in the tariff rates between the outputs and the inputs of the industry.[10] Chapter V is, therefore, devoted to a discussion of the theory of tariff structure and effective protection afforded the Canadian manufacturing industries of the sample along with various conceptual and statistical problems involved in such computations.

For the purpose of inter-industry and inter-country comparisons of productivity, three alternative samples of the Canadian manufacturing industries are selected. These are broken down into three categories

---

[10] For definitions and a model for the computation of nominal and effective tariffs see Chapter V, pp. 84-88.

which are characterised as export, domestic and protected industries. Comparable samples (not identical in the sense of above Canadian industry categories) are chosen for the United States. Export industries are defined as those industries in which Canada has a comparative advantage, usually realizing efficiencies from economies of scale and specialization. Protected or import competing industries by definition are those in which Canada has a comparative disadvantage; under free trade conditions many of these industries would have been eliminated and the industry would have been importing these products instead, or these industries would have been forced to improve their efficiency if they were to stay in the market. Such industries, as determined by natural economic forces, are not suited to the country and their productivity is usually very low. Nevertheless, their existence may be considered desirable on many economic, political, social and other grounds. Domestic industries, again by definition, are those in which comparative advantage or disadvantage is so low that goods cannot be profitably shipped from one country to the other, when consideration is given to cost of transportation. In other words, in this category fall those industries for which difference in marginal cost of production in the two countries is less than the transport charges. Hence goods cannot economically be shipped from one country to the other and must be consumed domestically.

The above distinction between the three categories of industries appears to be appropriate for, firstly, it is in conformity with contemporary trade theory and secondly, as will be seen in the following pages, this distinction is also very well suited to the purpose at hand.

For the purpose of this thesis the three categories of industries are characterized in this fasion. The protected industries are those which in 1963 enjoyed a nominal tariff of 17 percent or more and exported less than 10 percent of domestic output; export industries are those which in 1963 exported 20 percent or more of domestic output but received less than 15 percent tariff protection,[11] and domestic industries are those of which over 80 percent of output was consumed domestically and which received nominal tariff protection of less than 15 percent. Since the purpose of the tariff is restrictive or protective, the tariff level is more relevant to protected industries. In the case of export and domestic industries the percentage of products exported or consumed domestically would appear to be a more important criterion since these industries rest on comparative advantage and low comparative advantage or disadvantage respectively.

There were two reasons which led to adoption of the above criterion for classification. First, each industry in the sample produces a range of different products. On some of these it may have a comparative advantage, on others not. Thus in almost all industries there will be some export, some import and some domestic goods. Also, there is hardly a single industry in the sample which does not enjoy some tariff protection. Moreover, in most cases no such thing as a

---

[11] The only exception in the sample to this rule is the Distillery industry which in 1963 enjoyed a nominal tariff protection of 20 percent and exported about 48 percent of the domestic output. According to the criterion adopted, this industry could have been included in either export or protected category, but since for an export industry the percentage of domestic output exported is relatively more important a criterion than the tariff protection afforded, this industry seemed to fit in better in the export category. It was, therefore, decided to include this industry in the export category.

single tariff on an industry output exists. Typically, various products of an industry have different rates. To determine the tariff on each individual product would be a statistical undertaking of mammoth proportions. As an acceptable compromise of statistical feasibility it was decided to approach the problem of protection by industry. This measure would thus combine the numerous tariff rates. Now since all industries of the sample are subject to import duty, mere inclusion of an industry on the dutiable list of tariff schedules cannot be interpreted as protection. It then becomes important to assess the burden of these duties and the height of the tariff thus becomes an important consideration in determining protected industries.[12] In cases where tariff rates are low they can be regarded as revenue producing rather than restrictive or protective measures. Thus because of these reasons, we had to adopt somewhat arbitrarily, a criterion for distinguishing export, protected and domestic industries on the basis of percentage of products exported or imported and tariff protection afforded. This classification criterion has the additional advantage that it allowed for a sufficient number (more or less equal) of industries in each category. From a recently

---

[12]Strictly speaking, not even the burden of the tariff would appear to be important in the determination of protected or non-protected industries. Since the purpose of the tariff is restrictive, what is important is how effectively any level of tariff can restrict the import of competing products. Some products may be imported even if tariffs were high, and other products may not be imported even if tariffs were low. Hence not all the products of an industry that would be subject to high or low duty if imported, can, therefore, be regarded as protected or non-protected. Thus protection from any level will depend on price elasticities and not on height of the tariff. But since we do not have information about the elasticities of various products of an industry, of necessity this important consideration is ignored in the determination of protected industries and the rate of 17 percent as the minimum that could be considered protective is arbitrarily chosen.

published Economic Council study[13] containing schedules of tariff rates for most industries classified in the Canadian Manufacturing Manual for 1963, we chose 10 appropriate industries to constitute the protected group of our sample. For selecting the export and domestic groups, the percentage of output of individual industries exported or domestically consumed in 1963 was computed and, with the help of tariff schedules, appropriate industries to make these groups were chosen.

We have selected the protected industry group on the basis of nominal rather than effective rates. In doing so we have simply followed the traditional practice. However, if we had decided in favour of effective rates as our criterion instead of nominal rates, our protected industry group would have still remained the same, with the only exception being the sugar refining industry which receives negative effective protection and therefore, would have been treated as a nonprotected industry.[14] But adopting effective rates as the selection criterion for the protected group would have resulted in difficulties with respect to export industries. If we adopt the effective rates criterion, then three industries of the export group, namely, Pulp and Paper; Flour Mills and Veneer and Plywood industries will have to be treated as protected industries. This would seem to be contrary to reality, for these three industries are all important export industries of Canada. Considering these problems, we

---

[13] James R. Melvin and Bruce W. Wilkinson: Effective Protection in the Canadian Economy, Staff Study No. 9, Economic Council of Canada, Ottawa, Queen's Printer, 1968.

[14] For nominal and effective tariff afforded different Canadian industries in the sample see Chapter V, pp. 95-97.

decided to retain the traditional criteria for selecting industries for the protected group.

Productivity differences and annual rates of change of productivity are measured in the two countries at points of time 1949-52, 1962-65 and 1965 and over the period interval 1949-52 and 1962-65 in current and constant dollars. These periods are chosen for one important reason, that since major tariff changes in Canada occurred in 1947 and 1960, these two periods appeared to be ideally suited for testing the hypothesis.

Productivity comparisons and annual rates of change in productivity are measured in three alternative ways - (1) value added per production worker; (2) value added per employee; and (3) value added per production man-hour. This is presented and analysed in Chapter VI. A basic assumption of this thesis is that producers in Canadian protected industries price up to the U.S. price plus the Canadian tariff. The Canadian value added published data for protected industries are, therefore, believed to be over-stated relative to the American data for comparable industries by the amount of the Canadian tariff. A downward adjustment is, therefore, made to the published Canadian data for the protected industries to bring it to a comparable level with the American data.[15] The above calculations are derived from both the published as well as adjusted data and are presented separately. Further, under free trade conditions, the price level of export and import industries is nearly the same throughout the trading area, the difference being equal to cost of transportation. Since the export and import shipment values

[15]For the method of adjustment for the price-inflation effect of the Canadian tariff see Chapter VI, pp. 126-127.

are on f.o.b. at plant basis, it is believed that the reported value added of Canadian export industries is understated, and of import competing industries overstated relative to the comparable industries in the United States. While it is not possible to make adjustment in the published data for this under and overstatement, the results are analyzed bearing in mind this biasing influence. For the Canadian domestic industries no definite conclusion is possible because their prices are independent of the American prices.

The test of the hypothesis that Canadian tariffs have caused lower labour productivity levels in Canada relative to the United States constitutes the subject matter of Chapter VII. The hypothesis is tested in three alternative ways. The first method compares the average productivity levels in the Canadian domestic, export and protected industry categories to determine whether the protected industries are less efficient than the other two categories. Since the tariff mainly affects the protected industries, if the suggested hypothesis is true, we would expect to find lower productivity levels in the protected industries than in the export and domestic industries. The second method of examination compares levels of productivity in the Canadian industry categories (export, domestic and protected) with those of comparable listings in the United States (<u>not necessarily</u> export, domestic and protected category for the United States) to determine whether the productivity performance level of the Canadian protected industry category is much lower than that of the export and domestic categories relative to the counterpart industries in the United States. Since the Canadian tariff affects mainly the protected industries and the other two categories largely remain unaffected, then if the suggested hypothesis is true, we would again expect the United

States-Canada productivity gap to be larger in Canada's protected industries than either in export or domestic industries. Both these tests are run in current and constant dollars utilizing the three sets of data. In addition to the above two tests, the technique of correlation and regression analysis is also used to see if the tariffs and the United States-Canada productivity differences are related variables. First, regressions are run for the entire sample, then the sample is disaggregated into export, domestic and protected groups, with separate regressions being run for each group. All these tests are run using the three productivity measurements.

Finally, the hypothesis is tested by relating changes in the tariffs and productivity to determine whether reductions in tariffs lead to increase in productivity. If the hypothesis that Canadian tariffs cause relatively low productivity levels in Canada is true, then we would expect that industries for which the greatest tariff reductions have occured in Canada will also be the ones with the greatest gains in productivity. To determine the relationship between the rate of change of productivity and the rate of change of tariffs, correlation and regression coefficients are computed. This is done with respect to both--nominal and effective-tariffs. Here again regressions are run twice--in the first instance for the entire sample and then for the disaggregated samples.

In the final chapter a brief summary of earlier discussion and the main findings of the study are reported.

CHAPTER II

THE TARIFF, BEHAVIOUR AND THE ORGANIZATION OF THE CANADIAN MANUFACTURING INDUSTRIES

This chapter presents a brief survey of the views expressed by economists about the lower labour productivity levels in Canada relative to the United States. The chapter first provides evidence on the historical existance of a productivity gap between the manufacturing sectors of the Canadian and American economies and distinguishes between the hypotheses advanced by various writers on the subject. It then examines in greater detail the way in which the American and Canadian tariffs affect Canadian manufacturing productivity levels relative to the United States. Finally, it examines other factors which, although rarely accorded the status of general hypotheses, are believed to explain at least part of the United States-Canada productivity gap.

It is a well established fact that a wide disparity in productivity levels has persisted between Canada and the United States for several generations.[1] As far back as 1952 Maddison made comparisons for a number of manufacturing industries between the United States and Canada and found Canadian productivity per production worker in 1935 between 33 to 47 percent below that of the United States, with the gap generally narrowing down between 1935-1947.[2] About a decade ago the

---

[1]See Economic Council of Canada, Second Annual Review, Chapter IV, Queen's Printer, Ottawa, 1965 and D. Walters: Canadian Income Levels and Growth: An International Perspective, Economic Council of Canada, Staff Study No. 23, Queen's Printer, Ottawa, 1968, particularly Chapters XIV and XV.

[2]A. Maddison: "Productivity in Canada, the United Kingdom and the United States", Oxford Economic Papers, Oct. 1952, pp. 237-38.

Royal Commission on Canada's Economic Prospects also addressed itself to a number of aspects of the question of productivity differences between Canada and the United States and came to the conclusion that the "man-hour comparison of secondary manufacturing productivity in Canada and the United States suggests that our net output is no less than 35-40 percent below that in the same sectors of the American economy".[3] A recent study, using as its measure output per employed person, found that a difference of this magnitude has persisted to the present.[4] Another recent Economic Council Study, using the Cobb-Douglas type production function method, found Canadian productivity per employee 28 percent below the American levels.[5]

Manufacturing is an important sector of the Canadian economy; in terms of employment this sector comprises about 25 percent of the total size of the economy and contributes about 26 percent to the nation's gross domestic product,[6] and therefore, its productivity performance is of crucial importance to the economy. Not only is there a productivity gap of one third between the manufacturing sectors of Canada and the United States, the gap in the productivity level of manufacturing sectors of the two economies is larger than for the two

---

[3] D. M. Fullerton and H. A. Hampson: Canadian Secondary Manufacturing Industries, Royal Commission on Canada's Economic Prospects, Queen's Printer, 1957, Ottawa, p. 154.

[4] D. J. Daley, B. A. Keys and E. J. Spence: Scale and Specialization in Canadian Manufacturing Industries, Staff Study No. 21, Economic Council of Canada, Queen's Printer, Ottawa, March 1967, p. 13.

[5] E. C. West: Canada-United States Price and Productivity Differences in Manufacturing Industries, 1963, Economic Council of Canada, Information Canada, Ottawa, 1971, p. 35.

[6] See Constance Sorrentino: "Employment Shifts in 10 Countries", Monthly Labour Review, October 1971, p. 5 and Dominion Bureau of Statistics: National Accounts: Income and Expenditure, 1967, Cat. No. 13-201, Queen's Printer, Ottawa, 1968, p. 30.

economies as a whole and thus is an important element in the overall 20 to 25 percent productivity gap between the two countries.[7] The productivity gap in manufacturing between the United States and Canada of around 30 to 35 percent is both large and significant. This is a wider gap than average earnings - wages in Canada are about 19 percent below the level of the United States.[8] Since the size of the productivity gap is larger than the earning gap, it works out that labour costs per unit of output are higher in Canada in spite of lower wage rates.

Manufacturing industries in Canada can be broadly classified into three categories -- export, domestic and protected or import competing. The domestic sector has essentially a national or local market, whereas export and protected sectors are linked to international markets. In 1963, of the entire manufacturing sector of the economy, the domestic group contributed about two thirds of the manufacturing output and the other two categories comprised one-third.[9] The individual industries belonging to these three categories show marked variations in productivity per man.[10] There are some in which the Canadian figures compare favourably to those of the United States, but in a majority of cases Canadian figures are substantially below the United States' level and thus responsible for the overall productivity gap in the manufacturing

---

[7] Economic Ecouncil of Canada: Fourth Annual Review, Queen's Printer, Ottawa, 1967, pp. 147-48.

[8] Daly, Keys and Spence, op.cit., p.14.

[9] See B. W. Wilkinson: Canada's International Trade: An Analysis of Recent Trends and Patterns, The Private Planning Association of Canada, 1968, Table 29, p. 84.

[10] For productivity of individual industries see Tables 6.2, 6.8 and Appendix Tables G and H.

sectors of the two countries.

What are the factors contributing to this productivity gap? In general many factors have a bearing on productivity levels. These include geographical and climatic factors, educational attainments and training of the work force, quantity and quality of capital equipment, innovation, industrial technology, scale of plant, market size, degree of specialization, length of production runs, environmental and institutional factors, etc.[11] In reference to the United States-Canada manufacturing productivity differences, undoubtedly many of the general factors outlined above have some influence. Indeed, there is no single factor which will explain the productivity difference. Also, explanations will vary for export, domestic and protected categories. In an ultimate analysis only a definitive study of the individual industries concerned in each category will reveal all the specific factors - physical, economic, institutional, etc. which account for such differences. What at best can be done is to enumerate the various factors which have been put forward to explain the productivity difference. Even with such a cataloguing of causal factors, it is difficult to appraise accurately the relative importance of the various factors contributing to the differentials in productivity. It is likely that no single factor is paramount. There is a strong interaction between the various factors and they are, therefore, difficult to group into clear cut categories. Nevertheless, in the following pages we discuss some of the more

[11] For general factors affecting productivity between countries, see E. F. Denison: Sources of Economic Growth and Alternatives Before us, New York, Committee on Economic Development, 1962 and Why Growth Rates Differ: Post-War Experience of Nine European Countries, Brookings Institution, Washington, 1967.

important general factors and theories advanced to explain this productivity difference.

One element which is sometimes deemed responsible for high productivity in the United States vis-a-vis Canada is the more extensive and intensive utilization of capital in the United States relative to Canadian production.[12] Indeed America's pace of development is attributable to the 'universal application of machinery effected with a rapidity which is altogether unprecedented'. While the United States is widely regarded as a nation having the highest amount of capital per worker in the world, the truth is that capital per worker is generally higher in Canada than in the United States. In manufacturing the stock of machinery and equipment per worker is about the same in the United States and Canada, whereas when taking machinery, equipment and structures together, capital per employed person is about 10 - 15 percent higher in Canada.[13] Thus the proposition that a basic lack of capital per worker in Canada has been a significant factor in the United States-Canada manufacturing productivity differences does not receive support from this comparison.[14] These data relate to quantity of capital only and

---

[12]This hypothesis is suggested in J. H. Young: Some Aspects of Canadian Economic Development, unpublished Ph.D. Dissertation, Cambridge, 1955, Quoted by Eastman and Stykolt in their article: "A model for the study of Protected Oligopolies" Economic Journal, June 1960, p. 336.

[13]Economic Council of Canada: Second Annual Review, Queen's Printer, Ottawa, 1965, pp. 59-60.

[14]See also H. N. Lithwick: Prices,Productivity and Canadian Competitive Position, Canadian Trade Committee, Private Planning Association of Canada,1967, p.10. The Lithwick study indicates a level of net capital per worker some 29 percent higher in Canadian manufacturing. See also E. C. West, op.cit., Appendix Table D-I, p.79. Also see D. Walters, op.cit., p.6 where she shows that annual average rate of growth of gross capital has been considerably higher in Canada than in the United States.

do not indicate differences in the quality as reflected by the average vintage of capital or differences in technology. The age of equipment in Canada and the United States is broadly similar and there also is not much difference in technology as most of the machinery and equipment is of American origin.[15] Thus from these comparisons, the "lack of capital" hypothesis would appear to be a "naive man in the street" type of view.

Another popular theory advanced to explain the lower Canadian productivity lies in the barriers to economies of large scale production. In Canada there is a lack of specialized production, with the manufacturing sector exhibiting a wide range of manufacturing plants of greater diversification of products and shorter production runs than in their counterparts in the United States.[16] Shorter production runs usually result in inefficiencies in the use of labour and capital as a result of frequent change overs for individual products, requiring the halting of production to adjust or clean the equipment, and more "down time" to move different models or types of products through production lines. This limited extent of specialization and shorter production runs is felt by some economists to be a pervasive factor affecting the cost and

---

[15] Dorothy Walters: ibid, p. 80.

[16] This is suggested by a number of studies. See for example, Fullerton and Hampson, op. cit., particularly pp. 61-93 and 147-62; H. E. English: Industrial Structure in Canada's International Competitive Position: A study of factors affecting Economies of scale and specialization in Canadian Manufacturing, Private Planning Association of Canada, Montreal, 1963, p. 2. Similar evidence is also available in F. A. Knox, C. L. Barber and D. W. Slater: Canadian Electrical Manufacturing Industry, Canadian Electrical Manufacturing Association, 1955; Eastman and Stykolt: Tariff and Competition in Canada, Macmillan, Toronto, 1967, Part 1, Economic Council of Canada, Fourth Annual Review, op. cit., pp. 151-72.

productivity of manufacturing in Canada.[17] Thus the lower manufacturing productivity in Canada in considerable part reflects the way production is organized.[18] Economists, such as Fullerton and Hampson for example, have suggested that some three fourths of the productivity differential of 35 to 40 percent between Canada and the United States is attributable to the smaller scale and less specialized nature of manufacturing operations in Canada.[19]

There are differences of opinion among economists about the forces which have prevented the development of a more specialized and rational system of production. One of the more important theories advanced to explain this lack of specialization is the famous market size hypothesis.[20] One is often reminded of Canada's small and scattered population and equally often is asked how firms supplying such a market can hope to secure economies of mass production. An argument often put forward is that the United States owes her higher productivity to her big markets which allow greater specialization. It is argued that the modern methods of production are founded in the use of machinery and equipment in large blocks. In the face of the resulting indivisibi-

---

[17] Daly, Keys and Spence, op.cit., p.23. These authors have collected quantitative and qualitative evidence through interviews with business firms to support this assertion.

[18] D. J.Daly and W. Walters: "Factors in Canada-United States Real Income Differentials", International Review of Income and Wealth, Dec., 1967, pp. 285-310.

[19] Fullerton and Hampson, op.cit., p. 159.

[20] Fullerton and Hampson, ibid., p. 63. See also Eastman and Stykolt: "A model for the study of protected Oligopolies", Economic Journal, June 1960 and G. D. Sutton: "Productivity in Canada", Canadian Journal of Economics and Political Science, May, 1953; Daly, Keys and Spence, op.cit., in particular pp. 16-20.

lities and the need for a high degree of specialization in the application of human and mechanical efforts, the smaller Canadian market constitutes a handicap.

The size of the market also affects the potential size of firms and plants, costs and prices. A recurring observation in studies of manufacturing industries in Canada is that the costs and prices of many manufactured products are higher than they would be if the best contemporary techniques were used.[21] To be precise, total costs of production are about 20 -35 percent higher in Canada than in the United States.[22] It is argued that the cause of this high cost is a "scale and output below the best practice scale".[23] The small scale of production of a high proportion of plant does not exhaust available economies of large scale production. This is reflected in a significantly lower level of output in relation to total factor inputs in Canada. Thus, it has been suggested that the smaller size of Canadian market for manufacturing goods necessarily results in sub-optimal scale of plants with a consequent loss of productivity.[24] "The machinery used in Canada is

---

[21] Eastman and Stykolt: Tariff and Competition in Canada, Macmillan, Toronto, 1967, p. 13. Considerable evidence is provided on this by J. H. Young also; See his Canadian Commercial Policy, Ottawa, Queen's Printer, 1955. Appendix A shows a pattern of fairly high prices for manufactured goods. See also A. E.Safarian: Foreign Ownership of Canadian Industry,McGraw Hill, Toronto, 1960, particularly Chapter VIII: In this study Safarian found cost in two thirds of industries typically higher in Canada.

[22] Daly, Keys and Spence, op.cit., p. 12.

[23] Eastman and Stykolt, op.cit., p. 13.

[24] Fullerton and Hampson, op.cit., pp. 158-60.

often less effective because indivisibilities in the use of more efficient methods can be overcome only at a higher level of production than exists in Canada. Furthermore, the most automatic equipment, which is sometimes the most efficient, is also most costly to reset when a change in size or style is required. The alternative sometimes adopted in Canada to using less efficient and less fully automatic equipment is to acquire equipment which is most efficient and to bear the cost of conversion and resetting or of keeping the machinery idle for part of the time when runs are insufficiently long to operate it continuously".[25] Eastman and Stykolt compared the actual plant size for a selected number of industries with the plant size that gave the lowest average cost and frequently found capacity of Canadian plants below the optimum.[26]

Although the market size hypothesis has traditionally been an important explanation for lack of specialization in Canadian manufacturing, recent empirical studies seem to suggest that the Canadian domestic market itself is not a major limitation to the size and success of many manufacturing industries.[27] While it is true that the Canadian market is, in general, much more dispersed and less dense than the American market, more than sixty percent of it is located in central Canada, and this market as a whole has tripled in size in the interwar years--the combined result of the doubling of population and fifty percent

---

[25]Eastman and Stykolt: "A Model for the Study of Protected Oligopolies", Economic Journal, June, 1960, p. 337.

[26]Eastman and Stykolt: Tariff and Competition in Canada, Macmillan, Toronto, 1967, Part II.

[27]English, op.cit., particularly Chapters I and V.

increase in per capita real income.[28] The fact that market oriented manufacturing has grown more rapidly than resource based processing industries since the war[29] reflects, among other things, the increased size of the domestic market. The significance of this change can be seen from the estimates of an international symposium of economists which suggested that at some point between 10 and 15 million people a nation achieves a home market base capable of supporting production of the main lines of manufacturing.[30] The market of central Canada, to which this kind of standard appropriately applies, has grown from six to about twelve million people since the late 1920's, with one of the world's highest per capita spending capacities. To a country with a population of this size, the market size hypothesis should hardly apply. These observations suggest that the size of Canadian market is no longer as significant a constraint in achieving economies of scale of production as was previously true. Where problems of inadequate firm or plant size exist, the reason should be sought in the factors which determine the number of firms which share the Canadian market, and in the American and Canadian Commercial policies which determine the extent to which imports share the domestic market and Canadian exports exploit the United States' market.[31]

Another argument advanced for productivity differentials is that "production diversification represents an attempt by Canadian producers

---

[28]English, Ibid., pp. 6-7.

[29]English, Ibid., p. X

[30]E. A. G. Robinson (ed.): Economic Consequences of the size of Nations, International Economic Association, London, 1960, pp. xiii - xxii.

[31]English, op.cit., p. X.

to reduce the handicap of short runs in our relatively small and fragmented market".[32] It is argued that specialization does not provide the producers with enough volume of output to keep down their overhead and selling costs and, therefore, it makes sense to manufacturers to use the facilities of a plant for the manufacture of more than one product. Since the machinery and techniques used in Canada are often the most efficient types of American origin designed for higher scales of production than exist in small sized Canadian market, instead of keeping the machinery idle for part of the time when the runs are insufficiently large to exhaust the capacity of the equipment, the manufacturers produce a diversified output and achieve to some extent economies of multi-product operations. The economies of selling a range of products may also partly explain lack of specialization in production. If the firms were to specialize only in one product, then this output must bear the entire overhead cost (fixed cost). Given the scale of the plant, the greater the output of the firm (which product diversification allows) the greater the efficiency of fixed resources (as the fixed costs are spread over more units of output and consequently each unit bears a smaller share). Hence for larger outputs, average fixed cost and average total cost will be declining. Also, assuming selling cost to be a variable cost, the average and marginal costs associated with selling and advertising will be declining up to a certain stage as larger outputs are sold. Hence the producers prefer to produce a diversified output rather than specialize in one product.

---

[32] Fullerton and Hampson, op.cit., p. 74.

An important impediment to greater specialization in Canada lies in the far reaching effect of advertising on product differentiation.[33] Canadian buyers, like their American counterparts, have brand preferences, and since Canadian consumers' tastes and preferences are shaped and moulded to a great extent by American advertising, they expect a variety of products available in Canada similar to that in the United States. The Canadian manufacturers have sought to provide this spectrum of commodities through production differentiation. In many instances, product distributors have contributed to production diversification by demanding a complete product line.[34] Thus, the manufacturer is compelled to produce a greater variety of items than he can produce efficiently, but which must be carried for competitive reasons. The manufacturers, instead of importing these products, prefer to produce them domestically, because the Canadian tariff makes such operations possible by protecting them from imports of similar goods at the lower world prices.[35]

Many other factors also have combined to produce a relatively limited extent of specialization within Canadian manufacturing plants.[36] Among the more important ones have been: (1) Canadian commercial policy historically designed to foster diversity of manufacturing activity in Canada; (2) fears and risks, even in situations where penetration into the foreign markets could have been possible on the basis of greater specialization of production activity, that foreign trade barriers will

---

[33] Fullerton and Hampson, <u>Ibid</u>., p. 74.

[34] Fullerton and Hampson, <u>Ibid</u>., p. 74

[35] An elaborated discussion of this argument can be found in succeeding pages of this thesis.

[36] For a cataloguing of these factors see Daly, Keys and Spence, <u>op.cit</u>., pp. 23-24.

be raised to prevent expansion of sales into these markets; (3) uncertainties about the applications of restrictive trade practices and policies tending to restrain greater specialization and rationalization, etc. In some cases diversified output is considered safer and the Canadian manufacturer does not want to find himself at the mercy of one or two buyers who may threaten to switch to readily available imports as a bargaining weapon.[37]

The most persuasive hypothesis advanced concerns the effect of the tariff--both the foreign and domestic--which is typically regarded as the most striking factor tending to limit greater specialization and longer production runs--a factor that at the same time increases costs and depresses Canadian productivity levels relative to the United States.[38] It is argued by some economists that the tariffs have encouraged an excessive number of producers and an insufficient degree of specialization in Canadian markets. On the one hand, barriers to entry into the United States' markets have intensified the dependence of the Canadian manufacturers on the relatively small Canadian market and have prevented them from obtaining maximum economies of mass production. On the other hand, the Canadian tariff shelters inefficiency in Canadian industries over a wide range of protected products, thus offering "no incentive for producers to rationalize their production (e.g., via larger plants or fewer lines and longer production runs in existing plants) and acquire

---

[37] Fullerton and Hampson, op. cit., pp. 77-78.

[38] Support to this hypothesis is found in several works. See for example Fullerton and Hampson, Ibid., p. 77; Wonnacott and Wonnacott: op.cit. See also Eastman and Stykolt: Tariff and Competition in Canada, Macmillan, Toronto, 1967; Daly, Keys and Spence, op.cit., pp. 9-53.

even those scale economies theoretically available within the Canadian market".[39] It is contended that the foreign (U.S.) tariff creates a small market in Canada separate from the larger United States' market, whereas, the Canadian tariff on the other hand, permits the manufacturers to fix a high price to cover the high cost of production and marketing, or permits a continuance of high profits without the risk of attracting imports.[40]

Thus, ceteris paribus, the Canadian tariff permits high prices and insofar as high prices are set "encourages the entry of plants and firms even if they must enter at a scale too small to be efficient, because the increment to total output made by an efficient unit would depress prices to an unprofitable level".[41] In other words, the tariff, by raising prices of a wide range of manufactured products, makes it possible and profitable for Canadian firms and plants to produce products in a wider range than would be possible with a lower tariff or free trade. The size of machinery and size of plants that one might find profitable to use in a small protected market could be less than in a more competitive market. The effects of generally less than optimum plant and more diversified production runs are reflected in a lower level of output in relation to inputs, as well as higher prices for manufactured products than in the United States. As long as significant tariffs persist it is not profitable to shift towards more specialization and larger production

---

[39] Melvin and Wilkinson, op.cit., p. 54.

[40] Eastman and Stykolt: "A model for the study of Protected Oligopoles", Economic Journal, June 1960, p. 338.

[41] H. C. Eastman: "The Canadian Tariff and Efficiency of the Canadian Economy", American Economic Review, May 1964, p. 438.

runs. In short, it is profitable for Canadian plants to be less productive than plants in the United States.

Since the Canadian tariff allows the domestic producers a margin by which their prices may exceed those of foreign producers, consequently, although there may be more plants (many of which are of less than optimum size) than is necessary to serve the domestic market, even the more efficient producers (who are likely enjoying quite good profits) may have little incentive to build a plant of most efficient size and reduce their prices below the foreign price plus the Canadian tariff. "Such a policy could easily result in a costly price war lasting until one or more firms were driven out of operation. The initiating firm could not be certain that it would be one of those remaining. Moreover, the high degree of foreign ownership of Canadian industry augments the problem. Few domestically owned firms would want to commence a price battle with a company having great international resources backing it. Nor would foreign subsidiaries wish to cause a struggle in Canada which might spread abroad."[42] Consequently, a less than optimum scale plant may be what the firm decides to construct.

Furthermore, even for those plants which appear to be of at least minimum optimum size, in terms of investment necessary, the firm may still have little incentive to reduce the number of product lines to achieve the length of production runs necessary for minimum unit costs because of protection afforded by tariffs. Hence the firms may be unwilling to reduce production diversification and expand output of

---

[42]Wilkinson, op.cit., p. 111. See also H. C. Eastman: "Some Aspects of Tariff Protection in Canada"; International Journal, Summer 1963, pp. 356-358.

particular items in an attempt to reduce unit costs. In order for such a policy to be profitable in the absence of exports (which the American tariffs limit) "the firms would have to secure a large slice of the total market for those lines which it chooses to specialize in, and this may again involve an expensive price war which it may or may not win. It also incurs the additional risk of being less diversified. Moreover, reducing the number of its lines may raise selling costs and meet with disfavour from buyers wanting to buy from suppliers with "full lines". Thus the incentive is lacking for any single firm to undertake a program of limiting its product lines."[43]

The argument of the tariff-productivity hypothesis may now be summarised.[44] The argument has been advanced that tariffs of the two countries--the United States and Canada-have prevented the structuring of the Canadian manufacturing production patterns to take advantage of scale and specialization, larger market and longer production runs. To the extent that scale and specialization and length of production runs are factors in productivity performance, the result of the two tariffs has been to depress Canadian productivity levels relative to the United States. On the one hand, the American tariff, by creating barriers to entry into larger U.S. markets, confines the Canadian manufacturers to relatively small Canadian market, thereby preventing them from achieving cost cutting economies of larger scale production and specialized operations. On the other hand, the Canadian tariff,

---

[43] Wilkinson, op.cit., p. 112.

[44] Mathematical formulation of the hypothesis and specification of relationships between the variables can be found in Chapter VII.

by limiting competition and raising the price of protected goods behind the tariff wall, encourages excessive numbers of producers (many of them with less than optimum plant), diversified output and shorter production runs. Thus the tariff, by allowing producers high domestic prices without the risk of attracting imports, causes protected industries to expand and attract more factors of production in an employment where their marginal productivity is lower and thus induces the economy to move from a higher level of productivity to a lower level.

But while the Canadian tariff is considered important in causing lower productivity levels in Canada, this hypothesis explains lower productivity levels only in one segment of the manufacturing sector, that is, the protected or import competing industries, for it is only this category of industries which benefits from tariffs. For lower productivity in other categories of industries, some other explanation must be found.

Other factors affecting productivity differences between the United States and Canada may now be briefly touched upon. In most cases their effects on productivity are less tangible and less measurable than the ones already discussed above, and it is perhaps for this reason they are rarely accorded the status of general hypotheses in explanation of United States-Canada manufacturing productivity differences. Yet their influence is often stressed, particularly so where their interactions with one another or with the equipment, plant or market factors are considered.

One factor often noted is that differences in the two countries exist in the educational attainment of the labour force. There is generally a lower average level of education in Canada relative to the

United States. By and large, Canada has not sent as many of its young people to schools as in the United States. For example, in 1951-52 secondary school enrollment as a percentage of the population age group 14 to 17 was 46 percent in Canada compared with 78 percent in the United States.[45] In 1965 the share of labour force with some post-secondary education was only half as large in Canada as in the United States.[46] It is also true that the average years of schooling is higher in the United States than in Canada and the United States has relatively a larger proportion of university graduates in its labour force.[47]

In addition, the role of technical and other non-formal education has received substantially less emphasis and resources in Canada than in the United States.[48] If recognition is given to the fact that education possesses intrinsic values as a factor enhancing the quality of the labour force, stimulating creative talent and productive capacities, that the new technology requires education and skill and that productivity is jeopardised by shortage of qualified and skilled manpower, then the fact that striking differences exist in the educational attainments of the labour force in the two countries may help explain differences in productivity between the two countries.

---

[45]Gordon W. Bertram: The Contribution of Education to Economic Growth , Economic Council of Canada, Staff Study No.12, Queen's Printer, Ottawa, 1966, p.61.

[46]Dorothy Walters, op. cit., p. 64.

[47]Dorothy Walters, Ibid., pp. 53-54.

[48]Dorothy Walters, Ibid., p. 64.

Differences between the two countries in management's approach to productivity problems and in worker attitude and practices have often been commented upon. Management's role as a coordinator of activities, as a provider of incentives to workers and as a transmitter of new technology from outside into the plant has a strong bearing on productivity performance . One of the important characteristics of North American business is the skill, flexibility and enterprise of its leaders. The argument is advanced that Canadian management is not quite as able, aggressive, productivity conscious and ready to adapt new ideas and new techniques as its American counterpart. There is obviously little concrete data by which to judge the relative quality of Canadian and American management, but the evidence submitted to the Royal Commission on Canada's Economic Prospects suggests that on the whole there is some truth in the view that management in Canadian Industry is somewhat less progressive and forward looking than that of its counterparts in the United States.[49] Also, it is relevant to note that the educational attainment of the management group is significantly lower in Canada than in the United States.[50] It is also contended that the American management is comprised to a greater extent of men with technical training and makes greater use of highly trained specialists in filling its advisory and supervisory needs. Unfortunately, to our knowledge, there is no empirical evidence to support this observation, but the statements made by Canadian management consultants from time to time appearing in

---

[49]Fullerton and Hampson, op. cit., pp. 138-143., see also Wilkinson, op. cit., pp. 152-155.

[50]Economic Council of Canada, op. cit., p. 62; Daly, Keys and Spence, op. cit., p. 36.

business newspapers and magazines indicate that there is increasing recognition and concern about the need for more highly trained personnel for future management of Canadian business as a basis for more aggressive and imaginative approaches to risk taking, innovation, new product development and marketing.[51] These statements appear suggestive of the significance of management in accounting for the productivity gap between the United States and Canada.

The fact that the United States invests much more heavily in research and development may also be of major significance. Thus total research and development expenditure in manufacturing in Canada in 1963 was only 163 million dollars, where as in the United States in 1962, it was 11.3 billion dollars in the same sector of the economy.[52] If we assume research expenditures as productive as capital, this may be a relevant consideration in explaining the lagging productivity performance of Canada relative to the United States. Though it is true that Canada can borrow much of this new technology relatively cost free, the new technology may not be as efficient for a smaller scale economy.

An assessment of the relative importance of the various factors held responsible to explain the productivity gap is rather difficult and will not be attempted here. With respect to all of them, however, only one thing can be said with certainty: that they register their effect not in isolation but through complex interaction with each other.

---

[51] See, for example, Thomas Kubicek "A Plan for Professional Management", Canadian Business, October 1967. See also William Preshing: "The Manager's Role in Executive Development", Canadian Business, May 1968 and "Get More from Management Training", November 1966.

[52] Lithwick, op. cit., p. 14.

CHAPTER III

CONCEPTS, MEASUREMENT OF PRODUCTIVITY AND INTERNATIONAL COMPARISONS

This chapter essentially deals with a single question: What is productivity and what does it measure in inter-country and inter-industry comparisons. In dealing with this question first a naive definition of productivity is advanced, then attention is focused on input and output measures. After an examination of conceptual and statistical problems involved in the interpretation of these measures an answer is provided to the question of what productivity is and what it measures. Finally a model for the interpretation of the output measure is presented.

Definition of Productivity

Productivity may be defined as the ratio between the output and the input of resources used up in the process of production. Within this broad definition, however, there can be a considerable diversity of approaches. The output may be related to the input of a single resource to produce what is termed a partial productivity measure. Or it may be related to a combination of resource inputs to give what is called total factor productivity. But this definition of productivity is rather loose and open to several interpretations according to the meaning the terms "output" and "input" take. A rigorous definition of productivity is, therefore, deferred until the output and input measures have been properly examined. The following discussion will then examine the input and output measures.

The Input Measure

The productivity measure used in this paper essentially exhibits the relationship between output and labour input, hence is more properly referred to as labour productivity. This ratio is used to evaluate how well the labour input is used to provide an approximation of the overall effectiveness of the production process. This effectiveness of labour use as a measure of productivity is used to examine (1) the level and changes in performance of a given industry; (2) the relative measure of performances of the same industry in the two countries; and (3) to show relative performance of different industries within a country.

Since labour productivity is a ratio, its value can be influenced through changes in either the numerator or the denominator. These changes could occur due to changes in statistical concepts; due to problems associated with measuring the units; or due to real changes in the units measured which are free from the effect of changes in statistical concepts and other illusory changes in the numerator and the denominator. It is a change in labour productivity due to real changes which is pertinent to evaluating the effectiveness with which labour is used and it is with this change that the present project is concerned.

It may be noted that the data on labour input presently available treats all labour input as homogeneous, that is, each man or man-hour worked by persons of different skill levels, levels of education and training, length and experience are treated as equivalent. Thus the data ignores an important form of human capital that helps in production. This human capital is largely technical knowledge of individuals accumulated by investment in education and research and its services are manifested through the application of technical knowhow by individuals directly in productive activity or through the instruments of production. Thus in the proposed calculations no consideration is given to differences or changes in the degree of effort or grades of ability expended, though these will be reflected in the productivity ratios.

Since labour productivity is a ratio, there would seem to be an implication, in a sense, that all value was created by labour. This is misleading. It has to be borne in mind that this is a partial productivity measure and indicates the saving achieved in the labour cost element only. What the ratio simply indicates is that given the quantity and quality of other factor and non-factor inputs with which labour worked, so much output per unit of labour was produced. Similarly in inter-temporal comparisons the use of labour input in the denominator of the productivity ratio is not to be interpreted as meaning that changes in the ratio can be attributed directly and solely to labour. In fact this change reflects not only changes in labour input but also changes in the quantity and quality of any other factor or non-factor inputs with which labour works, including the way in which they are combined and organized for production. Indeed one of the major limitations of this partial productivity measure is that this measure, while useful in measuring the saving achieved in labour input, does not measure overall changes in productive efficiency since they are affected by changes in the composition of inputs; i.e., substitution of capital for labour and saving in materials, as well as technological changes. Thus a change in labour productivity in this sense does not indicate what caused the change, it merely means that a change in output per unit of labour has taken place.

With sole reliance placed on this partial productivity measure in this thesis it becomes important to show that this measure will adequately express the performance of the selected industries in Canada relative to one another and relative to comparable industries in the United States. From the foregoing discussion of what this partial productivity measure means in inter-spatial and inter-temporal comparisons it is evident that the more the two countries and two industries in a single country differ with respect to non-labour inputs, the less meaningful and informative will be the comparisons of labour productivity. For the present purpose, however, since the industrial and technological structures are pretty much alike in the two countries, and assuming that other relevant considerations, by implication, are similar, it is taken that these problems are not likely to be serious enough to prevent labour productivity comparisons from providing meaningful results. Manufacturing industries in the two countries are highly capital intensive, using up to date and similar technologies, and similar raw materials, with the labour force having roughly similar background and training.[1] Moreover, many of the Canadian firms are affiliates of American firms. It

---

[1]R. Olley: "Comparative Productivity in Canada and the United States", Industrial Canada, July 1966, p. 119.

is, therefore, believed that so long as much significance is not attached to small differences in the productivity ratios they will provide at least an approximate indication of relative performance of industries within Canada and between Canada and the United States.

Another consideration which has led to the use of labour input alone in the denominator of the productivity ratio is the belief that since in the two economies at large and in most manufacturing industries in the two countries labour is one of the most important inputs (as measured by income accruing to it), the measurement based on labour input may not be in serious error.[2] As has been argued and shown in the preceding and succeeding pages of this chapter, many relevant considerations of production are pretty much similar among industries within Canada and between Canada and the United States. It is, therefore, hoped that the distortion created by what the labour productivity measure can not catch may not be too great. It is, therefore, believed that labour productivity ratios will provide at least an approximate indication of the relative

---

[2]The following table gives some idea of the share of labour cost in manufacturing value added and value of shipments in Canada and the United States.

Year	CANADA			UNITED STATES		
	Labour cost Mill.$	value added Mill.$	value of shipments Mill.$	Labour cost Mill.$	value added Mill.$	value of shipments Mill.$
1963	6495	12273	28015	99739	191035	417300
1965	7823	14928	33389	113942	225366	483300

Sources: 1. Dominion Bureau of Statistics: Canada Year Book, 1967, p. 683 and 1968, p. 701, Queen's Printer, Ottawa.
2. U.S. Bureau of the Census: Statistical Abstract of the United States, 1966, pp. 769, 781 and 1967, pp. 741, 753, U.S. Government Printing Office, Washington, D.C.

performance of industries in Canada and between Canada and the United States.

The Output Measure

In this section the output measure is evaluated. The section is divided into two parts. In the first part two output measures are distinguished - gross output and net output and it is argued that for the present purpose the net measure is more appropriate. In the second part properties of the net output measure are examined. The measure is divided into two components - a quantity component and a price component. Conceptual consistency and statistical problems involved in the interpretation of these two components are examined and it is concluded that in the context of the United States-Canada comparisons at least these conceptual problems do not debar reasonably meaningful conclusions.

There are two measures of production which may be used in productivity analysis: gross output and net output[3] or value added. The former is an estimate of final production sold by manufacturer without any deductions; the latter measures the value that has been added including, in the case of capital, an allowance for capital consumption by all factor inputs to the material inputs purchased by

---

[3]Several "net" and "gross" concepts can be distinguished with the interpretation of netness and grossness depending on the purpose or context, different sets of operations to be performed and data available. For detailed comments on these see I. H. Siegal: Concepts and Measurement of Production and Productivity, Bureau of Labour Statistics, U.S. Department of Labour, Washington, D.C., 1952, Chapter II.

manufacturers.[4] The question is which of these two is a more appropriate measure. The main criticism of the gross output measure is that in this measure no attention is paid to the vertical integration of the industry or the manufacturing activity performed. Thus, in situations where a product of one industry becomes raw material of another and a measure of total value of production for two or more industries is required, the use of "gross value of production" may not be an accurate output measure for the degree of fabrication may vary from one industry to another and may change over time. This problem may be avoided by using a value added measure of production. This measure yields an unduplicated total within the sector covered, for the value of intermediate products is already included in the value of final products. Also, since the present paper examines the manufacturing industries, it is more appropriate that the analysis be concerned with the "manufacturing activity performed" rather than examine the performance of industries supplying intermediate products. From this point of view, therefore, the most ideal measure of output is value added since this takes into account

---

[4]The latter measure is net only in the sense that it is net of material and other intermediate inputs. This measure, as does the former, includes depreciation also, and in this sense both are gross measures. Since this value added measure includes capital consumption allowance also, it is more appropriate to call it a gross value added measure. A more desirable measure will be the above measure less the cost of capital used up in the production process which may be termed a net value added measure. However, because of statistical difficulties, the gross value added measure is used in this paper. In the census of manufacturing terminology this gross value added measure is termed net output (because it is net of material and other intermediate inputs). In this thesis net output and net value added are used interchangeably to refer to gross value added as defined above.

only the amount of manufacturing activity performed. For these reasons value added is used in this thesis as a measure of production.

Value added is defined as equal to value of production (value of shipments adjusted for changes in the value of inventories of finished goods and goods in process) less the cost of materials and fuel and electricity consumed[5], which is, when properly derived, identical with the value of services contributed by the factors of production employed in the industry. In other words, value added consists of returns to the primary inputs labour, capital and land in manufacturing.[6] In the Census of Manufactures terminology the measure refers to net output produced or net value added by industry.[7]

---

[5]Dominion Bureau of Statistics: General Review of Manufacturing Industries of Canada, 1961, Catalogue No. 31-201, Queen's Printer, Ottawa, p. 8.

[6]This measure also includes payments for business expenses such as advertising, insurance, consulting services and other business expenses which are not distinguished in the Census of Manufactures, but are included in value added estimates.

[7]Quite close to net value added concept is the measure of gross value added (not in the sense as defined in footnote 4) which in national income accounting terminology is referred to as gross domestic product at factor cost (gross domestic product because it measures production on an area or geographic basis. Gross domestic product equals gross national product minus net factor income payments from the rest of the world). This measure differs from the above net value added concept in that it does not include payments for advertising, insurance and similar business expenses. Both these measures, as presented in official publications, include capital consumption allowance and in this sense both are gross measures.

Value Added

For an examination of this measure it may be convenient to express the concept algebraically for at a point of time measurement as follows:

$$\text{Value added} = \sum_{i=1}^{i=n} Q_{i_1} P_{i_1} - \sum_{j=1}^{j=n} q_{j_1} p_{j_1}$$

where

Q_1 = quantity of output of the industry in time period 1

P_1 = price level of output of the industry in time period 1

q_1 = quantity of input materials of the industry in time period 1

p_1 = price level of input materials of the industry in time period 1

Summations (Σ) are over all i products and j inputs of the industry.

Thus the value added measure has a quantity component and a price component. This output measure is a very involved statistic. A number of conceptual and statistical problems arise in using this output measure. The main criterion of the useability of the output measure is of course that the value added data as presently available for the two countries be comparable at a point of time and over time. While it is possible to think of a number of comparability problems, the following discussion will examine only the important ones. The discussion will first examine the conceptual problems that arise with respect to the quantity component and then the problems associated with the price component. After an examination of these problems a rigorous definition of productivity will be advanced.

(1) The Quantity Component:

With respect to international comparisons the very first problem that arises is whether the industries the output of which we want to compare are really comparable. This problem, however, does not pose any difficulty for the present project. In principle, international comparability is easily achieved through reconciliation of the national standard classification systems of the two countries with the United Nation's International Standard Industrial Classification. The definition of relevant economic units and the criteria used in classifying economic units within an industry are similar. For inter-industry comparisons also there appears to be no serious problem. Though in Canada changes in industrial classification schemes have occurred affecting comparability over time for many industries[8], this development does not present any major problems for the proposed calculations because the present project utilizes a sample of industries which are comparable over the two periods.

However, there is another aspect of industry comparability. In theory it is possible to define an industry in terms of a certain group of goods which are primary to it, that is, they are primarily produced by a certain group of establishments. However, it is also

---

[8]The first standard industrial classification system was adopted in Canada in 1948. It was revised in 1960. In the revised system the number of major industry groups increased from 17 to 20. Some new groups were established and some former major groups eliminated. Within major groups many individual industry groups were set up and several were eliminated - see Dominion Bureau of Statistics, General Review of Manufacturing Industries of Canada, 1960, pp. 12-15 and 1961, pp. 8-9, Queen's Printer, Ottawa.

possible that these very products may be produced as a by-product or ancillary products by other establishments primarily engaged in producing other products, while the given industry also engages in producing secondary products which are primary to other industries. Thus automobile companies may produce such ancillary products as tractors and parts. At the same time some parts of the motor car may be produced in another industry. If the tractors are produced in a separate plant, the plant may well report statistics separately and be classified as part of the tractor industry. However, in a multiproduct plant this may become impossible. So the product content of an industry is a matter of classification and while the concept helps in arranging establishments in an orderly way the operational concept is not always clearcut[9].

A second comparability problem arises if the product mix within industries in the two countries are different, that is, there are variations in product classes within industries by grade, proportion, size, style or other characteristics and these products differ in value added per unit of output. The only way to ensure adequate comparability of the output measure is then to compare industries which undertake just the same kind of activity. If the distribution of goods differs within industries between the two countries and if there are differences in value added per unit of output then a relative distortion in productivity comparisons may

---

[9]Such considerations will not impair the comparability of the output measure if value added per unit of output in the main and by-product are equal in the two countries. However, if they differ then a relative distortion in the output measure will be introduced.

arise. From the output data available from official sources in the two countries there is just no way of determining how significant the problem will be in numerical terms.

A third difficulty arises if the market structure of industries in the two countries and within a single country relative to each other are not similar. For example, it will make a considerable difference whether the industry in question operates in a perfectly competitive market or some sort of imperfect market. In a competitive industry under conditions of long run equilibrium each firm operates an optimum scale of plant at the optimum rate of output. In other words, production occurs at the minimum of short and long run average cost and maximum economic efficiency is obtained. To put the matter in a different way, the product will be produced at the least possible cost per unit of output. In contrast, however, there is no tendency for this to occur under monopoly or oligopoly. Whether or not a monopolist builds an optimum scale of plant depends on the relationship between his market and his long run average cost. Also, whether or not he operates at the optimum rate of output the scale of plant he builds depends on economies of scale. In the case of oligopoly, a firm's output depends upon its quotas, market share or anticipation with regard to marginal revenue. Once the output to be produced in the long run is decided upon, the firm will build a scale of plant whose short run average cost curve is tangent to the long run average cost curve at that output. It would be a sheer accident that the desired output coincides with the output of an optimum scale of plant operated at the optimum rate of output. Thus in general the scale of plant and the output that maximises the monopolist's and the oligopolist's long run profits are not necessarily the optimum scale of plant or the optimum rate of output of the scale of plant that he builds and thus ordinarily resources are not used at their peak potential efficiency. Thus if there are differences in the market structure of industries, then differences in the amount of resources used to produce a unit of output may occur and a relative distortion in the value added and productivity measure may be introduced. The extent to which this may occur cannot be determined.

A last important technical problem of possible bias in the output measure arises out of the possibility of differences in the relative factor intensities or factor proportions in the industries being compared. If there is a difference in the relative labour-capital ratios between the two industries in a single country or between the identical industries in the two countries, then the output measure is hardly comparable. To see relative factor intensities or factor intensity of technologies in the three categories of the Canadian industries, labour-capital ratios were computed from the 1961 Canadian input-output table.[10] The results of these computations are shown in table 3.1 below. It was not possible to compute comparable relative factor intensities of similar industries

---

[10]Dominion Bureau of Statistics: The Input-Output Structure of the Canadian Economy, 1961, Vols I and II, Queen's Printer, Ottawa, 1969.

between Canada and the United States.[11] However, since both the countries are believed to be relatively labour poor and capital rich, using similar technologies, and facing roughly comparable factor price ratios, it is assumed that factor intensities and the technology used in identical industries will be similar in the two countries.

---

[11] The U.S. input-output table (U.S. Dept. of Commerce, Office of Business Economics: Input-output structure of the U.S. Economy, Vols I, II and III, U.S. Government Printing Office, Washington, D.C., 1969) shows the income generated by different manufacturing industries in terms of value added totals without presenting individual factor income components. This precluded the computation of labour-capital ratios from this source. Attempts were made to obtain the U.S. data from other sources and to compute labour-capital ratios for the American industries on the same basis as for Canada. The 1958 U.S. Census of Manufactures (U.S. Dept. of Commerce, Bureau of the Census: Census of Manufactures, 1958, Vol I, Summary Statistics, U.S. Government Printing Office, Washington, D.C., 1961, pp. 9-3 - 9-23) does contain capital data, but it was believed that it was not on the same basis as for Canada presented in the Canadian input-output table. For example, the Canadian input-output table presented income accruing to factor capital under the heading "surplus" which is defined "as the sum of "costs" or income accruing to capital employed in production in the form of profits and other investment income, plus the cost of the consumption of the stock of fixed capital employed, that is, depreciation" - (Dominion Bureau of Statistics, op. cit., p. 13). The U.S. Census does contain data on rental payments and depreciation, but there is no information on profits. Because of this it was, therefore, doubtful whether this data were comparable with the Canadian data. From other sources, it was in general difficult to obtain data on three and four digit industries. Because of these reasons it was not possible to compute relative factor intensities of comparable industries between Canada and the United States.

TABLE 3.1

Labour-Capital Ratios in
Canadian Manufacturing Industries, 1961

S.I.C.	Industry	Labour/capital*
	Export Industries	
124	Flour Mills	57.34
143	Distilleries	.40
2513	Saw and Planning Mills	4.47
282	Veneer and Plywood	4.75
271	Pulp and Paper	.96
311	Agricultural Implements	4.66
321	Aircraft and Parts	10.56
369	Other Petroleum and Coal Products	.48
373	Plastic and Synthetic Resins	1.12
	Weighted Average	3.88
	Protected Industries	
133	Sugar Refineries	.63
151-153	Tobacco Products	1.46
174	Shoe Factories	10.67
201	Synthetic Textile Mills	1.63
216	Carpet, Mat and Rug	3.00
231	Hosiery Mills	5.98
239	Knitting Mills	6.32
243,244,245	Men, Women and Children Clothing	9.41
-	Sash, Door and Plant Mills	4.51
261	Household Furniture	5.34
266	Other Furniture	3.41
374	Medicine & Pharmacy	1.93
161	Rubber Industries	4.27
323	Motor Vehicle Manufacturing	1.50
325	Motor Parts and Accessories	4.04
	Weighted Average	3.94

--- continued on next page ---

Table 3.1 (cont'd)

S.I.C.	Industry	Labour/Capital
	<u>Domestic Industries</u>	
103	Poultry Processors	2.80
112	Fruit and Vegetable Canners	2.02
123	Feed Manufacturers	3.97
376	Soap and Cleaning Compounds	1.56
125	Breakfast cereals	1.22
128	Biscuits	2.53
129	Bakeries	4.53
131	Confectionery	3.97
135	Vegetable oils	.93
141	Soft Drinks	1.43
221,223	Canvas Products and Cotton & Jute Bags	3.65
289	Printing and Publishing	3.59
292	Steel, Pipe and Tube Mills	.88
294	Iron Foundaries	3.65
296	Aluminum Rolling and Casting	16.80
306	Hardware, Tool and Cutlery	3.42
336	Electrical Industrial Equipment	5.69
341,343	Cement and Lime Manufacturing	.56
356	Glass and Glass Products	2.83
357	Paint and Varnish	2.80
377	Toilet Preparations	1.53
302	Fabricated Structural Metal	5.35
331,332	Electrical Appliances	4.40
197	Wool Yarn and Cloth Mills	3.52
	Weighted Average	3.51

*Value added by labour for each dollar of total value added divided by value added by capital per dollar expressed as a percentage.

Source: Dominion Bureau of Statistics: <u>The Input-Output Structure of the Canadian Economy</u>, <u>1961</u>, <u>Vol. II</u>, pp. 10-69. Queen's Printer, Ottawa, 1969, and Census of Manufactures, Individual Industry Reports, 1961.

Since the Canadian input-output table did not contain data for all the industries of the sample, the calculations were restricted to 9 export, 15 import and 24 domestic industries of the sample. As can be seen from the table 3.1 that though there are wide variations from industry to industry in the labour-capital ratios, the weighted average[12] of labour-capital ratios for each of the three groups of industries were found to be much closer. To be precise, the ratios of labour-capital intensity in the exporting group to importing group, in the exporting group to domestic group, and in the importing group to domestic group were found to be .98, 1.10 and 1.12 respectively. Since the relative labour-capital intensity in the three groups of industries are not very different, no significant differential distortion in the output measure is likely to arise on this score.

A number of difficulties also arise in the interpretation of the output measure in comparisons over time. The first problem arises out of the possibility of substitution between factor and non-factor inputs. The value added output measure is derived by subtracting the value of non-factor inputs from the value of final output and is identical with the value of services contributed by the factors of production in the industry. By this definition a change in factor and non-factor inputs relative to each other is reflected in the value added measure. An important aspect of pro-

---

[12]Weights were assigned on the basis of value added in industry in 1961.

duction is that the composition of inputs and outputs may vary over time. A given output with a given technical knowledge can usually be produced with differing input combinations. Normally the actual input combination selected will be the one that allows the least cost combination of inputs at given relative input prices. This combination is subject to change if relative input prices change, or if there is a change in technology. Thus a change in relative volume of factor and non-factor inputs between the two countries and between two industries in the same country may arise due to relative price changes, or changes in technology. Differential degrees of change can introduce differential bias in the ratios being compared. The extent to which this may occur can not be determined since it depends on the technical possibilities for substitution between factor and non-factor inputs in the production process.

A most pervasive conceptual problem for the measurement of output changes is posed due to quality changes in products and materials over time. Old models and products get ousted and abandoned and new ones get introduced. As an example of quality change consider a series showing the number of a broad class of refrigerators produced. This series could hide any changes that have occurred, such as shifts from a small to large refrigerator units; shifts in types; intrinsic changes in quality such as more efficient motor and improved design; extrinsic changes such as alteration in appearance; and other quality changes introduced through the addition or deletion of a service input. To the extent that quality has improved, the output series will have a downward bias since there appears to be no satisfactory statistical proceedure to reflect these changes in quality. The use of price deflation could take account of the quality changes. Changes in specifications will be reflected in value totals, if such a total is deflated by a price index based on a definite specification of the item in question, and the resulting aggregate will reveal the true change in physical output, assuming that the prices of all the different types of the products move in the same way as those represented in the price index. The problem, however, is to obtain appropriate price indexes corresponding to the various industry valuation levels and based on sufficient detail. Most existing price indexes fail to take account of the more complex products of the industry and are based on prices at the wholesale or retail levels thus reflecting variations at the rate of mark up at these levels. Thus to the extent that quality changes that can not be accurately measured do occur, the productivity ratios reflecting over time changes may be biased. However, in the context of Canada-United States comparisons the impact of quality change may not do much violence to comparisons. Canadian tastes often run towards the American styles because the Canadian public is subjected to the advertising of the American firms in the various media of communication. The Canadian manufacturers often copy designs from the United States and the styles and designs that have wide acceptance in the United States are also popular with the Canadian consumers. Since the people in the two countries tend to buy similar products, if there is any quality problem it is likely to affect productivity comparisons similarly in both the countries.

A final important problem arises out of the possibility of dissimilar changes in the composition of the product mix within an industry between the two countries. When an industry making a variety of products shifts its output to goods requiring a higher or lower degree of fabrication or processing relative to the same industry in the other country, then the comparability of the output measure may be distorted[13]. If the products with higher ratio of value added grow faster in one country relative to the other, then the output measure for the former country will show greater increase than for the latter. To what extent such a shift in product structure will distort the relative output measure can not be evaluated.

(2) The Price Component

A number of problems arise due to the introduction of prices into the measurement. When inter-country and inter-industry comparisons are made using this measure, it is necessary to obtain adequate and comparable prices of both outputs and input materials. Usually some serious difficulties arise in obtaining really comparable prices. The present section will then examine the problem of comparable prices.

---

[13]This may not impair the comparability of the productivity measure if a higher (or lower) degree of fabrication or processing in one country relative to the other also requires more (or less) direct labour and will thus show a lower (or higher) labour productivity relative to the other country. If, however, a higher (or lower) degree of fabrication or processing (and hence a growth in the products with a higher (or lower) ratio of value added) involves use of greater (or lesser) amount of machinery and capital equipment, then the comparability of the productivity measure between the two countries will be affected.

A first problem that arises is that the "pricing of goods" procedure may vary between industries in a single country and for identical industries between the two countries. In such a situation using the value added data, as reported in the census, will not give an unbiased measure of the relative productivity performance of industries. A recent study on productivity in the Farm Machinery industry[14] found differences in the way in which farm machinery shipments are valued in Canada and the United States tending to reduce the Canadian value of shipments and value added in comparison to the United States. These differences are of two types. First, the value of shipments in Canada consisted of production costs only excluding any manufacturing profits, whereas in the United States value of shipment figure included profits also[15]. The second difference in valuation arose from the fact that substantial amounts of output from establishments in both countries are shipped to the wholesale distribution divisions of the same companies, and are, therefore, intra-firm shipments. These intra-firm shipments do not involve arms length transactions and the transfer prices used to value these shipments are those most convenient to the company[16]. This study found that within each country there are differences in

---

[14] Christopher J. Maule: Productivity in the Farm Machinery Industry, Royal Commission on Farm Machinery, Study No.3, Ottawa, Queen's Printer, 1969.

[15] Maule, *op. cit.*, p.9.

[16] Maule, *ibid*, p.3.

transfer pricing procedures used by different firms reporting to D.B.S. and the Bureau of the Census. This presents two sets of problems. First, within each country the differing methods of estimation mean that the value of shipments is not comparable between firms, nor is it for the industry over time if each firm's share varies from year to year. Secondly, between the two countries the industry value of shipments is not comparable and, therefore, direct productivity comparison can not be made. "It would be unlikely that only the Farm Machinery statistics on the value of production and value added suffered from such distortion between the two countries and among different companies. Similar conditions could be expected to occur wherever companies in an industry looked after their own wholesale distribution (i.e., intra-firm shipments)".[17] Adjustment, therefore, must be made to bring the two sets of data to a comparable level before any comparisons are made, otherwise "value added analysis based on such data would have to be regarded as of doubtful value in determining the difference in productivity levels between Canada and other countries."[18] This study found that when data are adjusted the Canadian productivity tends to rise by 12 to 17 percent.[19]

There may thus be a potential source of bias in our inter-country comparisons due to intra-firm shipments and differences in

[17] C.L.Barber, Royal Commission on Farm Machinery, Press Release, p.2.

[18] Barber, ibid., p.3.

[19] Maule, op. cit., p.2.

valuation practices in the two countries[20]. Similar differences may exist among different industries in Canada impairing the inter-industry comparisons[21]. But while the Royal Commission had access to individual returns submitted by individual companies to Dominion Bureau of Statistics and other confidential information regarding pricing procedure in the industry in the United States which made data adjustment possible, the present project does not enjoy such a privilege. Therefore, the requisite adjustments can not be made in our data. In the proposed calculations it is simply assumed that the pricing procedures in different industries in Canada and in identical industries between Canada and the United States are comparable.

A second potential difficulty arises if the pricing of output and materials take place under different market situations. For

---

[20]In both the countries fairly large amounts of industry outputs are shipped to the wholesale branches of the companies. If there are differences in transfer pricing procedures then this may cause a distortion in the relative comparability of the value of shipments. From the published statistics on the channels of manufacturing distribution in the two countries it is, however, not possible to form even a rough idea about the relative significance of the intra-firm shipments because of the incomparability of product-groupings in the two country's statistical presentations. See Dominion Bureau of Statistics: <u>1961 Census of Canada</u>, <u>Manufacturing Industries</u>, <u>Channels of Distribution</u>, Bulletin SI-1, Catalogue No. 97-544, Queen's Printer, Ottawa, 1966, pp. 8-17, and U.S. Bureau of the Census: <u>U.S. Census of Manufactures 1958</u>, <u>Vol I</u>, <u>Summary Statistics</u>, U.S. Government Printing Office, Washington,D.C., 1961, pp. 10-6- 10-96.

[21]In fact, there are substantial industry to industry variation in the percentage of shipments to the wholesale distribution divisions of industries - see Dominion Bureau of Statistics, <u>op</u>. <u>cit</u>., pp. 8-17. If the transfer prices used by manufacturers to value these shipments are different then the inter-industry comparability may be impaired.

example, an industry operating in a perfectly competitive market can be expected to have a lower price than the same industry operating under monopolistic or oligopolistic conditions. Thus if there are differences in market structures of two industries compared in a single country or of two identical industries compared between the same two countries, the inter-industry and inter-country comparisons may be biased relative to each other. The census value of shipments and value added data for different industries in the two countries make no distinction in the market structure thus precluding the possibility of making the necessary adjustment, if any is required. While it is not possible to obtain information about the market structure from the published output statistics, nevertheless it may be possible to gain some indication of the relative effective competition or the degree of market control in the manufacturing industries of the United States and Canada through a comparison of firm concentration. Evidence exists to show that firm concentration is generally higher in Canada than in the United States[22]. "The figures for the United States show lower concentration levels in almost all major industry groups -------- 34.0 percent of Canadian manufacturing shipments came from industries of very high or high concentration, compared

---

[22] See Gideon Rosenbluth: Concentration in Canadian Manufacturing Industries, National Bureau of Economic Research, Princeton University Press, Princeton, 1957, pp. 75-93; and Daly, Keys and Spence, op. cit., p. 18.

with 13.7 percent of U.S. manufacturing shipments."[23] If the level of concentration is taken as indication of the prevalence of monopoly, then from this evidence it can be concluded that relatively higher prices would prevail in Canada and hence Canadian value added may be overstated relative to the United States.

A third problem arises out of the possibility of a number of other influences affecting the prices. For example, prices of outputs and input materials are affected by scarcities, speculative and distributional factors, supply conditions and a host of others. Then there are governmental interferences - for example, price fixing -, the activities of trade unions, and other institutional factors like tariffs, quotas and other restrictive devices tending to distort prices, the allocation of resources and in general productivity. The impact of these factors is likely to vary in different countries and for different industries in a single country, and hence have a differential effect on the value of shipments and value added. It is extremely difficult to find out the direction and magnitude of this differential effect on different industries in the two countries.

A distinction must also be made between international and domestic goods for this has an important bearing on the value added output measure. International goods are subject to export and import

---

[23]Max D. Stewart: Concentration in Canadian Manufacturing and Mining Industries, Background Study to the Interim Report on Competition Policy, Economic Council of Canada, Queen's Printer, Ottawa, August 1970, p.59.

trade (i.e., export and import industries in our case), whereas domestic goods are produced and consumed in the same country (i.e., domestic industries). Trade theory suggests, assuming free trade, that the price level of export and import industries is nearly the same throughout the trading area, apart from the difference that may result from the cost of transportation. Domestic industries, on the other hand, do not necessarily have the same price as similar commodities abroad, that is, their prices are assumed to be independent of those in foreign markets.[24] If there are tariffs on imports, the price of import competing goods can be expected to approach the foreign price plus the tariff. Since the landed price of imports in Canada will be equal to foreign price plus the Canadian tariff, the producers in the import competing (protected) industries can easily price their products up to this level and compete successfully without the fear of being priced out of the market.

The published statistical information in the census does not distinguish such industrial categories, thereby making data adjustment difficult. But while for inter-country comparisons of export and import industries the data can be more or less adjusted or approximations made, the problem is more acute for domestic industries in

---

[24] See for example: A.W. Taussig: International Trade, MacMillan Company,1927, New York, pp. 3-42; G.V.Haberler: The Theory of International Trade with its Application to Commercial Policy, Augustine M.Kelley Publishers, New York,1965, pp.34-35; J.Viner: Studies in Theory of International Trade, Harper and Brothers,1937, pp. 323-67.

making inter-country comparisons for how can one make comparisons of domestic industries in Canada with comparable industries in the United States if one does not know the relative prices in the two countries? Similar problems arise with respect to inter-industry comparisons. In the case of inter-industry comparisons we do not know anything about the domestic price relationship of export, import and domestic industries. It is merely assumed that the prices are comparable and on this basis inter-industry comparisons are made. However, it is possible that the domestic prices of these three categories of industries may not be comparable.

A final important problem lies in the difficulty of securing a common denominator for the two currencies in which the output values are expressed. In the present project the prevailing United States' rate of exchange is used as a conversion factor on the assumption that it equates the dollar value of the output of the two countries. However, expressing the Canadian dollar values of output in American dollars is by no means precise because the market exchange rates do not necessarily accurately reflect the relative purchasing power of the currencies.[25] Even assuming that the U.S. exchange rate

---

[25]Milton Gilbert and Irving B. Kravis in their work An International Comparison of National Products and the Purchasing Power of Currencies, (O.E.E.C.,Paris, 1954) concerning the United States, France, Germany and Italy overcome this kind of problem by comparing national products first in the U.S. currency and then European currencies (countries concerned). While noting a number of conceptual and statistical problems in such comparisons they feel that this technique is more useful in securing realistic international comparisons of the levels of real national product. The present project does not attempt to utilize the Gilbert and Kravis technique for one main reason that sufficient and definitive statistical foundations for this technique have not yet been established.

accurately reflects the internal purchasing power, it has to be recognized that the American prices may carry with it the U.S. market and scarcity relationships (foreign exchange value of the American dollar assumed to reflect the domestic prices). Other domestic and institutional factors may also be built up in the United States' exchange rate which may be quite inappropriate for Canada. Similar problems arise with respect to the external value of the Canadian dollar.

Recognition of all these problems associated with the introduction of a value dimension into the measurement raises some doubts about the validity of the value added approach in productivity comparisons. However, in spite of these problems value added is considered adequate as a basis of productivity comparisions between these two countries. The social, political and economic environment in which business enterprise is conducted in Canada is very much akin to the United States. Trade unions have a policy and social philosophy similar to the American unions. The two countries trade a lot and are subject to the same market forces. Scarcities and market vibrations are quickly transmitted from one country to the other. Keeping all these factors in mind it appears that the value added measure qualifies to be a reasonable indicator of relative United States-Canada productivity comparisons. What is important is that in appraising the productivity ratios in the following chapters one must keep in mind the limitations attaching to the productivity measure due to the introduction of value dimension into the measurement.

In the light of the above discussion it is now possible to define productivity. Productivity is a ratio of output to labour input (assumed homogeneous). This ratio is a measure of performance or efficiency of multi-product and multi-plant industries. This performance or efficiency may be the result of differences in product mixes, differing factor prices and factor proportions, quality of inputs, influences arising out of the competitive structure of the industry, pricing procedures of outputs and input materials, and a host of other factors which influence prices. Similarly, changes in these ratios may reflect the effect of price changes of factor and non-factor inputs, changes in the significance of product classes, technological changes and quality and characteristic changes in products and materials.

In the light of the above discussion of the conceptual and statistical problems that arise with respect to the output and input data on which the productivity measures are based, how valid can we expect the inter-country conparisons to be? While it is possible that the above potential conceptual and statistical problems may impart some bias to the comparisons and render the attainment of a high degree of accuracy impossible, these limitations do not entirely deprive the productivity data of its value. The contemporary relevant literature purports to show that for countries at a broadly similar level of economic development, the conceptual difficulties are of no great practical importance and they do not debar reasonably precise, meanful, and analytically useful conclusions about the actual relationships.[26] It is, therefore, taken that the above conceptual problems pose no serious difficulties and the present project can proceed with the proposed calculations.

---

[26] See, for example, D. Paige and G. Bombach: A Comparison of Real Products and Productivity, O.E.E.C., Paris, 1959, particularly pp. 104-107, and Gilbert and Kravis, op. cit., particularly chapter VI, pp. 61-96.

A Model for the Interpretation of "value added"

The above analysis suggests that the value added output measure is a very involved statistic. It consists of two components - a quantity component and a price component. As has been noted above, a number of influences are built up in the quantity component and consequently difficulties arise in the interpretation of the measure. Similarly,prices introduce an artificial arbitrary external element into the measurement distorting the value added statistics as published in official sources. The question may be raised how shall we then interpret the output measure in inter-country and inter-industry comparisons? In other words, in which case shall we expect the published value added data to be overstated or understated, and in the light of this, how can data be adjusted, or if adjustment is not possible, how the results based on published statistics may be interpreted. While it is not possible to determine directional bias in the measure due to all the possible influences on the quantity and price components discussed above, there are two, the effects of which can be determined with some certainty. These are the price relationship between the export, import and domestic industries and the effects of the tariff.

As has been stated above, it is important that in inter-country comparisons a clear distinction must be made between export, import and domestic industries. In the case of export and import industries, the Canadian prices will be tied with the American prices, while the prices of domestic industries are assumed to be independent of the United States' prices. In an inter-country trading context, in order that a commodity shall move from one country to another, it must be cheaper in the exporting country - cheaper at least by the cost of transport. Similarly a commodity will be imported from abroad only if the import price is lower than the domestic price or if the exporters offer an additional variety or there is a scarcity in availability. Since export and import shipment values are on f.o.b. at plant basis, that is, they exclude freight charges, we will expect the reported value added of Canadian export industries to be understated and value added of Canadian import industries to be overstated relative to the same industries in the United States. This follows from the argument that if Canadian prices of export goods were not lower (at least by the amount of freight charges) than the prices prevailing in the United States for the same goods, the Canadian exporters would not be able to sell in the American markets. In other words, Canadian prices for such goods have to be lower than the American prices. Now since Canadian prices for export goods are lower than the American prices for identical goods, it follows that the reported value added of the Canadian export industries will be understated relative to the American value added for the same industries. Similarly, Canada will import from the United States only if Americans quote lower price than those prevailing in Canada for identical goods. Now since the prices of import goods are higher in Canada than the domestic prices in the United States, it follows that the Canadian reported value added for import industries will be overstated relative to the same industries in the United States. It is difficult to pronounce any judgement about the domestic industries. Since prices of domestic industries are assumed to be independent of the United States' prices, their level in Canada may be lower or higher than abroad and hence the value added relative to the same industries in the United States may be overstated or understated.

Discussion so far has assumed free trade conditions. In reality this, however, is not the case. Canadian import competing industries enjoy different amounts of tariff protection. The producers in the protected industries can be expected to price up to the American price plus the tariff. This will tend to raise the price of the products of the protected industries and hence will further inflate the value added of protected industries relative to the same industries in the United States. The industries classified as domestic in this thesis may also include some protected goods receiving some tariff protection. The producers in these industries may also be tempted to raise their prices. However, it is difficult to say if this will overstate their value added relative to counterpart industries in the United States since we do not know whether prior to the tariff prices in the domestic industries in Canada were lower or higher (and if they were then by what amount) relative to identical industries in the United States.

It is difficult to judge the suitability of the published value added data for inter-industry comparisons. Inter-industry comparisons depend upon the underlying price assumption. As mentioned earlier neither the census of manufactures make any distinction between export, import and domestic industries, market situations and pricing procedures, nor are there any separate price records for these three categories of industries. We also do not know anything about the many possible influences that may be working on the prices of these industries. We take the published data as it is assuming that prices in these three categories of industries are comparable and, therefore, the computed value added is also comparable. There is, however, one influence the effect of which can be traced with some accuracy and it is the effect of the Canadian tariff. Assuming that domestic producers in protected industries price their products up to the American price plus the tariff, it implies that the imposition of the tariff will lead to rise in prices of these products and therefore, inflate the reported value added. Assuming that prior to the imposition of the tariff, domestic prices of exports, protected and domestic industries were comparable, it follows that the post-tariff reported value added of the protected industries will be overstated relative to the other two categories.

We may conclude that in the case of inter-country comparisons, we expect the published value added of Canadian export industries to be understated and of protected industries to be overstated relative to the identical industries in the United States. Regarding the domestic industries no definite conclusion is possible. In the case of inter-industry comparisons, assuming that prior to the imposition of the tariff the prices of the three categories of industries were comparable, we expect the published value added of protected industries to be inflated relative to the export and domestic industries. Considering the three categories of the Canadian industries as a whole and comparing these with the counterpart industries in the United States it is not possible to pass a judgement on the relative comparability of published value added data in the two countries. The Canadian data may be overstated, understated or comparable relative to the data in the United States.

CHAPTER IV

SOURCES OF THE AMERICAN AND CANADIAN PRODUCTIVITY DATA AND THEIR COMPARABILITY

This chapter describes the sources of the American and Canadian data that have been used in this study and assesses their comparability. Comparability can be affected by the use of different concepts in the two countries and by changes within each country over time. A number of differences do in fact exist. Since they may contribute a bias to our measurements, each statistical variable is examined in an attempt to ascertain the directional bias arising from a lack of strict comparability. The data are considered first for Canada and then for the United States. This is followed by an assessment of the comparability of the American and Canadian data.

(A) The Canadian Data

The main sources of the Canadian data are :

(1) Dominion Bureau of Statistics: Annual Census of Manufactures, which is a survey of all establishments regardless of size classified into the manufacturing industry category according to the Standard Industrial Classification. This is the main source of data for the period 1962-65. These contain data on total shipments, value added and inputs (such as labour, materials, fuel and electricity) used to produce the output.

(2) Dominion Bureau of Statistics: Annual Review of the Manu-

facturing Industries of Canada and Monthly Review of Employment,Payroll and Man-hours. These provide relevant information on inputs and output for the period 1949-52.

(3) Dominion Bureau of Statistics: Index of Real Domestic Product by Industry. These provide estimates of Real Domestic Product and are consistent over the whole period.

In Canada changes in methods of collection and reporting of statistics have occured from time to time. These changes are more significant for some industries than for others. These changes are published under "Explanatory Notes" and "Concepts and Definitions" in most annual industry reports and the "General Review of the Manufacturing Industries of Canada". The changes discussed here deal only with the consistency of data for the two periods of 1949-52 and 1962-65.

(1) In the 1948 Standard Industrial Classification, the classification of manufacturing industries was based upon "chief component material". In the revised Standard Industrial Classification manual, 1960, in the classification of manufacturing industries, the concept of "purpose" has been combined with "chief component material"[1]. Under the 1948 S.I.C., 135 three digit industry classes were contained in the annual census of manufactures, aggregated into 17 major groups. The 1960 S.I.C. provides for the breakdown of manufacturing universe into 140 industries arranged in 20 major groups.[2] The revised classification brought about substantial changes

---

[1]Dominion Bureau of Statistics:General Review of the Manufacturing Industries of Canada,1960,Catalogue No.31-201,Queen's Printer, Ottawa,p.12.

[2]Dominion Bureau of Statistics:General Review of the Manufacturing Industries of Canada,1961,Catalogue No.31-201,Queen's Printer,Ottawa,p.8.

in a number of industries because of the shifting of establishments from one industry to another or because of regrouping of establishments into different industry classes. Thus comparability of many industries was affected. The changes in the classification mentioned above, in addition to new industries and the transfer of industries from manufacturing to other sectors of the economy, make it extremely difficult to compare the manufacturing industries compiled on the revised classification basis with those compiled on the old classification basis. In order to get comparability for industries evaluated on the 1960 S.I.C. with those for back years evaluated on the 1948 S.I.C., the D.B.S. (now Statistics Canada) has recompiled statistics of manufactures on the new basis but this goes back as far as 1957 only. We are, therefore, unable to judge on the direction of bias in the comparisons of 1949-52 and 1962-65 industry productivity figures.

(2) The 1948 Standard Industrial classification had classed establishments engaged in repair work in the manufacturing division. Under the 1960 S.I.C. establishments engaged primarily in specialized repairs are generally excluded from manufacturing.[3] The only exceptions, for our purpose, are Furniture and Air craft industries where repairs are mostly of industrial rather than of a commercial nature. Thus many industries are not strictly comparable

---

[3]Dominion Bureau of Statistics: General Review of the Manufacturing Industries of Canada, 1961, Catalogue No.31-201, Queen's Printer, Ottawa, p.11.

over the two periods. The switch over to the new S.I.C. eliminated some establishments, with industries being affected differently depending upon the importance of repair works under the 1948 S.I.C. In total this change resulted in the transfer of some three thousand establishments out of manufacturing[4]. This decrease in the number of establishments belonging to an industry will have the effect of decreasing the value of shipments, total employment and, therefore, will affect the value added. Lacking the requisite data we are unable to predict the direction of the productivity ratio movement, but it is our guess that the total effect was probably negligible, since the three thousand establishments affected contributed less than one percent of total manufacturing[5].

(3) Prior to 1961 the main emphasis in the Canadian Census of Manufacturing was on manufacturing activity only, but beginning with 1961 each establishment reported on total operations[6] carried out within its accounting boundaries. Though statistics are still collected for manufacturing activities separately, these are not entirely consistent because many firms do not have separate

---

[4]I.Bernolak: "Monograph for Canada: Possibilities for the measurement of productivity and its comparison internationally in O.E.C.D. countries", printed in O.E.C.D.: Productivity Measurement, Part III, Paris, 1960, p.113.

[5]*Ibid.*, p.113.

[6]Dominion Bureau of Statistics: General Review of the Manufacturing Industries of Canada, 1961, Catalogue No.31-201, Queen's Printer, Ottawa, p.7. Prior to 1961 establishments were required to submit separate reports of their different activities although this often meant that artificial split of activities were necessary. Since 1961 all the activities of manufacturing establishments are covered including own accounting, construction, sale of goods purchased for resale, revenue from services, selling and delivery activities within the establishment boundary, etc.

records for manufacturing activity.[7] For instance, while production and related workers can be reported for manufacturing activity, office and related workers can hardly be allocated to manufacturing versus non-manufacturing activity. The various inputs and output statistics can, therefore, be only perfectly matched at the total activity level. Total activity relates only to operational data and excludes such non-operational items as rent, interest and dividends.

Under the "total activity" concept, the number of establishments was the same as under "manufacturing activity", the value of shipments and value added has generally tended to increase relative to "manufacturing activity", but for certain industries total value added has been less than the value added by manufacturing activity. The difference between the two has been, on the average, of the order of about 0.5 percent.[8] The effect of this change does not appear to be large. This development does not affect us any way. The D.B.S. in the annual census of manufactures (annual industry reports) publishes value added figures separately for manufacturing activities and total activity of the industry. We have taken manufacturing activity value added data for the period 1962-65 so as to make it comparable with the 1949-52 data and also to make it comparable with the American data.

(B) The American Data

The American data for our purpose are obtainable from:

(1) Bureau of the Census: Census of Manufactures,1954,1958 and

---

[7] I. Bernolak, *op. cit.*, p. 113.

[8] *Ibid.*, p. 132.

1963.

(2) Bureau of the Census: Annual Survey of Manufactures, 1949 1950, 1951, 1952, 1962, 1964 and 1965.

(3) Bureau of the Census: Current Industrial Reports - Annual.

In the United States a new industrial classification system came into effect in 1957 which for certain industries differed significantly from the 1945 classification. As a result comparability of industries for the period 1962-65 (based on the 1957 classification) and 1949-52 (based on the 1945 classification scheme) was affected. In an attempt to ensure comparability through time as well as to facilitate inter-country comparisons, certain reconcilations had to be made.[9]

(C) Comparability of the American and Canadian Data.

In this section an examination is made of differences in concepts used in the two countries over time with a view to ascertaining the direction in which they will affect the productivity comparisions.

(1) Establishment: The concept of establishment appears to be identical in the two countries.[10] The main difference is that whereas the United States includes in its census only those establishments which employ one or more persons, thus excluding establishments operated

---

[9]This consisted of the derivation of the 1957 S.I.C. industries from the 1945 S.I.C. industries. This was achieved on the basis of Appendix C, pp. C-3 - C-18 in the U.S. Census of Manufactures, 1958. Appendix C shows the disposition of each "old" industry in terms of the "new" industry and, conversely, the composition of each new industry in terms of the old industry.

[10]For definitions see U.S. Department of Commerce: Annual Survey of Manufactures, 1964-65, U.S. Government Printing Office, Washington D.C., p. 3 and Dominion Bureau of Statistics: General Review of the Manufacturing Industries of Canada, 1961, Queen's Printer, Ottawa, p. 7.

by individual proprietors or partners with no paid employees[11], in Canada there is no cut off limit for small establishments. The criteria for inclusion is whether or not the operating entity is capable of reporting on principal statistics.[12]

(2) Employees: In both the countries total employment can be divided into two categories - "production and related workers" and "all other employees". The contents of these two sub-categories are also very similar.[13] Differences do exist in the date and number of times establishments in each country are required to report their number of employees to census authorities. However, the differences are so minute that they are not expected to result in appreciable problems of comparability.

In Canada prior to the introduction of the new S.I.C. in 1961, the Annual Census of Manufactures presented data only on manufacturing activities. The data were presented under two categories (1) production and related workers and (2) administrative and office employees, with this latter category included working owners and partners. Under the 1961,

---

[11] In 1958 in the U.S. manufacturing industries in all there were 52,000 establishments with no paid employees, i.e., one man operation and these accounted for less than one percent of the total value of shipments in that year - see U.S. Department of Commerce: Census of Manufactures, 1958, U.S. Government Printing Office, Washington,D.C.,p.5.

[12] An establishment is defined as an operating entity capable of reporting on materials and supplies used, goods purchased for resale as such, fuel and power consumed, number of employees and their pay, inventories,shipments and sale - Dominion Bureau of Statistics: General Review of the Manufacturing Industries of Canada, 1961, Queen's Printer, Ottawa,p.7.

[13] See U.S. Department of Commerce: Annual Survey of Manufactures, 1964-65, U.S. Government Printing Office, Washington D.C., Appendix A, p.A-2; Dominion Bureau of Statistics: General Review of Manufacturing Industries of Canada, 1961, Queen's Printer, Ottawa, p. 7.

S.I.C., data on "working owners and partners" of unincorporated business are published as a separate category. To ensure maximum comparability of the 1949-52 and 1962-65 data, we have added the numbers of working owners and partners to the total employees figure.

(3) Man-Hours: In the United States the definition of man-hours consists of all plant man-hours of production and related workers. It represents all man-hours worked or paid for at the plant, including actual overtime hours. It excludes hours paid for vacations, holidays or sick leaves when the employee was not at the plant.[14]

In contrast Canadian man-hours of production and related workers in manufacturing activity represent man-hours paid[15] (total hours at work during the calendar year plus hours not worked but nevertheless paid for such as paid vacations, sick leaves, statuatory holidays, etc.)

Thus the American and the Canadian data are not strictly comparable. The Canadian productivity ratio will be somewhat downward biased relative to American because of this difference. In 1965, payments for time not worked (paid vacations, payment for holidays not worked and paid sick leave) in the manufacturing industries of the United States constituted 7.2 percent of the payroll.[16] When the

---

[14] U.S. Department of Commerce: Annual Survey of Manufactures, 1964-65, U.S. Government Printing Office, Washington D.C., Appendix A, p. A-3.

[15] Dominion Bureau of Statistics: Annual Census of Manfactures, Motor Vehicle Parts and Accessories Manufacturers, 1962, p. nil, section on "Explanatory Notes" on Employees.

[16] The Conference Board: Economic Almanac, 1967-68: Business Fact Book, The Macmillan Company, New York, 1967, p. 84.

American wage data in 1965 was downwardly adjusted by this amount and calculations made it was found that Canadian productivity per man-hour relative to the United States tended to rise by 6 percent. Thus in our calculations, based on unadjusted U.S. wage data, Canadian productivity per man-hour relative to the United States will be downwardly biased by about 6 percent during 1962-65 and somewhat less than this during 1949-52.[17]

(4) Salaries and Wages: Salaries and wages refer to gross earnings of employees including wages, bonuses, compensation in kind and cash, vacations, sick leave, etc. and are identical by definition in both countries.[18] In the United States salaries of corporate officers are included but payments to working owners and partners are excluded. In Canada, on the other hand, withdrawals by working owners and partners for normal living expenses are included in salaries up to 1961 but from 1961 onwards, they are presented separately. To make the 1949-52 and 1962-65 periods comparable for Canada, we have added withdrawals for working owners and partners into salaries and wages of total employees.

The adjustment resulting from the inclusion of working owners and partners withdrawals in the wage and salary total has the effect

---

[17] Fringe benefits arising from paid vacations, sick leave and holidays have tended to increase over the years. A rough guess, therefore, would be that for the period 1949-52, Canadian productivity per man-hour relative to the United States will be downwardly biased by 3 to 4 percent and for the period 1962-65 by 5 to 6 percent.

[18] See U.S. Department of Commerce: Annual Survey of Manufactures, 1964-65, U.S. Government Printing Office, Washington D.C., Appendix A, p. A-2 and Dominion Bureau of Statistics: General Review of Manufacturing Industries of Canada, 1961, Queen's Printer, Ottawa, p. 7.

of making the Canadian data comparable for the two periods. However, the adjustment does not have the effect of making the Canadian and the American data strictly comparable. This means that share of labour and therefore, very likely the value added for Canada will tend to be upwardly biased. However, it may be noted that withdrawals of "working owners and partners" in Canada represent on the average about 0.2 percent of total withdrawals, salaries and wages [19] and thus the degree of incomparability between the United States and Canada will be insignificant.

(5) Materials, Supplies, Fuels and Electricity: "Materials and supplies" items are almost the same in both the countries. One difference is that whereas for the United States, fuel and electricity costs are included in the total cost of materials, for Canada, they are presented separately.[20] Therefore, in order to obtain comparable data, for Canada we have added the cost of fuel and electricity to total cost of materials.

In the United States the cost of materials bought and resold in the same condition without further processing was excluded from material costs prior to 1958 but included from 1958 on.[21] In Canada the cost of material refers to manufacturing activity only and not

---

[19] Based on our own calculations for a number of industries of the sample.

[20] U.S. Department of Commerce: Annual Survey of Manufactures, 1964-65, U.S. Government Printing Office, Washington D.C., Appendix A, p.A-3; Dominion Bureau of Statistics, op. cit., p. 8.

[21] See U.S. Department of Commerce: Census of Manufactures, 1958, U.S. Government Printing Office, Washington D.C., p.10.

to reselling activity. Thus the cost of material data for the two periods 1949-52 and 1962-65 for the United States are not comparable, and the United States data are comparable with Canada only for the earlier period. This resale part of total cost in the United States constituted approximately 8% in 1958 and 5% in 1963.[22] Information on resales is available only for the two census years since it has not been recorded in the Annual Survey of Manufactures. A rough estimate of the American material cost differential resulting from the subsequent inclusion of the material resale component would be between 5 to 8 percent relative to the basis on which cost of material data is collected in Canada. This obviously will have an impact on value added. It is discussed below in section 7.

(6) Value of Shipments: Shipment values are on f.o.b. plant basis after discounts and allowances and excluding taxes in both countries.[23] In the United States the value of shipments of goods bought for resale without further processing was not included prior to 1958 in the total value of shipments but has been included from 1958 to the present.[24] In Canada resales are excluded from value of shipments but after 1961 they are presented as a separate item - "Shipment of goods not of own manufacture". However, the value of

---

[22] Calculated from the resale statistics provided in the Census of Manufactures, 1958 and 1963.

[23] See U.S. Department of Commerce: Annual Survey of Manufactures, 1964-65, U.S. Government Printing Office, Washington D.C., Appendix A, p.A-3; Dominion Bureau of Statistics, op. cit., p.8.

[24] U.S. Department of Commerce: Census of Manufactures, 1958, U.S. Government Printing Office, Washington D.C., p.11.

shipment figures that we have taken are "value of shipments of own manufacture" (i.e., resales are not included).

Value of shipments are thus comparable for Canada for both the periods but between Canada and the United States they are comparable only for the 1949-52 period and not for the 1962-65 period - for this period the United States numbers include resales. This resale value accounts for about 3 to 5 percent of total sales for different industries of the sample.[25] This means that the United States' value of shipments will be 3 to 5 percent upwardly biased for the period 1962-65 relative to Canada.

(7) Value Added: This measure is derived by subtracting the cost of materials, fuel, electricity, and intermediate service inputs from the value of shipments. Value added will, therefore, be affected by changes in either costs or value of shipments.

The following changes have occured in the calculation of value added in Canada. For the period 1949-51 industry output was measured by the value of production. Value added was, therefore, calculated by subtracting the cost of materials, fuel, and electricity, etc., from the value of production. In 1952, industry output was measured by the value of shipments, and value added was, therefore, equal to the value of shipments minus cost of materials, fuel and electricity. That is to say, for 1949-51 inputs were matched against output; in contrast in 1952 inputs were *not* matched against output.

---

[25] See U.S. Department of Commerce: *Census of Manufactures, 1958*, (p. 35A-8) and *1963* (p. 35A-10), U.S. Government Printing Office, Washington D.C.

For the period 1962-65 the value of shipments was adjusted for changes in inventory of final goods and also for changes in the inventory of goods in process before value added was calculated.

The following changes occured in the United States in the calculation of value added. For the period 1949-52 value added was calculated by subtracting the cost of materials, fuels and electricity and contract work (excluding cost of resale) from the total value of shipments (excluding resale). For the period 1962-65 value added equals value of shipments (including resale) minus the cost of materials (including cost of resale), fuel, electricity and contract work plus the net change in finished goods and work in process inventories between beginning and end of the year.

Thus for the period 1962-65, the concept of value added relates to production undertaken in each year in both the countries. This same concept of value added applies to Canada for 1949-51, but for the United States for the period 1949-52 value added is calculated using the value of shipments adjusted for inventory changes.

However, the different methods of valuing shipments, mentioned above, in the two countries make a direct comparison of value added invalid even for the period 1962-65. As has been mentioned above, for the period 1962-65, the U.S. data for value of shipments and cost of materials includes "resales" and "cost of resales" respectively, which is not the case in Canada. In other words, the value added concept in Canada refers to production of goods of own manufacture, in the United States it refers to both production as well as to reselling activity. As has been stated above this resale value accounts for about 3 to 5 percent of value of shipments. A fair guess would be that this reselling activity would contribute about 2 percent to value added by manufacturing industries of our sample. This would appear to be an insignificant difference, too small to be able to create an undue bias in our comparisons.

The above examination has revealed that although there are a number of data comparability problems between the two countries, with the exception of differences in the definition of man-hours, in most cases biases are likely to be small. However, even small biases in the data may produce considerable bias in the productivity ratios. While it is not possible to avoid these potential biases and to obtain perfect comparability and precision, the present project proceeds on the belief that in most cases the likelihood of systematic combination of biases that would significantly distort the productivity ratios are small. Nevertheless, the above bewildering account of changes and differences in the relevant concepts in the two countries attest to the caution that must be exercised in the interpretation of results. In particular, care must be taken not to attach too much significance to small differences in the productivity ratios.

CHAPTER V

THEORY OF THE TARIFF STRUCTURE AND EFFECTIVE PROTECTIVE RATE

This chapter presents effective protective tariff rates for Canada in 1949 and 1963. The organization of the chapter is as follows: First, the theory of the effective protection rate is presented, then the model for effective tariff rate computations is developed. This is followed by discussion of data and computational problems. Finally the effective protective rates are presented.

In recent years, international trade economists have paid increasing attention to the theory of the tariff structure and effective protection. The concept of effective protection, developing the theory of tariff structure, came into economic literature in 1955 from the pen of Clarence L. Barber.[1] Since then a great deal of theoretical and empirical work has been done in recent years on many aspects of the question.[2] At the same time the formulation and

---

[1]Barber's article "The Canadian Tariff Policy" in the Canadian Journal of Economics and Political Science, Nov. 1955, represents the pioneering contribution on the subject. See also Corden's "The Tariff" in A. Hunter (ed.) The Economics of Australian Industry, Melbourne University Press, 1963.

[2]The important theoretical contributions are: William P. Travis: The Theory of Trade and Protection, Harvard University Press, Cambridge, 1964; H.G. Johnson: "The Theory of Tariff Structure with special Reference to World Trade and Development" -Etudes Et Travaux de L'Institut Universtaire de Hautes Etudes Internationales, No. 4 (Geneva: Librarie Droz, 1965) and W.M. Corden: "The Structure of a Tariff System and the Effective Protective Rate", Journal of Political Economy,

-----continued over -----

implementation of new policies have produced an increasing awareness in government and academic circles of the protective implications of the tariff structure as distinct from nominal tariff rates.

The effective protection concept recognizes the fact that internationally traded goods enter the production process at different stages and are subject to different rates of duty depending upon the stage of production. Recognizing this fact the new development concerns itself with the net effects of the tariff structure in giving protection to various stages of production within the input-output system of modern industry. In fact, whereas the traditional theory of tariffs assumes a world in which commodities are all final goods destined for final consumption and produced entirely with original factors of production, the theory of effective protection recognizes that commodities are not only produced from original factors of production, but also utilize intermediate products as inputs. Further, the protection of value added (the effective tariff) rather than the duty on product itself (the nominal tariff) is relevant for domestic producers whose main concern is whether and to what extent the tariff permits them to produce at a direct cost

---

[2]-continued- June 1966. Among empirical works important ones are: Bela Balassa, "Tariff Protection in Industrial Countries", Journal of Political Economy, Dec. 1965, Giorgi Basevi: "The United States Tariff Structure: Estimates of Effective Rates of Protection of United States' Industries and Industrial Labour", Review of Economics and Statistics, May,1966, H.G. Johnson and H.G. Grubel: "Nominal Tariff, Indirect Taxes and Effective Rates of Protection: The Common Market Countries: 1959", Economic Journal, Dec., 1967, and James R. Melvin and Bruce W. Wilkinson: Effective Protection in the Canadian Economy, Economic Council of Canada, Queen's Printer, Ottawa, 1968.

(value added) higher than that obtained under free trade conditions. In turn the protection of value added in the manufacturing process is affected not only by the tariff on the product itself, but also by duties levied on raw materials and intermediate goods used in its manufacture. It will thus be of great interest to know how much protection is afforded to an industry if we impose a duty on the final imported good or an imported intermediate good. In other words, what we are asking is: how much protection is afforded to the production process itself. The total amount of protection given to an industry by a tariff is called the effective protective rate. More precisely the effective rate of protection afforded an industry by the tariff structure may be defined as the percentage increase in value added per unit of output made possible by the tariff structure.

The basic argument in favour of the effective protection concept is that the nominal tariff structure does not accurately indicate the extent to which a particular industry receives protection. The protection afforded to an industry will depend on how high a tariff is levied not only on its products but also on its inputs. For purpose of illustration, following the model of Melvin and Wilkinson[3] (hereafter referred to as M & W) assume there are only two industries - one producing a final product the unit value of which may be taken as 1 and the other engaged in producing intermediate goods. If we let α denote the proportion which this intermediate product

---

[3]Melvin and Wilkinson, Ibid.

comprises of the value of the final product then $V = 1 - \alpha$, where V denotes the value added per unit of output.

If we use V to denote value added per unit of output before tariffs are imposed on either final good or intermediate good and require V' to indicate the value added per unit of output after the imposition of tariff on either final product or intermediate product, then the effective protection rate is given by, $g = \frac{V' - V}{V}$, where g is the effective rate of protection. In other words, effective rate of protection for an industry j is defined as the difference between the industry's value added under protection (V_j') and under free trade conditions (V_j) expressed as a percentage of the free market value added, i.e.,

$$g_j = \frac{V_j' - V_j}{V_j} \times 100$$

This formula will show that effective rate of protection will be high if the nominal tariff on output is high relative to the tariff on inputs and will be low if the nominal tariff on the final product is low relative to the tariff on inputs. This can be shown more precisely by elaborating the formula thus. Let

V_j = value added per unit of product j in activity j in the absence of tariffs.

V_j' = value added per unit of j in activity j made possible by the tariff structure.

g_j = effective rate of protection for activity j.

P_j = price of a unit of j in the absence of tariffs.

α_{ij} = proportion of input i in cost of j in the absence of tariffs.

t_j = tariff rate on j.

t_i = tariff rate on i.

Then

$$V_j = p_j\ (1 - \alpha_{ij}) \text{ ------------------------------ (i)}$$

$$V'_j = p_j\ [(1 + t_j) - \alpha_{ij}\ (1 + t_i)] \text{ ----------- (ii)}$$

$$g_j \equiv \frac{V'_j - V_j}{V_j} \text{ ---------------------------------- (iii)}$$

From equations (i), (ii) and (iii)

$$g_j = \frac{t_j - \alpha_{ij}t_i}{1 - \alpha_{ij}} \text{ ---------------------------- (iv)}$$

From this formulation it can be seen that if $t_j > t_i$, then $g_j > t_j > t_i$ and if $t_j < t_i$, then $g_j < t_j < t_i$.

The Model

The computation of effective tariff levels requires a knowledge of value added both before and after tariffs are imposed. There is no problems with respect to post tariff data but pre-tariff data requirements create formidable difficulties for we do not know precisely what would have been the magnitude of the pre-tariff numbers if there were no tariffs. It, therefore, becomes necessary to make certain assumptions in order to estimate pre-tariff magnitudes from post-tariff values. The assumptions are:[4]

---

[4]These assumptions are common in literature dealing with effective tariff. See for example, Johnson, op. cit., p. 11; Basevi, op. cit., p. 148; Balassa, op. cit., p. 576 and Melvin and Wilkinson, op. cit., pp. 8-9.

1. That the input-output coefficients or the ratio of each input to each output remains the same both before and after tariffs are imposed on both inputs and outputs. In other words, production function of fixed physical proportions is assumed and maintained between each material input and output.

2. That domestic producers price their products at world prices plus the tariff so that the internal price of each importable is given by the foreign price plus the tariff. Hence the pre-tariff price is assumed to be the observed post-tariff price less the tariff.

3. That the elasticities of demand for all exports and supply of all imports are infinite.

Consider now a simple case of an importable product, j, which has input, i, which is also an importable. There are no taxes or subsidies affecting j and i other than import tariffs. Then the formula for effective rate may be derived as follows:

α_{ij} ≡ Value of the input of good i per dollar value of output of j, i.e., the production coefficient or the input-output coefficient for the i th intermediate good in the j th industry.

t_j ≡ Nominal tariff on the j th industry.

t_i ≡ Nominal tariff on the i th input.

$\sum_{i=1}^{n} \alpha_{ij}$ ≡ The proportion of the sales value of a unit of final output of industry j under existing tariff (i.e., post tariff) structure going to intermediate inputs.

Thus:-

$V'_j \equiv 1 - \alpha' = 1 - \sum_{i=1}^{n} \alpha_{ij}$ ≡ Value added per unit of output under the existing tariff structure or post tariff value added.

$\frac{1}{1+t_j} \equiv$ The estimated pre-tariff value of a unit of output in industry j.

$\sum_{i=1}^{n} \frac{\alpha_{ij}}{1+t_i} \equiv$ Estimated total pre-tariff value of the production coefficient for the i th intermediate input into the j th industry.

And therefore,

$\frac{1}{1+t_j} - \sum_{i=1}^{n} \frac{\alpha_{ij}}{1+t_i} = V_j =$ Estimated value added per unit of output in the absence of tariffs for any industry, j, i.e., pre-tariff value.

And we get the formula.[5]

$$g_j = \frac{\left[1 - \sum_{i=1}^{n} (\alpha_{ij})\right] - \left[\frac{1}{1+t_j} - \sum_{i=1}^{n} \left(\frac{\alpha_{ij}}{1+t_i}\right)\right]}{\frac{1}{1+t_j} - \sum_{i=1}^{n} \left(\frac{\alpha_{ij}}{1+t_i}\right)}$$

Thus the effective rate of protection afforded a particular domestic industry by the tariff structure may be defined as the maximum proportion by which the value added per unit of output by primary resources employed by domestic industries can exceed the value that

---

[5]This is the formula M & W have developed for their empirical study and we have adopted it. However, this formula can be presented in several alternative ways. See for example, Johnson, op. cit., p. 12; Corden, op. cit., pp. 222-23; Balassa, op. cit., p. 577. Our choice of M & W formula has been influenced largely by the desire to maintain strict comparability of our computations with theirs. As will be seen in the following pages, we have made effective rate computations only for 1949 and have borrowed effective rates for 1963 from the M & W study.

they would add if all imports entered duty free[6].

The above formula can be used to draw the following inferences about the relationship between the tariff rate on the output (t_j) and the effective rate of protection (g_j).

(a) If the weighted average tariff on inputs is lower than the tariff on output, the effective protection will be higher than the nominal tariff.

(b) If the weighted average tariff rate on inputs is higher than the tariff on output, the effective protection will be lower than the nominal tariff.

(c) Effective and nominal rates will be identical if the weighted average of tariffs on inputs is the same as the tariff on the product itself.

(d) Effective protection can be negative (implying a tax on domestic production) if the weighted average tariff on input is higher than the output tariff or if there is no tariff on the output.

The divergence between effective and nominal tariffs arises from the fact that in an input-output system a tariff simultaneously provides a subsidy to domestic production of the goods on which they are levied and imposes taxes on the domestic production of other goods using the protected goods as inputs. The tariff on competing imports of an industry allows the producer to raise the price of his product and in this respect the tariff is a subsidy to domestic production. On the other hand, the tariff on competing intermediate and

---

[6] Basevi, op. cit., p. 148.

raw material inputs allows the domestic supplier of such products to raise their prices and in this sense the tariff is a tax on domestic production.

The structure of tariffs may have important effects in situations where, as is often the case, the nominal tariff increases with the degree of fabrication, being relatively low on raw materials, higher on semi-processed goods and highest of all on processed goods. Such a structure influences the level of relative prices tending to raise the price of manufactured products relative to other types of output. This pattern of relative prices tends to limit the market for manufactured products in relation to the market for other goods and, therefore, restricts the extent and scale of specialization.

Data Problems and Computations

Using the above formula, effective rates were computed for Canada. For 1949 we made our own computations, with the 1963 figures adopted from M & W. Since we want to make comparisons for 1949 and 1963 effective and nominal rates, we have strictly followed M & W in methodology and computations. In fact our data problems were identical.

In calculating effective protective rate, we encountered several problems. Before we started our computations the first problem was to decide whether the effective rates are to be calculated on a commodity basis or industry basis. Ideally, effective rates should be computed on a commodity basis but since output and input data on a commodity basis do not exist, the calculation of effective rates on an industry basis was the obvious alternative choice.

Before effective rates could be calculated one immediate problem was that of determining the nominal tariff on the industries. There is nothing like a single tariff on the industry in a published form. Rather, different products which constitute an industry have different rates of duty. Therefore, to find an industry tariff, some sort of weighted average of these products must be computed. Various weighting methods were available. Weights could be assigned on the basis of domestic production, consumption, world trade or imports. Availability of data being the important consideration we decided to weight by imports, realizing that this is not the most ideal method but probably the best keeping in view the availability of data. D.B.S. in its publication: Trade of Canada, Vol. III - Imports, publishes data on the duty collected and total imports of each product. Consequently once we were able to characterize imports by industry, we were able to compute the average industry tariff. Our method of relating imports to industry category was the following: first we looked to the standard industrial classification to get the industry definition and the kind of products which belong to the industry. Then we calculated from the import data the total import of each product and duty collected falling under an industry definition. Finally by dividing the total duty collected by the total value of the industry imports the average nominal tariff was computed. The going in general was smooth except at places where we had to make arbitrary judgements of classification. This happened particularly when the said D.B.S. publication lumped together duty collected and value of imports for the two products together, with each product belonging to different industry. For example, for 1949 data on "Bread and Biscuit" and "Furniture and Household goods" were lumped together but we were interested only in bread and furniture. There was no way of knowing what fraction of the total values will belong to each of the products of interest to us. We had, therefore, to take the total value.

Similar problems arose with respect to effective rate computations. On the majority of materials (inputs) used in an industry, data on total imports and duty collected was available permitting the calculation of average tariff on them and also a determination of what their value (cost) would have been had there been no tariff. However, there were certain items of materials used on which data on imports and duty collected were not available, precluding the use of this method. Presumably such materials were not imported but purchased entirely domestically. However, by assumption, if these materials were purchased domestically, their price would have been equal to the foreign price (exporting country's price) plus the tariff. Thus in order to know what would have been the pre-tariff price of such products, theoretically we only had to be aware of the foreign prices. Such information proved difficult to collect. We, therefore, used an assumed tariff rate for such materials. This assumed tariff rate was equal to the weighted average of all the different tariff rates on other imported materials.

Another problem was presented by the catch-all group listed in the Canadian census of manufactures: "all other materials used".

Here again we could have used an assumed equivalent of the weighted average of imported materials. However, we refrained from this and adopted the procedure used by M & W, so as to make our computations comparable. We used an assumed value of 8.53% (which for M & W is 11.3%) which is the weighted mean of the nominal tariff on all the industries of the sample.

Following M & W, we applied a zero tariff to "fuel and electricity" since in fact coal, natural gases and electricity have a zero or a very low tariff. Moreover, the fuel and electricity component of total cost usually made up 1 to 2 percent of the total input cost and consequently even a substantial deviation from a zero tariff would have not substantially distorted our results. Other inputs such as advertising, insurance and consulting services etc., were not distinguished in the census of manufactures, nevertheless, included in the value added estimates. We have, therefore, following M & W, treated these inputs like primary factors - Land, Labour and Capital.

Still another problem arose while collecting data on total imports and duty collected on an input. The materials used data in the census of manufactures indicated one broad category of an input used, for example iron wire, steel plates in the motor vehicle and parts industry. It is most probable that more than one variety of wire or steel plates was used in this industry but in the census of manufactures they were all lumped together under one broad category. When looking to import and tariff values, one confronts a large variety of one particular commodity group each having a different duty rate. For example, at least 10 to 15 varieties of iron wire and steel plates are distinguished in the import value according to the strength, width, and temper, etc. It is frequently difficult to know which tariff item was the one relevant to the industry in question (or whether or not they all were and if so in what proportion) and so decisions of a rather arbitrary nature sometimes had to be made. This type of difficulty arose with almost every industry and frequently a weighted average tariff on the material had to be calculated.

Other kinds of data problems arose with respect to individual industries. For some industries the census of manufactures did not provide information on inputs and consequently α_{ij}'s could not be calculated. For this reason we could not calculate effective rates for six industries of our sample. These industries were Tobacco Products industry, Air craft and Parts industry, Cement industry, Lime industry, Animal oils and fats industry and Motor Vehicle and Parts industry.

Effective Protection in Canada

After elimination of above six industries 24 industries remained for which effective rates were calculated. As mentioned above we made computations only for 1949, with the 1963 rates adopted from M & W. The result of these computations are presented in tables 5.1 and 5.2 below.

Tables 5.1 and 5.2 show that our effective rates are considerably higher than nominal rates. In fact, table 5.2 indicates that, on the average, effective rates are 2 to 4 times the nominal rates. These results thus support the widely held view that tariffs on final output tend to be higher than on the inputs.

An examination of table 5.1 also indicates, however, that in a few individual cases effective rates are lower than nominal rates. Of the 24 industries for which calculations are made, there are 3 cases in 1949 and 6 cases in 1963 for which effective rates are less than the nominal rates.

Table 5.1 also shows that for certain industries effective rates are negative - this tendency is more marked in the 1949 computations. Indeed there are three individual cases in 1949 in which the effective protection is negative. It means that for about 12% of the industries of our sample in 1949, tariffs on inputs were so much higher as compared with tariffs on outputs that the tariff structure actually made it more difficult for these producers to compete with imports than if there were no tariffs at all.

TABLE 5.1

NOMINAL AND EFFECTIVE TARIFF RATES IN CANADA: 1949 and 1963

	1949		1963	
Industry	Nominal Tariff (t_j)%	Effective Tariff (g_j)%	Nominal Tariff (t_j)%	Effective Tariff (g_j)%
1. Cotton and Jute Bags	13.5	120.7	14.7	48.5
2. Vegetable oil Mills	9.7	91.7	4.7	34.5
3. Soft Drinks	3.2	-34.6	4.9	1.4
4. Bread and Bakery	18.5	38.7	8.0	7.3
5. Leather Tanneries	12.6	60.0	8.6	16.7
6. Petroleum & Coal Products	5.4	22.4	5.3[3]	27.4[3]
7. Printing and Publishing	6.0	-3.9	1.3	0.4

--- continued on page 96 ---

Table 5.1 (cont'd)

Industry	1949 Nominal Tariff (t_j)%	1949 Effective Tariff (g_j)%	1963 Nominal Tariff (t_j)%	1963 Effective Tariff (g_j)%
8. Flour Mills	18.3	134.6	8.8	31.9
9. Fabricated Structural Metal	6.6	6.5	8.0	5.7
10. Pulp and Paper	13.2	75.1	13.0	74.9
11. Veneer and Plywood	15.0	29.1	14.4	24.9
12. Saw and Planning Mills	2.3	4.5	7.6	13.6
13. Plastic and Synth. Resins	7.0	9.2	8.2	7.1
14. Distilleries	61.9	100.2	20.0	19.3
15. Medicinal & Pharm. Products	14.3	12.7	22.5	28.8
16. Jewellery and Silverware	17.3	28.7	22.5	42.4
17. Knitting Mills	19.8	44.5	29.4[2]	56.8[2]
18. Leather Gloves	21.1	51.0	23.1	34.6
19. Sugar Refineries	7.9	9.4	24.2	-7.6
20. Fur Goods	6.4	-1.3	25.0	98.9
21. Gypsum Products	10.2	3.9	25.0	37.0
22. Brooms, Brushes	17.2	29.8	30.0	56.0
23. Furniture	9.8	10.5	25.9[1]	40.7[1]
24. Agrl. Implements	0.3	0.0	0.0	0.0

Source:

Cols 1 and 2. Dominion Bureau of Statistics: Trade of Canada, Vol III - Imports, 1949, Queen's Printer, Ottawa and Dominion Bureau of Statistics: Standard Industrial Classification, 1948, Queen's Printer, Ottawa.

Cols 3 and 4. Melvin and Wilkinson: Effective Protection in the Canadian Economy, Economic Council of Canada, 1968, Queen's Printer, Ottawa., pp. 21-28.

[1]Weighted average of tariffs rates on household furniture industry, office furniture industry and miscellaneous furniture industry.

[2]Weighted average of tariff rates on Hosiery Mills and other Knitting Mills.

[3]Weighted average of tariff rates on Petroleum Refineries and other Petroleum and Coal Products.

In all these above calculations, weights were assigned on the basis of value added.

TABLE 5.2

SIMPLE AND WEIGHTED MEANS[1] OF NOMINAL AND EFFECTIVE TARIFFS IN CANADA: 24 INDUSTRIES

	1949		1963	
	Simple Mean %	Weighted Mean %	Simple Mean %	Weighted Mean %
Nominal Rates	13.2	7.8	14.8	11.5
Effective Rates	34.8	31.5	29.2	33.9

Source: Table 5.1.

[1]Following M & W, nominal rates are weighted with industry production and effective rates are weighted with value added component of industry production.

Caution, however, must be exercised in the interpretation of our results. It is likely that the assumptions on which our effective rate computations are based may have imparted bias to our results. While this is not a place to embark on a detailed examination of various situations in which our assumptions may distort the results,[7] we will sum up the discussion only by cautioning that in the event of non-fulfillment of assumptions our computations will be over or under stated. Indeed it is impossible to know, in the event of non-fulfillment of assumptions, in what direction and extent our computations will be distorted without a much more detailed analysis of each industry.

---

[7]For an examination of likely distortions and biases in results which the assumptions might impart, see Melvin and Wilkinson, op. cit., pp. 45-50. Since we have used M & W model and methodology for 1949 effective rate computations, the M & W conditions are applicable to our results also.

CHAPTER VI

PRODUCTIVITY IN CANADA AND THE UNITED STATES

An attempt is made in this chapter to present statistical comparisons of manufacturing productivity for Canada and the United States. Productivity comparisons are presented in the following order. First we present inter-industry and inter-country comparisons based on published statistics. Then adjustment is made in the Canadian data for the price-inflation effect of the Canadian tariffs and comparisons based on adjusted data are again presented and analyzed.

The selection of the industry sample for productivity comparisons was based on the amenability of census data to the purpose at hand. Product homogeneity and product classification in the census, consistency, parallelism, and comparability over time between the countries were other principal considerations. As has been stated in Chapter III, along with the economic development of Canada, the industrial classification has undergone changes over time. The first Canadian Standard Industrial Classification system was adopted in 1948. It was revised in 1960 which resulted in the transfer and rearrangement of products between industries. Similar changes occurred in the United States seriously affecting the temporal comparability of many industries. It was under this constraint that we sought to select a sample of 30 industries for Canada consisting of export, protected, and domestic industries that would be comparable to a similar sample chosen for the United States. We have already discussed in Chapter I the measure used to classify an industry as export, protected or domestic. Table 6.1 provides information tabulated to ensure conformity with the above industry classification.

For the comparative static analysis of productivity we chose the two periods of 1949-52 and 1962-65. The selection of these two periods was made because they appeared to be ideally suited to the purpose in hand. We were interested in measuring and comparing productivity both inter-temporally and at a point of time. The figures become integral to our analysis since we are ultimately interested in testing the hypothesis that the tariff causes low productivity levels in Canada. Periods of 1949-52 and 1962-65 were best suited to our purpose since major tariff changes in Canada occurred in 1947 and 1960. Assuming a lagged response to a tariff change, the two periods chosen were deemed appropriate given the intent of the analysis.

In Chapter III, we discussed problems common to productivity analysis in general. The following discussion will consider statistical difficulties particular to this analysis. The most problematic issues were those arising from changes in definitions and concepts of input and output and industrial classification in the two countries, both as concerned intertemporal and international comparisons. Throughout we attempted to maximize the sample size given the overriding constraint of statistical comparability.

As the U.S. classification of manufacturing industries is far more detailed and comprises of far more classes than the Canadian classification, many individual industries in the two countries differ considerably in structure and product mix. Occasionally, therefore,

TABLE 6.1

TARIFF PROTECTION TO AND DOMESTIC EXPORTS OF THE SAMPLE INDUSTRIES: CANADA, 1963

S.I.C.	Industry	Nominal Tariff 1963 (%)	Domestic Exports as % of value of shipments in 1963
	Export Industries:		
311	1. Agricultural Implements	0.0	62.9
321	2. Aircrafts and parts	9.5	30.0
271	3. Pulp and paper	13.0	67.9
252	4. Veneer and Plywood	14.4	27.8
124	5. Flour Mills	8.8	31.2
143	6. Distilleries	20.0	48.2
373	7. Plastic and Synthetic Resins	8.2	45.7
2513	8. Saw and Planning Mills	7.6	40.7
	Domestic Industries:		
141	1. Soft Drinks	4.9	0.0
129	2. Bakeries	8.0	0.6
289	3. Printing and Publishing	1.3	1.9
172	4. Leather Tanneries	8.6	15.5
343	5. Lime	6.4	7.7
135	6. Vegetable Oils	4.7	7.6
223	7. Cotton and Jute Bags	14.7	0.8
341	8. Cement	3.4	3.4
101	9. Animal oils and fats	4.7	8.2
365,369	10. Petroleum and Coal Products	5.3	1.2
302	11. Fabricated Structural Metal	8.0	3.3
	Protected Industries:		
151,153	1. Tobacco Products	30.0	0.1
246	2. Fur Goods	25.0	6.8
345	3. Gypsum Products	25.0	0.0
383	4. Broom and Brush	30.0	0.9
231,239	5. Knitting Mills	29.4	1.5
175	6. Leather Gloves	23.1	1.8
133	7. Sugar Refineries	24.2	6.8
374	8. Medicine and Pharmacy	22.5	5.4
261,264,266	9. Furniture	25.9	0.9
382	10. Jewellery and Silverware	22.5	1.5
323,325	11. Motor Vehicle Parts	17.5	4.3

Source: (1) Col. I, Melvin and Wilkinson: Effective Protection in the Canadian Economy, Economic Council of Canada, Queen's Printer, Ottawa, 1968, pp. 21-28.
(2) Col.II, Dominion Bureau of Statistics: Trade of Canada-Exports, 1963, Cat.No.65-202; and Annual Industry Reports- various Industries, 1963, Queen's Printer, Ottawa.

sub-classes of industries had to be added to or subtracted from an industry to ensure maximum comparability in data between the two countries.

Apart from the classificational and definitional problems, while we had little difficulty with respect to the Canadian input-output data, we did experience problems arising out of data gaps in the United States' case. This frequently happened with respect to "cost of electricity and other materials" and "value of shipments" data which, for certain industries, were withheld for the data "did not satisfy publication standards".[1] In a few instances we had to estimate the missing value but resort to this technique was kept at a minimum level necessary for our purpose. For certain industries there were absolutely no data for one or two years. We did not attempt estimation in such cases, but rather we weighted the available data (two or three year data) to represent the entire four year period.[2]

For the inter-temporal comparison of productivity, we needed price deflators so as to be able to express productivity ratios in constant dollars. While industry price indexes and indexes of real domestic product by industry were available for Canada for most industries of the sample permitting the expression of productivity in

---

[1] U.S. Department of Commerce: Annual Survey of Manufactures, 1951 and 1953, Bureau of the Census, Washington, D.C., pp.22-31 and 22-29 respectively. Figures for some of these industries are withheld from publication either on the basis of the associated standard error of estimates, or on the basis of a consistency review. Figures are also withheld from publication if they contain extensive duplication.

[2] Since weighted averages are used this is not likely to reflect significantly in comparisons. Even if there is a bias, its magnitude is considerably reduced since in the end the industry in question becomes part of a larger group.

constant dollars, this was not the case with respect to the United States. For one third of the industries in our sample, wholesale price indexes were available, for another one-third of the industries we had to approximate by using price indexes of very close industries[3], for the remaining industries it was not possible to make approximations resulting in their having to be dropped from the sample.[4] Thus, only 23 industries were retained for comparisons in constant dollars.

Another problem arose regarding the weighting of industries when these are aggregated into broad categories. Since the industries of the sample are of different relative importance from the point of view of productivity they clearly should be assigned different weights. The question arose as to whether weights be assigned on the basis of output or employment. Weighting by output has the disadvantage that it neglects the influence of vertical integration of the industry. In principle the influence of vertical integration of the industry can be by-passed by using the value added weights. However, the problems are still not fully resolved, for in determining whether high productivity industries be assigned high or low weights, the value added and employment weights tend to give different results. If value added is used to assign weights then clearly, since high productivity, in so far as it implies low costs, tends always to result in high out-

---

[3]Price Indexes are presented in the Appendix Tables D. In the footnotes explanations of computations and approximations are also provided.

[4]Industries dropped were: Aircraft and Parts (export category), Lime, Cotton and Jute Bags, Animal oils and fats (domestic category) and Fur Goods, Broom and Brush, Jewellery and Silverware (protected category).

put, high productivity industries be assigned high weights. However, high productivity also brings reduced labour requirements per unit of output thus tending to reduce employment, with this result leading to low employment weights to high productivity industries. Since either method can be used, with each giving a different result, it was arbitrarily decided to adopt value added weighting procedure. Moreover, since the objective of the study is to examine the performance of the manufacturing industries, value added weights appeared more logical since value added measures the "manufacturing activity performed".

For measurement of the average annual percentage change in productivity for the two periods 1949-52 and 1962-65 two alternative weighting procedures were available. One could assign weights on the basis of value added in period t_{-1} or the average of periods t_{-1} plus t to each year. If the value added in period t_{-1} happens to be an extreme one, then this will produce undue influence in average change in productivity. To ensure against this we chose the second alternative.

It is now possible to present productivity measurements and comparisons for the two countries. Estimates are presented of value added per production worker, per employee, and per man-hour. The estimates are presented in constant dollars for 23 industries and in current dollars for 30 industries. It would have been desirable to have had a larger number of industries in the sample for the purpose of comparisons but the changes in industrial classification in the two countries over time precluded the comparison of a larger sample. The value added is used to estimate productivity differences on the assumption that the sample industries in both the countries in buying their input materials and selling outputs face comparable market situations so that pricing procedure will be comparable for all the industries and in both the countries.

Comparisons of the American and Canadian levels of labour productivity for 23 industries are presented in Tables 6.2 and 6.3. The coverage represents about 13 percent of manufacturing value added in both the countries. Not all the major manufacturing sectors are represented in the sample, notable exceptions being Electrical Apparatus and Supplies, Electrical Goods, Rubber Goods, Primary and non-ferrous metal products, Textile industries and Clothing, and Chemical Goods. In addition, certain other groups receive only limited representation while others are over represented. The ultimate implications of this selective sampling procedure on our comparative productivity analysis is difficult to evaluate. Requirements for randomness in sampling are not met since the selection criteria (being based on comparability over time within a country and internationally which, as previously mentioned, has been seriously affected by changes in industrial classification) automatically precluded participation by many industries. At the same time it is by no means certain that the selection criteria introduces biases favouring some industries in the ensuing productivity analysis. Hence the results may not differ greatly from those a truly random sample would produce.

Tables 6.2 and 6.3 below are self-explanatory. They show in unmistakable terms, barring few exceptions, superior American productivity performance. The results below can probably be read better if they

TABLE 6.2

PRODUCTIVITY IN CANADA AND THE UNITED STATES, 1949-52 and 1962-65 IN CONSTANT (1961) U.S. DOLLARS

	United States 1949-52 (Average)			Canada 1949-52 (Average)			United States 1962-65 (Average)			Canada 1962-65 (Average)		
	Value Added			Value Added			Value Added			Value Added		
	A* (000 $)	B* (000 $)	C* (000 $)	A* (000 $)	B* (000 $)	C* (000 $)	A* (000 $)	B* (000 $)	C* ($)	A* (000 $)	B* (000 $)	C* ($)
	13.2	10.1	5.9	11.5	8.4	5.0	25.4	18.7	11.1	15.4	9.0	7.2
Implements	11.0	8.6	5.6	6.3	5.1	3.0	15.7	11.8	7.9	9.7	7.3	4.6
r	12.4	10.7	5.6	13.0	10.9	5.2	20.2	16.4	9.1	15.4	12.8	6.4
ywood	5.5	5.1	2.6	4.8	4.2	N.A.	9.6	8.7	4.6	6.4	5.8	3.0
ing Mills	4.5	4.3	2.6	3.0	2.3	1.6	7.1	6.4	3.6	7.1	5.9	3.3
	25.6	20.2	12.3	19.0	14.8	9.7	41.2	32.9	21.2	43.7	25.9	20.5
nthetic Resins	13.9	10.2	6.7	21.0	13.4	N.A.	31.4	21.3	15.0	31.5	17.9	13.9
	13.6	11.8	6.6	12.4	9.1	N.A.	28.0	10.6	12.9	20.1	8.0	7.4
	11.0	6.7	5.2	5.0	4.2	3.3	18.1	9.9	8.7	10.2	5.1	4.6
blishing	17.4	8.5	8.3	10.4	4.9	5.0	26.2	12.2	13.8	19.8	9.3	9.9
eries	7.1	6.6	3.6	4.4	3.7	N.A.	10.8	9.3	5.4	6.7	5.9	3.1
ls	11.5	9.3	4.5	8.8	5.9	N.A.	27.6	20.1	11.7	21.5	14.8	10.0
	15.9	13.5	7.6	20.1	18.7	N.A.	28.5	23.3	14.2	31.8	22.3	14.3
Coal Products	15.2	11.9	7.5	11.2	7.7	5.4	36.7	26.1	18.4	37.6	25.5	17.5
ructural Metal	10.8	8.4	5.2	8.5	6.7	3.9	13.9	10.3	6.7	10.9	7.9	5.3
ucts	11.5	10.6	6.1	7.0	6.0	3.4	24.6	21.8	12.7	15.7	12.0	8.0
cts	18.2	15.6	7.6	13.9	10.8	N.A.	26.5	21.0	11.8	18.2	14.3	8.5
ls	4.2	3.8	2.2	2.6	2.3	1.3	7.4	6.6	3.9	5.7	4.9	2.7
es	3.8	3.4	2.2	3.0	2.7	N.A.	5.3	4.7	3.0	4.4	3.5	2.2
ries	6.7	5.7	3.1	10.5	8.9	N.A.	24.7	20.1	11.4	15.7	12.1	7.1
harmacy	20.6	13.1	10.2	13.2	7.9	6.5	53.6	29.6	26.9	31.7	12.7	14.9
	7.5	6.5	3.7	4.8	4.0	2.2	9.4	8.0	4.6	7.0	5.4	3.2
e & Parts	11.7	10.0	5.8	9.0	7.6	4.3	23.3	19.3	10.7	15.1	11.1	6.7

TABLE 6.2

PRODUCTIVITY IN CANADA AND THE UNITED STATES,1949-52 and 1962-65
IN CONSTANT (1961) U.S. DOLLARS

			United States 1949-52 (Average)			Canada 1949-52 (Average)			United Sta (Avera	
			Value Added			Value Added			Value A	
S.I.C. United States	S.I.C. Canada	Industry	A* (000 $)	B* (000 $)	C* (000 $)	A* (000 $)	B* (000 $)	C* (000 $)	A* (000 $)	B* (000 $)
2041	124	Flour Mills	13.2	10.1	5.9	11.5	8.4	5.0	25.4	18.7
3522	311	Agricultural Implements	11.0	8.6	5.6	6.3	5.1	3.0	15.7	11.8
2611,2621,2631	271	Pulp and Paper	12.4	10.7	5.6	13.0	10.9	5.2	20.2	16.4
2432	252	Veneer and Plywood	5.5	5.1	2.6	4.8	4.2	N.A.	9.6	8.7
242	2513	Saw and Planning Mills	4.5	4.3	2.6	3.0	2.3	1.6	7.1	6.4
2085	143	Distilleries	25.6	20.2	12.3	19.0	14.8	9.7	41.2	32.9
2821	373	Plastics & Synthetic Resins	13.9	10.2	6.7	21.0	13.4	N.A.	31.4	21.3
2086	141	Soft Drinks	13.6	11.8	6.6	12.4	9.1	N.A.	28.0	10.6
2051	129	Bakeries	11.0	6.7	5.2	5.0	4.2	3.3	18.1	9.9
2711,2721,2731,2741	289	Printing & Publishing	17.4	8.5	8.3	10.4	4.9	5.0	26.2	12.2
3111	172	Leather Tanneries	7.1	6.6	3.6	4.4	3.7	N.A.	10.8	9.3
2091,2092,2093	135	Vegetable oils	11.5	9.3	4.5	8.8	5.9	N.A.	27.6	20.1
3241	341	Cement	15.9	13.5	7.6	20.1	13.7	N.A.	28.5	23.3
29	365,369	Petroleum & Coal Products	15.2	11.9	7.5	11.2	7.7	5.4	36.7	26.1
344	302	Fabricated Structural Metal	10.8	8.4	5.2	8.5	6.7	3.9	13.9	10.3
21	151,153	Tobacco Products	11.5	10.6	6.1	7.0	6.0	3.4	24.6	21.8
3275	3115	Gypsum Products	18.2	15.6	7.6	13.9	10.8	N.A.	26.5	21.0
225	231,239	Knitting Mills	4.2	3.8	2.2	2.6	2.3	1.3	7.4	6.6
3151	175	Leather Gloves	3.8	3.4	2.2	3.0	2.7	N.A.	5.3	4.7
206	133	Sugar Refineries	6.7	5.7	3.1	10.5	8.9	N.A.	24.7	20.1
283	374	Medicine & Pharmacy	20.6	13.1	10.2	13.2	7.9	6.5	53.6	29.6
25-2591	261,264,266	Furniture	7.5	6.5	3.7	4.8	4.0	2.2	9.4	8.0
3717	323,325	Motor Vehicle & Parts	11.7	10.0	5.8	9.0	7.6	4.3	23.3	19.3

N.A. = Not Available
Source: Appendix Tables E and F

*A = Production Workers
*B = Total Employment
*C = Production worker Man-Hours

TABLE 6.3

CANADIAN INDUSTRY VALUE ADDED AS A PERCENTAGE OF AMERICAN INDUSTRY VALUE ADDED, 1949-52 and 1962-65, CONSTANT (1961) U.S. DOLLARS

S.I.C. United States	S.I.C. Canada	Industry	1949-52 (Average) Value Added			1962-65 (Average) Value Added		
			A	B	C	A	B	C
2041	124	Flour Mills	87.2	83.7	84.6	60.8	48.0	65.2
3522	311	Agricultural Implements	57.3	59.4	53.5	61.6	62.1	58.2
2611,2621,2631	271	Pulp and Paper	105.3	102.6	93.5	76.4	78.2	70.1
2432	252	Veneer and Plywood	83.4	82.5	*	66.6	66.7	65.9
242	2513	Saw and Planning Mills	65.5	54.2	60.3	99.8	91.1	91.1
2085	143	Distilleries	74.2	91.9	79.3	104.8	79.9	99.1
2821	373	Plastic and Synthetic Resins	153.5	133.6	*	100.6	84.1	93.1
2086	141	Soft Drinks	91.9	151.6	*	74.6	94.0	64.8
2051	129	Bakeries	45.4	63.3	43.0	56.2	51.6	53.0
2711,2721,273,2741	289	Printing & Publishing	60.5	57.2	60.9	75.2	76.3	71.5
3111	172	Leather Tanneries	61.0	59.0	*	62.4	63.4	57.9
2091,2092,2093	135	Vegetable oils	44.4	64.6	*	78.6	71.4	85.7
3241	341	Cement	127.5	139.5	*	111.8	95.9	101.2
29	265,369	Petroleum & Coal Products	73.7	64.9	70.9	103.4	98.5	95.9
344	302	Fabricated Structural Metal	79.2	79.6	75.1	78.4	76.9	78.8
21	151,153	Tobacco Products	60.9	56.7	54.8	63.8	55.1	62.7
3275	345	Gypsum Products	77.0	70.1	*	68.7	68.3	72.1
325	231,239	Knitting Mills	62.7	60.3	57.8	76.8	74.7	69.4
3151	175	Leather Gloves	79.8	80.1	*	85.5	76.0	75.6
206	133	Sugar Refining	159.0	157.4	*	65.3	61.7	63.8
283	374	Medicine & Pharmacy	68.5	64.1	67.1	68.5	64.1	67.1
25-2591	261,264,266	Furniture	80.5	61.7	61.0	73.9	67.9	79.0
3717	323,325	Motor Vehicle & Parts	74.2	73.5	72.6	64.6	57.6	63.0

* Not Available

Source: Table 6.2

are presented in index number form. Thus the Table 6.4 merely represents Tables 6.2 and 6.3 in the suggested transformation. Table 6.5 summarizes Table 6.4 to give a birds eye view.

Considering productivity at a point of time the above tables show that in the first period (1949-52) only cement, pulp and paper and sugar refining industries showed an advantage for Canada, however, by the 1962-65 period this advantage for these industries had been eroded. Generally speaking, the productivity differentials evident in the 1949-52 period were maintained in the latter period, with only a few Canadian industries improving their relative productivity performance. Aside from a few industries mentioned above in the first period, the United States' advantage more or less prevails in all industries. The American productivity advantage appears to hold in a number of industries characterised by markedly different production runs. For example, American productivity advantages exist in assembly-line industries (automobiles), in continuous industries (petroleum and coal products) and batch production industries (fabricated structural metal and distilleries). With respect to product groups it applies to consumer goods (like motor vehicles and parts), non-durable goods (like tobacco products) and producer goods (like agricultural implements). Thus in general, the United States has an unmistakable productivity advantage, with our results appearing consistent with the findings of earlier investigations.[5]

---

[5]Fullerton and Hampson, *op. cit.*, pp. 147-62, Maddison, *op. cit.*, pp. 237-38.

TABLE 6.4

INDICES OF PRODUCTIVITY IN THE
UNITED STATES AND CANADA, 1949-52 and 1962-65
UNITED STATES = 100

	1949-52 (Average)						(1962-65) (Average)					
	Value Added						Value Added					
	A U.S.	A Canada	B U.S.	B Canada	C U.S.	C Canada	A U.S.	A Canada	B U.S.	B Canada	C U.S.	C Canada
ls	100	87.1	100	83.2	100	84.7	100	79.0	100	48.1	100	64.9
ral Implements	100	57.3	100	59.3	100	53.6	100	60.6	100	61.9	100	58.2
Paper	100	104.8	100	101.9	100	92.9	100	61.8	100	78.0	100	70.3
d Plywood	100	87.3	100	82.3	100	-	100	64.8	100	66.7	100	65.2
'lanning Mills	100	66.1	100	53.5	100	61.5	100	100.0	100	92.2	100	91.7
ries	100	74.2	100	73.3	100	78.9	100	101.4	100	78.7	100	96.7
nd Synthetic Resins	100	151.1	100	131.4	100	N.A.	100	103.3	100	84.0	100	92.7
ks	100	91.2	100	77.1	100	N.A.	100	71.8	100	75.5	100	72.9
	100	45.4	100	62.7	100	63.2	100	56.4	100	51.5	100	52.9
& Publishing	100	59.8	100	57.6	100	60.7	100	75.6	100	76.2	100	71.7
Tanneries	100	62.0	100	57.8	100	N.A.	100	62.0	100	63.4	100	57.0
e oils	100	76.5	100	63.4	100	N.A.	100	77.9	100	73.6	100	85.5
	100	126.4	100	138.5	100	N.A.	100	111.6	100	95.7	100	100.1
m & Coal Products	100	73.7	100	64.7	100	72.0	100	102.5	100	97.7	100	95.1
ed Structural Metal	100	78.7	100	79.8	100	75.0	100	78.4	100	76.7	100	79.1
Products	100	60.9	100	56.6	100	55.7	100	63.8	100	55.0	100	63.0
roducts	100	76.4	100	69.2	100	N.A.	100	68.8	100	68.1	100	72.0
Mills	100	61.9	100	60.5	100	59.1	100	77.0	100	74.2	100	69.2
Gloves	100	78.9	100	79.4	100	N.A.	100	83.0	100	74.5	100	73.3
fineries	100	156.7	100	156.1	100	N.A.	100	63.6	100	60.2	100	62.3
& Pharmacy	100	64.1	100	60.3	100	63.7	100	59.1	100	42.9	100	55.4
e	100	64.0	100	61.5	100	59.5	100	74.5	100	67.5	100	69.6
hicle & Parts	100	76.9	100	76.0	100	74.1	100	76.2	100	57.5	100	62.5

TABLE 6.4

INDICES OF PRODUCTIVITY IN THE
UNITED STATES AND CANADA, 1949-52 and 1962-65
UNITED STATES = 100

S.I.C. United States	S.I.C. Canada	Industry	1949-52 (Average) Value Added A U.S.	A Canada	B U.S.	B Canada	C U.S.	C Canada	A U.S.	A Canada
2041	124	Flour Mills	100	87.1	100	83.2	100	84.7	100	79.0
3522	371	Agricultural Implements	100	57.3	100	59.3	100	53.6	100	60.6
2611,2621,2631	271	Pulp and Paper	100	104.8	100	101.9	100	92.9	100	61.8
2432	252	Veneer and Plywood	100	87.3	100	82.3	100	–	100	64.8
242	2513	Saw and Planning Mills	100	66.1	100	53.5	100	61.5	100	100.0
2085	143	Distilleries	100	74.2	100	73.3	100	78.9	100	101.4
2821	373	Plastic and Synthetic Resins	100	151.1	100	131.4	100	N.A.	100	103.3
2086	141	Soft Drinks	100	91.2	100	77.1	100	N.A.	100	71.8
2051	129	Bakeries	100	45.4	100	62.7	100	63.2	100	56.4
2711,2721,273,2741	289	Printing & Publishing	100	59.8	100	57.6	100	60.7	100	75.6
3111	172	Leather Tanneries	100	62.0	100	57.8	100	N.A.	100	62.0
2091	135	Vegetable oils	100	76.5	100	63.4	100	N.A.	100	77.9
3241	341	Cement	100	126.4	100	138.5	100	N.A.	100	111.6
29	365,369	Petroleum & Coal Products	100	73.7	100	64.7	100	72.0	100	102.5
344	302	Fabricated Structural Metal	100	78.7	100	79.8	100	75.0	100	78.4
21	151,153	Tobacco Products	100	60.9	100	56.6	100	55.7	100	63.8
3275	345	Gypsum Products	100	76.4	100	69.2	100	N.A.	100	68.8
225	231,239	Knitting Mills	100	61.9	100	60.5	100	59.1	100	77.0
3151	175	Leather Gloves	100	78.9	100	79.4	100	N.A.	100	83.0
206	133	Sugar Refineries	100	156.7	100	156.1	100	N.A.	100	63.6
283	374	Medicine & Pharmacy	100	64.1	100	60.3	100	63.7	100	59.1
25-2591	261,264,266	Furniture	100	64.0	100	61.5	100	59.5	100	74.5
3717	323,325	Motor Vehicle & Parts	100	76.9	100	76.0	100	74.1	100	76.2

Source: Table 6.2

TABLE 6.5

INDICES OF PRODUCTIVITY IN THE UNITED STATES AND CANADA, 1949-52 and 1962-65
OVERALL WEIGHTED AVERAGES:
UNITED STATES = 100

1949-52 (Average)

	A	B	C*
United States	100.0	100.0	100.0
Canada	82.2	83.5	72.9

1962-65 (Average)

	A	B	C*
United States	100.0	100.0	100.0
Canada	72.0	70.1	67.2

Source: Table 6.2

* This computation is for a sample of only 14 industries for which data was available for Canada.

Overall Weighted Averages

An interesting overall picture emerges from the above results. Table 6.5 shows that Canadian productivity relative to the United States in the industries of the sample, when measured in terms of value added per production worker, per employee and per man-hour was lower by 18, 17 and 27 percent respectively for the first period. For the second period the corresponding figures were lower by 28, 30 and 33 percent. This means that not only does a productivity gap exist between the United States and Canada at a point of time, but also that the United States' advantage has tended to increase over the years. In other words, productivity advance in Canada has tended to lag behind that of the United States. This conclusion is further substantiated in the results of Tables 6.6 and 6.7 below.

Current Dollar Measurements

To guard against the inadequacies of the price deflators and the biases that might have crept into our computations because of the approximations we made in developing the price indices, we also computed productivity for each year in current dollars though clearly inter-temporal comparisons were not possible on this basis. The results of these computations are shown in Tables 6.8, 6.9 and 6.10 below.

Worthy of note in Table 6.9 is the marked productivity advantage belonging to the United States in most of the industries. When these data are aggregated and presented in Table 6.10 we find the Canadian labour productivity to be lower than that in the United States

TABLE 6.6

GROWTH OF PRODUCTIVITY IN THE
UNITED STATES AND CANADA, 1949-52 and 1962-65
1949-52 = 100

			United States Value added					
			A		B		C	
S.I.C. United States	S.I.C. Canada	Industry	U.S. 1949-52	U.S. 1962-65	U.S. 1949-52	U.S. 1962-65	U.S. 1949-52	U.S. 1962-65
2041	124	Flour Mills	100	192.4	100	185.1	100	188.1
3522	311	Agricultural Implements	100	142.7	100	137.2	100	141.1
2611,2621,2631	271	Pulp and Paper	100	162.9	100	153.3	100	162.5
2432	252	Veneer and Plywood	100	174.5	100	170.6	100	176.9
242	2513	Saw and Planning Mills	100	157.8	100	148.8	100	138.5
2085	143	Distilleries	100	165.2	100	162.9	100	172.4
2821	373	Plastic & Synthetic Resins	100	225.9	100	208.8	100	223.9
2086	141	Soft Drinks	100	205.9	100	189.8	100	195.5
2051	129	Bakeries	100	164.5	100	147.8	100	167.3
2711,2721,273,2741	289	Printing and Publishing	100	150.6	100	143.5	100	166.3
3111	172	Leather Tanneries	100	152.1	100	145.3	100	154.0
2091,2092,2093	135	Vegetable Oils	100	240.0	100	216.1	100	260.0
3241	341	Cement	100	179.2	100	172.6	100	186.8
29	365,369	Petroleum & Coal Products	100	241.4	100	219.3	100	245.3
344	302	Fabricated Structural Metal	100	128.9	100	122.6	100	128.8
21	151,153	Tobacco Products	100	213.9	100	205.7	100	208.2
3275	345	Gypsum Products	100	145.6	100	134.6	100	155.3
225	231,239	Knitting Mills	100	172.6	100	173.7	100	177.3
3151	175	Leather Gloves	100	139.5	100	138.2	100	136.4
206	133	Sugar Refining	100	368.6	100	352.6	100	367.7
283	374	Medicine & Pharmacy	100	260.2	100	226.0	100	263.7
25-2591	261,264,266	Furniture	100	125.3	100	123.1	100	124.3
3717	323,325	Motor Vehicle & Parts	100	199.1	100	193.0	100	184.5

Source: Table 6.3

	Canada			
	Value Added			
	B		C	
anada 62-65	Canada 1949-52	Canada 1962-65	Canada 1949-52	Canada 1962-65
33.9	100	107.1	100	144.0
54.0	100	143.1	100	153.3
18.5	100	117.4	100	123.1
33.3	100	138.1	100	N.A.
36.7	100	256.5	100	206.3
30.0	100	175.0	100	211.3
50.0	100	133.6	100	N.A.
62.1	100	87.9	100	N.A.
04.0	100	127.4	100	139.4
90.4	100	189.7	100	198.0
52.3	100	159.5	100	N.A.
44.3	100	250.8	100	N.A.
58.2	100	119.3	100	N.A.
35.7	100	331.2	100	324.1
28.2	100	117.9	100	135.9
24.3	100	200.0	100	235.3
30.9	100	132.6	100	N.A.
19.2	100	213.0	100	242.2
46.7	100	129.6	100	N.A.
49.5	100	135.9	100	N.A.
40.2	100	160.8	100	229.2
45.8	100	135.0	100	145.5
67.8	100	146.1	100	155.8

TABLE 6.7

GROWTH OF PRODUCTIVITY IN THE UNITED STATES AND CANADA: SUMMARY TABLE

	A	B	C
% Change from period I to period II in the U.S.	102.5	83.5	96.6
% Change from period I to period II in Canada	77.3	54.0	81.4
% Canadian change from period I to period II as a % of the U.S.	75.4	64.7	84.3

Source: Table 6.2

TABLE 6.8

PRODUCTIVITY IN THE UNITED STATES AND CANADA,1949-52 and 1962-65
IN CURRENT U.S. DOLLARS

	U.S. 1949-52 (Average)			Canada 1949-52 (Average)			U.S. 1962-65 (Average)			Canada 1962-65 (Average)		
	Value added			Value added			Value added			Value added		
try	A (000 $)	B (000 $)	C ($)	A (000 $)	B (000 $)	C ($)	A (000 $)	B (000 $)	C ($)	A (000 $)	B (000 $)	C ($)
Mills	13.1	10.0	5.9	8.9	6.5	3.8	24.3	17.9	10.6	17.3	10.0	8.1
ultural Implements	8.5	6.7	4.4	5.3	4.4	2.6	16.4	12.3	8.2	9.9	7.6	4.7
aft and Parts	7.5	5.6	3.5	5.1	3.5	2.3	20.8	11.9	10.0	10.7	6.9	5.0
and Paper	10.5	9.1	4.7	11.5	9.6	4.6	20.4	16.6	9.2	17.2	13.3	7.3
r and Plywood	6.2	5.7	2.9	5.0	4.6	N.A.	9.3	8.4	4.4	6.9	6.2	4.8
nd Planning Mills	4.3	4.0	2.4	4.7	3.6	2.4	7.4	6.7	3.8	7.6	6.3	3.6
lleries	23.3	18.4	11.1	16.9	13.2	8.7	42.5	33.5	21.2	45.4	26.8	21.3
ics & Synthetic Resins	16.1	11.9	7.8	14.3	9.2	N.A.	30.6	20.7	14.6	30.0	17.0	13.2
Drinks	12.9	5.7	6.3	9.7	7.2	N.A.	30.9	11.7	14.3	23.4	9.0	10.6
ies	9.1	5.5	4.3	3.9	3.3	1.7	18.6	10.2	8.9	11.2	5.6	5.1
ing & Publishing	14.8	7.3	7.0	9.8	4.7	4.7	28.2	13.1	14.9	18.4	8.7	9.2
er Tanneries	7.0	6.3	3.5	4.2	3.6	N.A.	16.7	9.3	5.3	6.8	6.0	3.2
	7.6	6.5	3.4	9.1	8.3	N.A.	17.9	14.6	8.5	14.1	11.2	6.4
able Oil Mills	11.9	9.6	4.7	15.4	10.3	N.A.	22.6	17.0	9.6	22.2	15.2	10.3
n and Jute Bags	6.4	5.4	3.3	3.9	3.3	N.A.	8.9	7.7	4.6	7.7	6.4	3.8
t	12.0	10.2	5.7	13.8	12.8	N.A.	28.0	22.9	13.9	33.4	23.4	15.0
l Oils & Fats	10.1	7.7	4.3	5.2	4.2	N.A.	20.1	14.7	8.9	19.1	13.3	8.1
leum and Coal Products	13.7	10.7	6.8	15.0	10.3	7.1	35.4	25.2	18.9	36.1	24.5	16.8
cated Structural Metal	8.9	7.0	4.3	8.2	6.3	3.7	13.9	10.3	6.8	11.4	8.3	5.5
co Products	9.5	8.7	5.0	7.2	6.1	3.5	25.3	22.3	13.0	15.6	11.9	7.9
oods	8.1	6.7	5.1	4.9	3.6	N.A.	14.1	11.8	7.5	9.0	6.4	4.5
m Products	14.8	12.7	6.2	9.8	7.6	N.A.	27.0	21.6	12.1	18.4	14.4	8.6
s and Brushes	7.2	6.1	3.9	4.6	4.2	N.A.	12.9	10.5	6.7	9.0	5.7	4.3
ing Mills	4.4	4.0	2.3	3.5	3.1	1.7	7.3	6.5	3.8	5.5	4.8	2.6
er Goods	3.7	3.3	2.0	2.5	2.2	N.A.	5.3	4.8	3.0	4.6	3.6	2.3
Refineries	8.1	7.0	3.8	9.2	7.8	N.A.	20.9	18.1	9.6	19.8	15.2	8.9
cine & Pharmacy	21.1	13.4	10.4	11.7	7.0	5.8	51.8	28.6	26.0	31.1	12.4	14.7
ture	5.9	5.1	2.9	4.1	3.4	1.9	9.8	8.3	4.8	7.1	5.5	3.2
Vehicle & Parts	9.3	8.0	4.6	8.2	6.9	4.0	23.1	19.2	10.7	15.5	11.4	6.9
llery & Silverware	6.6	5.3	3.3	4.5	3.6	N.A.	12.6	9.8	5.9	8.1	5.8	3.9

TABLE 6.8

PRODUCTIVITY IN THE UNITED STATES AND CANADA, 1949-52 and 1962-65 IN CURRENT U.S. DOLLARS

S.I.C. United States	S.I.C. Canada	Industry	U.S. 1949-52 (Average) Value added A (000 $)	B (000 $)	C ($)	Canada 1949-52 (Average) Value added A (000 $)	B (000 $)	C ($)	U.S. 1962-65 (Average) Value added A (000 $)	B (000 $)	C ($)
2041	124	Flour Mills	13.1	10.0	5.9	8.9	6.5	3.8	24.3	17.9	10.
3522	311	Agricultural Implements	8.5	6.7	4.4	5.3	4.4	2.6	16.4	12.3	8.
372	321	Aircraft and Parts	7.5	5.6	3.5	5.1	3.5	2.3	20.8	11.9	10.
2611,2621,2631	271	Pulp and Paper	10.5	9.1	4.7	11.5	9.6	4.6	20.4	16.6	9.
2432	252	Veneer and Plywood	6.2	5.7	2.9	5.0	4.6	N.A.	9.3	8.4	4.
242	2513	Saw and Planning Mills	4.3	4.0	2.4	4.7	3.6	2.4	7.4	6.7	3.
2085	143	Distilleries	23.3	18.4	11.1	16.9	13.2	8.7	42.5	33.5	21.
2821	373	Plastics & Synthetic Resins	16.1	11.9	7.8	14.3	9.2	N.A.	30.6	20.7	14.
2086	141	Soft Drinks	12.9	5.7	6.3	9.7	7.2	N.A.	30.9	11.7	14.
2051	129	Bakeries	9.1	5.5	4.3	3.9	3.3	1.7	18.6	10.2	8.
2711,2721,273,2741	289	Printing & Publishing	14.8	7.3	7.0	9.8	4.7	4.7	28.2	13.1	14.
3111	172	Leather Tanneries	7.0	6.3	3.5	4.2	3.6	N.A.	16.7	9.3	5.
3274	343	Lime	7.6	6.5	3.4	9.1	8.3	N.A.	17.9	14.6	8.
2091,2092,2093	135	Vegetable Oil Mills	11.9	9.6	4.7	15.4	10.3	N.A.	22.6	17.0	9.
2393	223	Cotton and Jute Bags	6.4	5.4	3.3	3.9	3.3	N.A.	8.9	7.7	4.
3241	341	Cement	12.0	10.2	5.7	13.8	12.8	N.A.	28.0	22.9	13.
2094	101 (A part)	Animal Oils & Fats	10.1	7.7	4.3	5.2	4.2	N.A.	20.1	14.7	8.
29	365,369	Petroleum and Coal Products	13.7	10.7	6.8	15.0	10.3	7.1	35.4	25.2	18.
344	302	Fabricated Structural Metal	8.9	7.0	4.3	8.2	6.3	3.7	13.9	10.3	6.
21	151,153	Tobacco Products	9.5	8.7	5.0	7.2	6.1	3.5	25.3	22.3	13.
2371	246	Fur Goods	8.1	6.7	5.1	4.9	3.6	N.A.	14.1	11.8	7.
3275	345	Gypsum Products	14.8	12.7	6.2	9.8	7.6	N.A.	27.0	21.6	12.
3981	383	Brooms and Brushes	7.2	6.1	3.9	4.6	4.2	N.A.	12.9	10.5	6
225	231,239	Knitting Mills	4.4	4.0	2.3	3.5	3.1	1.7	7.3	6.5	3
3151	175	Leather Goods	3.7	3.3	2.0	2.5	2.2	N.A.	5.3	4.8	3
206	133	Sugar Refineries	8.1	7.0	3.8	9.2	7.8	N.A.	20.9	18.1	9
283	374	Medicine & Pharmacy	21.1	13.4	10.4	11.7	7.0	5.8	51.8	28.6	26
25-2591	261,264,266	Furniture	5.9	5.1	2.9	4.1	3.4	1.9	9.8	8.3	4
371	323,325	Motor Vehicle & Parts	9.3	8.0	4.6	8.2	6.9	4.0	23.1	19.2	10
391	382	Jewellery & Silverware	6.6	5.3	3.3	4.5	3.6	N.A.	12.6	9.8	5

Source: Appendix Tables B and C.

TABLE 6.9

CANADIAN INDUSTRY VALUE ADDED AS A PERCENTAGE OF THE AMERICAN INDUSTRY VALUE ADDED, 1949-52 and 1962-65 CURRENT U.S. DOLLARS

			1949-52 (Average) Value added			1962-65 (Average) Value added		
S.I.C. United States	S.I.C. Canada	Industry	A	B	C	A	B	C
2041	124	Flour Mills	68.0	65.5	64.9	70.8	55.8	76.0
3522	311	Agricultural Implements	64.1	66.5	59.3	60.5	61.0	56.9
372	321	Aircraft and Parts	67.7	63.0	65.0	51.3	58.1	50.4
2611,2621,2631	271	Pulp and Paper	109.4	106.1	96.7	78.6	80.4	79.0
2432	252	Veneer and Plywood	82.1	81.0	N.A.	75.5	72.8	73.0
242	2513	Saw and Planning Mills	109.4	90.2	107.5	102.9	93.4	95.5
2085	143	Distilleries	72.6	71.9	78.4	108.0	81.3	102.4
2812	373	Plastics and Synthetic Resins	88.9	77.4	N.A.	98.4	82.4	90.7
2086	141	Soft Drinks	74.8	125.4	N.A.	74.8	77.3	74.8
2051	129	Bakeries	75.9	59.8	40.4	59.9	55.0	56.9
2711,2721,273,2741	289	Printing and Publishing	66.8	64.1	67.2	65.4	66.0	61.6
3111	172	Leather Tanneries	59.4	57.5	N.A.	63.3	65.0	59.3
3274	343	Lime	120.4	128.2	N.A.	78.7	76.7	74.5
2091,2092,2093	135	Vegetable Oil Mills	130.4	108.7	N.A.	98.6	89.6	82.7
2393	223	Cotton and Jute Bags	66.2	64.5	N.A.	86.4	83.0	82.3
3241	341	Cement	115.6	126.5	N.A.	119.2	102.2	107.7
2094	101 (Part of)	Animal Oils and Fats	51.4	54.0	N.A.	94.6	90.4	89.9
29	365,369	Petroleum & Coal Products	108.5	95.8	103.9	102.7	97.9	91.5
344	302	Fabricated Structural Metal	91.8	90.8	84.7	82.0	80.8	81.6
21	151,153	Tobacco Products	75.4	70.2	68.4	63.2	53.1	60.4
2371	246	Fur Goods	55.6	50.8	N.A.	63.8	54.5	59.9
3275	345	Gypsum Products	66.6	60.6	N.A.	68.6	67.8	67.8
3981	383	Brooms and Brushes	64.7	59.3	N.A.	69.8	54.7	64.9
225	231,239	Knitting Mills	78.7	77.2	71.9	75.3	73.0	68.9
3151	175	Leather Gloves	67.6	65.9	N.A.	87.5	77.2	78.1
206	133	Sugar Refineries	113.3	120.1	N.A.	94.7	85.7	93.0
283	374	Medicine & Pharmacy	63.2	59.0	62.5	60.2	43.6	56.5
25-2591	261,264,266	Furniture	68.3	66.4	66.1	72.0	66.2	66.9
3717	323,325	Motor Vehicle & Parts	87.6	86.6	85.7	67.2	59.4	64.6
391	382	Jewellery & Silverware	67.9	68.5	N.A.	64.5	59.3	65.7

Source: Table 6.8

TABLE 6.10

WEIGHTED AVERAGE OF PRODUCTIVITY
IN THE UNITED STATES AND CANADA, 1949-52 and 1962-65
IN CURRENT U.S. DOLLARS

	A (000 $)	B (000 $)	C ($)
United States			
1949-52	10.1	7.6	4.9
1962-65	23.3	15.5	11.3
Canada			
1949-52	8.9	6.8	4.6
1962-65	17.2	11.5	7.8
Canada as % of the United States			
1949-52	88.1	89.5	93.9
1962-65	73.8	74.2	69.0

Source: Table 6.8

by 12, 10 and 6 percent in the first period for three measurements of value added per production worker, per employee and per man-hour respectively. For the latter period the corresponding Canadian figures are lower by 26, 26 and 31 percent. These results, as compared to Table 6.5, show that for the period 1949-52, the Canadian disadvantage changes significantly in pattern. For the latter period, 1962-65, the two measurements yield almost similar results. This small difference in the two results for the 1962-65 period and the significant divergence in the results for the 1949-52 period may reflect, to some extent, the inadequacies of the price indices we developed and used to deflate the value added data into constant dollars. Whatever the underlying reason for these results, basically both computations lead to the same conclusion: that a productivity gap exists between the United States and Canada.

It is possible that we might have selected a sample of industries which is biased and produces the results as they are. To guard against this possibility, we decided to study all the industries classified in the Canadian Industrial Manual for a single year. The year 1965 was chosen. However, of the 140 industries classified in the Canadian manual, only about 100 appeared to be comparable with the counterparts in the United States. We had, therefore, to be content with this slightly smaller sample. Table 6.11 below shows the proportion of the manufacturing sector covered by this sample.

This Table shows that our sample of about 100 industries for 1965 covered more than two-thirds of the manufacturing industrial sector in the two countries. This will presumably do away with the disadvantages associated with smaller samples on which our earlier analysis is based.

A look at the Appendix Table J from which Table 6.12 is derived

TABLE 6.11

PROPORTION OF MANUFACTURING SECTOR COVERED BY SELECTED INDUSTRIES IN 1965

	Canada %	United States %
1. Production workers	72.6	72.0
2. Employment	72.6	69.8
3. Man-hours	76.3	72.8
4. Value Added	75.7	71.0
5. Value of shipments	79.2	71.4

Source: Col. I. Appendix Table H and Dominion Bureau of Statistics: Canada Year Book,1969, Queen's Printer, Ottawa, p. 703.
Col. II. Appendix Table I and U.S. Bureau of the Census: Statistical Abstract of the United States, U.S. Government Printing Office, Washington D.C., pp. 737 and 753.

TABLE 6.12

PRODUCTIVITY IN THE UNITED STATES AND CANADA IN 1965: WEIGHTED AVERAGES

	A (000 U.S. $)	B (000 U.S. $)	C (U.S. $)
Canada	15.9	10.1	7.1
United States	21.3	14.8	10.5
Canada as % of the United States	74.7	68.2	67.6

Source: Appendix Tables H, I and J.

will show a marked American productivity advantage over Canada. Once again the American advantage is not confined to any special product group but seemingly applies to different kinds of goods, and different production processes and technologies.

Table 6.12 presenting a birds eye view of Appendix Table J shows Canadian productivity in terms of value added per production worker, per employee and per man-hour to be lower by 25, 32 and 32 percent respectively relative to that of the United States. These results are further supported by the estimates made for total manufacturing and 129 comparable industries in the United States and Canada for a single year 1963 by the Department of Industry, Trade and Commerce. This department's computations show that for total manufacturing Canadian productivity per man-hour and per employee in 1963 relative to the United States was lower by 33.3 and 28.6 percent respectively and for 129 comparable industries Canadian figures were below the United States' level by 24.0 and 23.2 percent respectively.[6]

To further guard against the limitations of small sampling procedures and deriving conclusions on a single years productivity comparisons, we decided to compare the United States-Canada productivity using industry totals on a time series basis for all the manufacturing in the two countries. The results of the computation are shown in the Table 6.13.

This table shows that Canadian productivity has been historically

---

[6]Department of Industry: Comparative Tables of Principal Statistics and Ratios for Selected Manufacturing Industries: Canada and the United States 1963 and 1950, Office of Economic Advisor, Productivity Division, Ottawa, 1967, p.1.

TABLE 6.13

AMERICAN-CANADIAN PRODUCTIVITY LEVELS FOR THE TOTAL MANUFACTURING SECTORS IN U.S. CONSTANT (1961) DOLLARS

	United States		Canada	
	Value added per employee (000 $)	Value added per production worker (000 $)	Value added per employee (000 $)	Value added per production worker (000 $)
1947	6.9	8.1	4.9	N.A.
1948	-	-	-	-
1949	6.9	8.6	5.1	N.A.
1950	7.3	9.2	5.4	6.7
1951	7.1	8.9	5.5	7.2
1952	7.5	9.5	5.6	7.1
1953	7.9	10.0	5.8	7.3
1954	8.0	10.4	5.9	7.6
1955	8.4	10.9	6.3	8.1
1956	8.9	11.6	6.6	8.6
1957	8.8	11.7	6.7	N.A.
1958	8.9	12.2	6.9	N.A.
1959	9.7	13.1	7.3	N.A.
1960	10.1	13.9	7.9	N.A.
1961	10.1	13.9	6.9	10.7
1962	10.7	14.8	8.0	11.4
1963	11.3	15.7	8.3	11.8
1964	11.9	16.6	8.7	12.2
1965	12.3	17.0	9.0	12.6
1966	12.5	17.3	9.2	12.9
Average	9.2	12.3	6.9	9.6

N.A. = Not Available

Source: Cols. I and II. U.S. Bureau of the Census: Statistical Abstract of the United States, Various years, U.S. Government Printing Office, Washington D.C., and U.S. Bureau of Labour Statistics: Handbook of Labour Statistics, 1967, U.S. Government Printing Office, Washington D.C., p. 239.

Cols. III and IV. Dominion Bureau of Statistics: Canada Year Book, Various years, Queen's Printer, Ottawa, and United Nations: Statistical Year Book, Various years, Statistical Office of the United Nations, Department of Economic and Social Affairs, New York.

lower relative to the United States. For the entire period it works out that the Canadian productivity when expressed in terms of productivity per employee and per production worker was 75 and 78 percent respectively of the United States' level. Thus, these computations once again merely support our earlier findings of lower Canadian productivity relative to the United States. Regardless of which of the four productivity measures is accepted, the conclusion is the same: there exists a significant productivity gap between the Canadian and American manufacturing industries.

To verify that the differences between the American and the Canadian productivity are significant, a "t" test for significance of differences between the two means was run with respect to all four samples. However, the results were found to be insignificant at a 5 percent probability level. These results thus do not support our findings of the existence of a productivity gap between the two countries. The possible explanation for the insignificant "t" values appeared to be that there exist within the samples too large an industry to industry or year to year variation in productivity. When the variance is large the standard error of estimate increases, hence calculated "t" value becomes small. When the variance of the sample is large, it decreases the calculated "t" because it shows up in the denominator of the test statistic. Therefore, the "t" value will be less likely to fall in the critical range of "t" distribution, thereby not enabling the hypothesis of $\overline{X}_1 - \overline{X}_2 = 0$ at a given level of significance to be rejected. Hence this analysis ("t" test for significance) is ignored and the result that a significant productivity gap exists between the two countries is taken for granted in the following analysis.

Average Annual Percentage Change in Productivity in Canada and the United States

The average annual percentage changes in productivity in the same group of industries in the two countries for the periods 1949-52 and 1962-65 are presented in Tables 6.14 and 6.15 below. The trend in productivity has been computed not as a change between the terminal years, but as a weighted average of the year to year change with each annual change being expressed as a percentage of the preceding years figure. The prime advantage of this method appears to be that it does not give undue influence to extreme or random observations.

Table 6.14 shows the average percentage change in productivity for the periods 1949-52 and 1962-65 and Table 6.15 summarizes Table 6.14 and presents in a condensed form the annual percentage change in the two countries. Table 6.14 shows that in both the countries different industries have been characterised by different rates of productivity growth or decline in the two periods.

Table 6.15 shows that the average annual percentage change in productivity was considerably higher for Canada for the first period than for the latter period as compared with the United States. However, in this case the rate of change in a particular period does not appear to be very important because the time period is very short. We have, therefore, computed annual percentage changes in productivity for the entire manufacturing sector in the two countries for a time series data. The Table 6.16 below shows that the average annual percentage increase in productivity was higher in Canada than in the United States for both the periods. Thus to catch up with the United States' productivity levels will require the Canadian productivity to grow on a sus-

TABLE 6.14

AVERAGE PERCENTAGE CHANGE IN PRODUCTIVITY:
UNITED STATES AND CANADA,
1949-52 and 1962-65

	United States 1949-52			United States 1962-65			Canada 1949-52			Canada 1962-65		
	Value Added			Value Added			Value Added			Value Added		
	A	B	C	A	B	C	A	B	C	A	B	C
	3.9	4.0	3.4	5.8	6.1	7.2	7.7	6.9	7.8	4.9	3.6	4.2
Implements	5.4	4.4	5.7	1.7	1.7	0.9	-1.6	-1.9	-0.7	10.0	12.1	9.5
er	5.7	5.5	5.4	6.0	5.9	5.3	2.6	2.2	3.9	1.4	2.1	18.7
lywood	-8.6	8.9	8.6	6.8	7.3	6.5	6.3	6.8	N.A.	1.6	1.8	2.2
hing Mills	2.3	2.4	1.3	2.8	1.9	2.2	6.3	1.5	-8.5	2.0	4.2	1.1
	-2.0	-1.6	-2.6	17.1	17.7	20.2	4.4	5.4	6.3	8.2	7.0	6.5
Synthetic Resins	6.5	6.1	6.1	7.4	6.8	6.9	-0.5	-0.9	N.A.	4.2	5.2	3.1
	5.4	4.2	9.9	3.5	1.1	4.9	6.1	6.0	N.A.	0.9	0.3	1.2
	2.5	1.6	3.3	4.1	4.7	4.4	5.5	5.6	6.1	0.6	0.1	0.0
Publishing	-5.4	-2.3	-5.5	1.2	0.9	0.1	5.6	6.2	6.9	7.3	5.7	7.1
eries	7.5	6.8	6.8	7.9	8.4	6.5	2.7	1.4	N.A.	8.0	7.5	8.9
ls	-3.1	-4.0	-3.9	7.1	6.8	6.1	1.4	1.7	N.A.	2.3	3.8	3.5
	5.0	5.1	5.8	6.3	5.0	6.1	-2.3	-2.4	N.A.	5.0	3.8	4.1
d Coal Products	10.1	8.9	10.5	10.0	10.1	10.6	11.7	8.6	13.4	2.6	3.5	3.2
tructural Metal	5.6	3.4	2.7	5.9	6.4	6.2	-0.6	-0.6	0.0	6.4	6.5	5.9
ucts	4.6	4.4	4.1	2.0	2.3	3.8	11.6	11.3	14.8	12.5	13.2	12.7
cts	6.8	6.6	7.8	0.9	-0.5	-0.5	5.5	-1.2	N.A.	5.5	6.8	2.1
ls	4.8	5.0	4.9	6.5	6.3	6.3	7.9	7.5	8.3	8.1	10.1	7.8
es	16.1	15.4	12.0	7.4	8.3	8.3	10.9	9.3	N.A.	-2.9	0.4	-1.4
ries	4.8	4.3	6.2	16.7	17.0	18.2	5.1	4.1	N.A.	13.1	11.2	12.9
Pharmacy	3.0	0.0	4.0	9.8	9.8	9.2	5.5	4.5	5.9	8.1	6.0	9.3
	5.4	5.2	5.7	2.9	3.4	2.9	5.8	5.2	6.1	2.9	3.8	4.3
e & Parts	4.6	4.5	3.2	4.4	4.8	3.5	12.9	8.8	8.0	2.6	8.6	1.7

TABLE 6.14

AVERAGE PERCENTAGE CHANGE IN PRODUCTIVITY:
UNITED STATES AND CANADA,
1949-52 and 1962-65

S.I.C. United States	S.I.C. Canada	Industry	United States 1949-52 Value Added A	B	C	United States 1962-65 Value Added A	B	C	Canada 1949-52 Value Added A	B
2041	124	Flour Mills	3.9	4.0	3.4	5.8	6.1	7.2	7.7	6.9
3522	311	Agricultural Implements	5.4	4.4	5.7	1.7	1.7	0.9	-1.6	-1.9
2611,2621,2631	271	Pulp and Paper	5.7	5.5	5.4	6.0	5.9	5.3	2.6	2.2
2432	252	Veneer and Plywood	-8.6	8.9	8.6	6.8	7.3	6.5	6.3	6.8
242	2513	Saw and Planning Mills	2.3	2.4	1.3	2.8	1.9	2.2	6.3	1.5
2085	143	Distilleries	-2.0	-1.6	-2.6	17.1	17.7	20.2	4.4	5.4
2821	373	Plastic and Synthetic Resins	6.5	6.1	6.1	7.4	6.8	6.9	-0.5	-0.9
2086	141	Soft Drinks	5.4	4.2	9.9	3.5	1.1	4.9	6.1	6.0
2051	129	Bakeries	2.5	1.6	3.3	4.1	4.7	4.4	5.5	5.6
2711,2721,273,2741	289	Printing and Publishing	-5.4	-2.3	-5.5	1.2	0.9	0.1	5.6	6.2
3115	172	Leather Tanneries	7.5	6.8	6.8	7.9	8.4	6.5	2.7	1.4
2091,2092,2093	135	Vegetable Oils	-3.1	-4.0	-3.9	7.1	6.8	6.1	1.4	1.7
3241	341	Cement	5.0	5.1	5.8	6.3	5.0	6.1	-2.3	-2.4
29	365,369	Petroleum and Coal Products	10.1	8.9	10.5	10.0	10.1	10.6	11.7	8.6
344	302	Fabricated Structural Metal	5.6	3.4	2.7	5.9	6.4	6.2	-0.6	-0.6
21	151,153	Tobacco Products	4.6	4.4	4.1	2.0	2.3	3.8	11.6	11.3
3275	345	Gypsum Products	6.8	6.6	7.8	0.9	-0.5	-0.5	5.5	-1.2
225	231,239	Knitting Mills	4.8	5.0	4.9	6.5	6.3	6.3	7.9	7.5
3151	175	Leather Gloves	16.1	15.4	12.0	7.4	8.3	8.3	10.9	9.3
206	133	Sugar Refineries	4.8	4.3	6.2	16.7	17.0	18.2	5.1	4.1
283	374	Medicine and Pharmacy	3.0	0.0	4.0	9.8	9.8	9.2	5.5	4.5
25-2591	261,264,266	Furniture	5.4	5.2	5.7	2.9	3.4	2.9	5.8	5.2
3717	323,325	Motor Vehicle & Parts	4.6	4.5	3.2	4.4	4.8	3.5	12.9	8.8

Source: Appendix Tables E and F

TABLE 6.15

ANNUAL PERCENTAGE CHANGE IN PRODUCTIVITY IN THE UNITED STATES AND CANADA, 1949-52 and 1962-65 WEIGHTED AVERAGES

	A	B	C
United States			
1949-52	1.3	1.2	1.2
1962-65	1.7	1.8	1.6
Canada			
1949-52	2.0	1.6	1.8
1962-65	1.2	1.6	2.5

Source: Table 6.14

TABLE 6.16

ANNUAL PERCENTAGE CHANGE IN PRODUCTIVITY IN THE UNITED STATES AND CANADA-1947-68: TOTAL MANUFACTURING

	United States		Canada	
	Productivity Per employee year to year % change	Productivity per man-hour year to year % change*	Productivity per employee year to year % change	Productivity per man-hour year to year % change*
1947	-	-	-	-
1948	-	5.7	-	1.5
1949	4.1	3.8	0.0	3.3
1950	5.9	7.2	5.8	5.8
1951	1.9	2.2	-2.7	4.4
1952	1.8	0.5	5.6	2.2
1953	3.6	3.3	5.3	3.3
1954	1.7	1.8	1.3	4.1
1955	6.8	5.9	5.0	6.5
1956	4.8	-1.0	6.0	4.2
1957	1.5	2.0	-1.1	0.6
1958	3.0	-0.1	1.1	3.2
1959	5.8	5.7	9.0	5.5
1960	4.1	1.8	0.0	3.7
1961	3.9	2.2	4.1	5.0
1962	1.3	5.9	5.9	7.1
1963	3.8	4.1	5.6	4.3
1964	4.8	4.9	5.3	4.2
1965	3.4	3.6	3.4	4.4
1966	2.2	2.0	1.6	3.0
1967		0.2		-0.2
1968		5.4		4.1
Average 1947-66(68)	3.4	3.2	3.6	3.8
Average 1955-66(68)	3.5	2.8	3.7	3.8

Source: Table 6.13 and Department of Industry, Trade and Commerce: A Comparison of Output per Man-hour, Average Hourly Earnings and Unit Payroll Costs, Manufacturing Industries: Canada and the United States: 1947-68, March 1970.

*Adapted from Department of Industry, Trade and Commerce Comparisons cited above in the Source.

tained basis at a much faster rate.

Data Adjustment and Interpretation

The above results obtained from computations based on published statistics appear to be distorted because they include the effect of the Canadian tariff. The Canadian tariff has the effect of raising the price level of goods in Canada relative to the price level of identical goods in the United States. The higher prices in Canada thus inflate the dollar value of her physical output leading to an overstatement of the Canadian value added relative to the United States.

Assuming that the producers in the protected industries in Canada realize higher prices over the United States' level by the amount of the tariff,[7] the dollar value of physical output in Canada will be inflated relative to the United States by the amount of the tariff. In order to remove the inflated fraction of the Canadian value added due to the tariff and to bring it on to a comparable level with the United States, the value added in the protected industries in Canada was downwardly adjusted by a scalar equal to the proportionate tariff effect. This was done with respect to both the nominal and the effective tariffs.

The basis of this argument may be worked out more precisely with the help of simple algebra as follows:

---

[7]Eastman and Stykolt, _op. cit._, pp. 22-25 and Eastman, _op. cit._, pp. 446-49, suggest that the laid down price from the United States provides an upper limit on the price that a Canadian manufacturer could consistently charge. This upper limit is the U.S. price, plus transport, plus the tariff, allowing for exchange rate adjustment. See also Melvin and Wilkinson, _op. cit._, where the authors assume that domestic producers all price at world prices plus the tariff, and J.H.Young, _op. cit._, in which he claims that higher prices in Canada largely reflect the effect of the tariff.

	United States	Canada
Outputs	Q_uP_u	Q_cP_c
Inputs	q_up_u	q_cp_c

Where Q and P refer to quantities of output and price of output and q and p refer to quantity of input materials and price of input materials respectively.

Suppose that there is a tariff in Canada on both input materials and output and that tariff is at percentage rate t^* on output and $\hat{t}$ on inputs. Assuming that the producers in Canadian protected industries price at the United States' price plus the tariff then the prices in Canada for output and inputs will be given by:

$$P_c = (1 + t^*)\ P_u \text{ and}$$

$$P_c = (1 + \hat{t}\ )\ P_u \text{ respectively}$$

and output and input in Canadian protected industries will be given by:

$$Q_cP_u\ (1 + t^*) \text{ and}$$

$$q_cp_u\ (1 + \hat{t}\ ).$$

If we divide Canadian output by $1 + t^*$ and input by $1 + \hat{t}$ we will get output and input in both the countries valued in identical prices.

Since the tariff is assumed to result in higher prices in protected industries, this will have repercussions on cost positions of export and domestic industries also if these industries utilize the output of protected industries as their input material. Finding their material costs up, these industries may want to pass on the higher cost on to the consumers in the form of higher prices for their products. However, because of the very circumstances of export industries, we do not expect them to be able to raise their prices appreciably. Domestic industries may be able to raise their prices somewhat provided this does not lead to Canadian prices over the American level in excess of the transport costs (otherwise the commodities will begin to be imported). However, since the prices in domestic industries are assumed to be independent of the American prices (Canadian prices may be higher or lower) no data adjustment is possible (if there is any divergence) to bring the two values on to a comparable level. Thus only the protected industry productivity data was downwardly adjusted to remove the inflationary effect of the Canadian tariff from the dollar value of physical output. The figures in the tables immediately below exhibit the tariff-price adjustment.

The protected industry output data, both in current and constant dollars was adjusted downward to bring it on a comparable basis in the two countries. It may be noted that expressing the Canadian output data in constant dollars does not mean that the price-inflation effect of the Canadian tariff has been altogether removed. The constant dollar estimates of output only capture year to year variation in prices from whatever sources, including those due to changes in tariffs, but do not affect the basis or method of valuing shipments. The argument is that the pricing practice in the Canadian manufacturing industries in valuing shipments is such that the prices used by companies are arbitrarily fixed at the American level plus the Canadian tariff. If we deflate the current dollar output values by a price index, it will only adjust the output values for changes in price levels as compared to the base year but will still leave the price-inflation effect of the Canadian tariff at the base year level.[8]

Revised Estimates: Canadian Data Adjusted for Effective Tariffs

From the results of Tables 6.17 to 6.20, it is apparent that the calculated Canadian-American productivity differentials vary in degree depending upon whether the calculations are derived solely from published statistics or are derived from tariff adjusted value added figures. The Table 6.21 presents a summary of various comparisons of productivity derived from adjusted data,as a percentage of the United States. This table shows that there is a small difference between

---

[8]The basis of the above argument may be presented rigorously with the help of simple algebra. Suppose Canadian tariff in year i is t_i. Let base year be 0. Let output in year i be Q_i and price be P_i.

Then the current value of output in year $i = Q_i P_i = V_i$

Current value of output in year i adjusted for Canadian tariff (in other words, the current value of output for year i in U.S. prices)

$$= \frac{Q_i P_i}{1+t_i} = \frac{V_i}{1+t_i} = U_i$$

Therefore, the value of output for year i in year 0 U.S. prices is

$$\frac{Q_i P_o}{1+t_o} = \frac{Q_i P_i}{1+t_o} \cdot \frac{P_o}{P_i} = \frac{V_i}{1+t_o} \cdot \frac{P_o}{P_i} = U_i \frac{P_o}{P_i}$$

Now consider the value of output deflated by year 0 Canadian prices. This is

$$W_i = Q_i P_o = (Q_i P_i) \frac{P_o}{P_i} = V_i \frac{P_o}{P_i} \neq U_i \frac{P_o}{P_i}$$

Clearly this adjusts only for changes in Canadian prices but not for tariffs. To get the value of output for year i in year 0 U.S. prices (namely $U_i \frac{P_o}{P_i}$), we have to adjust W_i for tariffs. That is

$$Q_i P_o^{U.S.} = Q_i \left(\frac{P_o^{U.S.}}{P_o^{Can}}\right) \cdot P_o^{Canada}$$

$$= W_i \left(\frac{P_o^{U.S.}}{P_o^{Can}}\right)$$

$$= \frac{W_i}{1+t_o}$$

TABLE 6.17

TARIFF-PRICE ADJUSTED PRODUCTIVITY IN THE UNITED STATES AND CANADA, 1949-52 and 1962-65, IN CONSTANT (1961) U.S. DOLLARS: WEIGHTED AVERAGES

	A (000 $)	B (000 $)	C ($)
1949-52			
United States	11.8	9.1	5.9
Canada*	9.1	7.1	3.9
1962-65			
United States	23.9	16.7	11.6
Canada*	15.4	10.5	6.8
Canada as % of the United States			
1949-52	77.1	78.0	66.0
1962-65	64.4	62.9	58.6

Source: Tables 6.2 and 5.1

*The corresponding Canadian figures adjusted for nominal tariffs are as follows:

	A (000 $)	B (000 $)	C ($)
1949-52	9.3	7.3	4.1
1962-65	16.3	11.1	6.7
Canada as % of the United States			
1949-52	78.8	80.2	69.5
1962-65	68.2	66.5	57.8

Source: Tables 6.2 and 5.1

TABLE 6.18

TARIFF-PRICE ADJUSTED GROWTH OF PRODUCTIVITY IN THE UNITED STATES AND CANADA: WEIGHTED AVERAGES

	A	B	C
% Increase from period I to period II in the U.S.	102.5	83.5	96.6
% Increase from period I to period II in Canada*	69.2	48.0	74.4
Canadian increase from period I to period II as % of the United States*	65.8	57.5	77.0

Source: Tables 6.2 and 5.1

*The corresponding Canadian numbers adjusted for nominal tariffs are as follows:

	A	B	C
% increase from period I to period II in Canada	75.3	52.0	63.4
Canadian Increase from period I to period II as a % of the United States	73.5	62.3	65.7

TABLE 6.19

TARIFF-PRICE ADJUSTED PRODUCTIVITY IN THE UNITED STATES AND CANADA, 1949-52 and 1962-65, IN CURRENT U.S. DOLLARS: WEIGHTED AVERAGES

	A (000 $)	B (000 $)	C ($)
United States			
1949-52	10.1	7.6	4.9
1962-65	23.3	15.5	11.3
Canada*			
1949-52	8.3	6.3	4.0
1962-65	15.3	10.2	6.5
Canada as % of the United States			
1949-52	82.2	82.9	81.6
1962-65	65.7	65.8	57.5

Source: Tables 6.8 and 5.1

*The Canadian data adjusted for nominal tariff is as follows:

	A (000 $)	B (000 $)	C ($)
1949-52	8.5	6.5	4.3
1962-65	16.1	10.8	7.0
Canada as % of the United States			
1949-52	84.2	85.5	87.8
1962-65	69.1	69.7	62.0

Source: Tables 6.8 and 5.1

TABLE 6.20

TARIFF-PRICE ADJUSTED PRODUCTIVITY IN THE UNITED STATES AND CANADA, 1965: WEIGHTED AVERAGES: U.S. DOLLARS

	A (000 $)	B (000 $)	C ($)
Canada *	14.9	9.4	6.6
United States	21.3	14.8	10.5
Canada as % of the U.S.	70.0	63.5	62.9

Source: Appendix Tables H, I and 5.1.

*Canadian data adjusted for nominal tariffs yields the following results:

	A (000 $)	B (000 $)	C ($)
Productivity in Canada	15.1	9.5	6.8
Canada as % of the U.S.	71.0	64.3	64.8

Source: Appendix Tables H, I and 5.1.

TABLE 6.21

TARIFF-PRICE ADJUSTED SUMMARY OF VARIOUS COMPARISONS: CANADA AS PERCENTAGE OF THE UNITED STATES

	A	B	C
1949-52			
Canadian productivity: Current $	88.1	89.5	93.9
Adjusted for effective tariffs	82.2	82.9	81.6
Adjusted for nominal tariffs	84.2	85.5	87.8
1962-65			
Canadian productivity: Current $	73.8	74.2	69.0
Adjusted for effective tariffs	65.7	65.8	57.5
Adjusted for nominal tariffs	69.1	69.7	62.0
1949-52			
Canadian productivity: constant $	82.2	83.5	72.9
Adjusted for effective tariffs	77.1	78.0	66.1
Adjusted for nominal tariffs	78.8	80.2	69.5
1962-65			
Canadian productivity: constant $	72.0	70.1	67.2
Adjusted for effective tariffs	64.4	62.9	58.6
Adjusted for nominal tariffs	68.2	66.5	57.8
Canadian over time Productivity Growth	75.4	64.7	84.3
Adjusted for effective tariffs	65.8	57.5	77.0
Adjusted for nominal tariffs	73.5	62.3	65.7
1965			
Canadian productivity	74.7	68.2	67.6
Adjusted for effective tariffs	70.0	63.5	62.9
Adjusted for nominal tariffs	70.9	64.2	64.8

Sources: Tables 6.17, 6.19 and 6.20

these results and the ones computed from the published statistics. To be precise the Canadian-American gap widens by 4 to 8 percent due to these data adjustments. This seemingly small difference between the two values may appear to be insignificant as far as productivity comparisons are concerned, but certainly very significant when industrial groupings are compared.

Thus, these revised computations show that when value added is measured in constant American dollars Canadian productivity was 20 to 30 percent lower than the United States' for the period 1949-52, while for the latter period it was below the United States' level by 30 to 35 percent (depending on whether productivity is measured per man or man-hour). When computations are made in current dollars Canadian productivity levels are 10 to 15 percent below the corresponding American levels for the first period, and 35 to 40 percent for the latter period. These results are consistent with the 1965 computations which show Canadian productivity below the American level by 30 to 35 percent. The summary table also shows that the over time productivity growth of Canada was 35 to 40 percent lower relative to the United States.

Interpretation of Results

Although we have adjusted the data to remove the price effect of the tariff, it should be noted that the two sets of data may still not be comparable. Our industry sample consisted of three categories of industries - export, protected and domestic. According to our model Canadian export industries will be understated and protected industries will be overstated relative to the same industries in the United States. Regarding the domestic industries nothing definitive can be said. Although it is possible to pass judgement on the productivity performance of individual groupings, an aggregation of all groupings almost defies useful comment. This is so because of the problems arising from a positive bias of Canadian export and domestic industries caused by the possible absorption of inputs whose value has been inflated by the amount of the tariff.

Apart from the possible biases in the Canadian productivity data due to industry distinctions and their differing price behavior and the consequent distorting effects on a point of time productivity comparisons, there may still be another force tending to distort Canadian productivity data for the latter period of 1962-65. The distorting factor is the effect of the devaluation of the Canadian dollar in 1962. Devaluation is an inflationary measure and leads to higher prices of internationally traded goods. In terms of domestic currency prices of both export and import industries usually rise. Since the prices in these two industry groups have gone up, Canadian productivity expressed in Canadian dollars will thus be inflated. But it may be noted that the exchange rate has changed as well and we have expressed the United States-Canada productivity ratios in American dollars. When the Canadian dollar value of physical output is expressed in the American dollars the reported Canadian value added will, therefore, be less and thus may cancel out the inflationary effect of exchange rate depreciation on Canadian value added expressed in Canadian dollars. If one assumes that the price inflation aspect of devaluation, that is, the absorption of price inflated inputs and commodities, raises prices by the same proportion as the exchange rate depreciation, then there will be no change in the reported Canadian value added data. This, however, may not be the case. Domestic prices in export and import industries may rise more or less or exactly in proportion to the exchange rate depreciation. If they rise in the same proportion, then there is no problem. Pre- and post-depreciation productivity data for Canada will thus be comparable with the United States at a point in time (1962-65) and also for inter-temporal comparisons. If, however, prices rise more than proportionately, as is sometimes the case, Canadian productivity can be expected to be overstated relative to the United States for a point of time (1962-65 and 1965) and for inter-temporal comparisons.

Conclusion:

The above analysis reaches the conclusion that a productivity gap does exist between the two countries.

The above discussion also suggests that it is necessary, in international productivity comparisons, to make a clear distinction between export, domestic and protected industries. As has been shown in Chapter III, differing price behavior of these three categories of industries may distort the comparisons. In addition, the price change effect arising from such factors as tariff biases and exchange rate changes should be duly accounted for, before the productivity values as computed from published statistics are interpreted and inferences drawn. In practice however, it is very difficult to determine exactly the relationship of price changes and exchange rate depreciation movements.

We have already discussed a number of problems in the interpretation of input and output measures and have noted what productivity ratios may measure in inter-country and inter-industry comparisons in Chapter III. A detailed examination of the problems of parallelism and comparability in the American and Canadian statistics, changes in concepts and definitions used in the two countries over time, and the direction in which they are likely to affect the results was made in Chapter IV. It was noted that although there are a number of comparability problems between Canada and the United States due to differences and changes over time in the use of definitions and concepts in the two countries, with the exception of difference in the definition of man-hours, other differences are not likely to affect the productivity comparisons between the two countries significantly. It was observed that since the Canadian man-hours include hours paid for vacations, holidays and sick leave, whereas the American data do not, the Canadian man-hour productivity data will be downwardly biased relative to the United States by about 5 to 6 percent for the period 1962-65 and by about 3 to 4 percent for the period 1949-52. Thus our man-hours productivity data for the two countries in this and in the subsequent chapters must be analysed keeping in mind this biasing influence. Apart from these and the above possible distortions due to devaluation of the dollar and the price behavior of the three categories of industries, we believe we have covered the significant factors giving rise to problems of data comparability. However, still once again it may be noted that productivity comparisons are an estimate only and our results must be taken with due qualifications.

CHAPTER VII

THE TARIFF AND PRODUCTIVITY IN CANADA

Our results of the previous chapter support the earlier findings of the existence of a significant productivity gap between Canada and the United States. In this chapter an attempt is made to investigate empirically the hypothesis that relatively lower Canadian productivity reflects the effect of tariffs, both the American and Canadian. The chapter is divided into two sections. In the first section a cross-tabular analysis is carried out; in the second section correlation and regression tests are run to see if the Canadian productivity and tariff levels are related variables. In the first section the hypothesis is tested with respect to the Canadian tariff and in the second section with respect to both tariffs - the Canadian and American. The analysis has been carried out using data adjusted for the effects of Canadian effective tariff levels, that is, data from which the inflationary effect of the Canadian effective tariff has been removed and brought to a comparable level with the United States.

In the first section of this chapter the hypothesis is tested in three alternative ways. The first method compares the average productivity levels of the three industry categories of Canada, that is, export, protected and domestic industries. The second method compares the average productivity levels of these three industry categories with the comparable industries in the United States. Comparisons are made in current and constant dollars using three sets of data. The third method utilizes the technique of rank correlation analysis.

As was noted in Chapter III, our computed productivity ratios as a measure of performance of industries may include many influences. They may, for example, reflect differences in product mixes, differing factor proportions and prices, quality of inputs, competitive structure of industry, pricing procedure of output and input materials, factors that influence prices, to name a few. It is suggested that these properties of the productivity measure must be kept in mind when our results are read in the following pages.

The organization of this chapter is as follows. First, we present the theoretical relationship of the tariffs and the low productivity levels in Canada relative to the United States implied by the hypothesis in a mathematical form which is followed by a brief discussion of the variables included in the model. Then come the tests of the hypothesis in various alternative ways discussed above.

The Model

The theoretical relationship of the tariff levels and the United States-Canada productivity differences, as implied by the hypothesis, may be expressed in a mathematical form as follows.

$$\frac{Y}{L} = f\left(\frac{K}{L}, T, t, \bar{t}, WS, O\right) \text{ ---------------(i)}$$

where $\frac{Y}{L}$ = Output per unit of labour input, or productivity in Canada, $\frac{K}{L}$ = Capital-labour ratio, T = Technology, t = Canadian tariff levels, $\bar{t}$ = American tariff levels, WS = Production runs and specialization in the Canadian industries and O = other factors.

If we make the assumption that the capital labour ratio, $\frac{K}{L}$, remains constant between industries*, and if we further assume that the residual factors, 0, are unimportant, the function can be written as follows:

$$\frac{Y}{L} = f(T, t, \bar{t}, WS) \text{ ---------------(ii)}$$

Technology is assumed to be a function of the Canadian tariff. Tariff protection to Canadian industries reduces competition from imports and, therefore, reduces manufacturers incentives to innovate and improve technology of production units. Given these assumptions, we can logically deduce that lower levels of tariffs in Canada will lead to more efficient levels of technology of production units and consequently higher levels of productivity. Thus,

$$T = h(t) \text{ and } \frac{\partial T}{\partial t} < 0 \text{ -------------(iii)}$$

The underlying theory in the hypothesis suggests that the lower levels of productivity in Canada relative to the United States is due to shorter production runs and lack of specialization in the Canadian industry which in turn reflects the effects of the Canadian tariff. The tariff is seen as providing a protected market to domestic producers enabling them to earn a satisfactory profit without underaking the rationalization that would be necessary for lower production costs and higher levels of productivity. Thus the higher the tariff levels, the shorter the production runs, the more product diversification and hence the lower the productivity levels (or higher costs) and vice versa. This may be expressed mathematically as follows;

$$WS = r(t) \text{ and } \frac{\partial WS}{\partial t} < 0 \text{ -------------(iv)}$$

Now equation (i) can be written as follows:

---

*See Chapter III, pp. 46-50 where it is shown that K/L ratios in the export, protected and domestic industry categories are almost equal.

$$Y' = \frac{Y}{L} = f[h(t), t, r(t)] \text{ ----------(v)}$$
$$= f_2(t)$$

On the basis of conditions (i) to (v) we may conclude:

$$\frac{\partial Y'}{\partial t} < 0 \text{ ------------------------------(vi)}$$

And if Y" is taken as the United States-Canada productivity ratio, this condition may be expressed as,

$$\frac{\partial Y''}{\partial t} > 0$$

The American tariff level is also supposed to affect Canadian productivity levels relative to those in the United States. By creating barriers to entry into the United States' market, the American tariff intensifies the dependence of the Canadian manufacturers on the relatively small domestic market and thus prevents them from obtaining maximum economies of mass production and higher levels of productivity. Thus according to this hypothesis, the higher the American tariffs, the lower is Canadian productivity. Thus,

$$Y' = \frac{Y}{L} = f(\bar{t}) \text{ and } \frac{\partial Y'}{\partial \bar{t}} < 0 \text{ ---------(vii)}$$

Again expressing Y" as United States-Canada productivity ratio, this condition can be illustrated symbolically as,

$$\frac{\partial Y''}{\partial \bar{t}} > 0$$

The effects of the two tariffs may be combined to express the function as follows:

$$\frac{\partial Y'}{\partial t^*} < 0$$

where t^* represents both the American and the Canadian tariffs. And the Y" representing the United States-Canada productivity ratio, the condition becomes: $\frac{\partial Y''}{\partial t^*} > 0$

It may, however, be noted that this approach does not permit considerations of length of production runs or number of product lines produced in each plant which are generally considered to be important considerations for the United States-Canada productivity differences. As there is no method other than a detailed analysis of each industry to gain information on product lines, length of runs and scale of production, we have, in effect, assumed that they will be correlated with tariff levels.

The argument that the Canadian tariffs are a factor causing low productivity levels in Canada implies that tariffs have depressed productivity in protected industries mainly, while other industries have remained largely unaffected. It might be concluded on this basis that in aggregate the effect of lower productivity in the protected industries has been to depress productivity in Canada generally. Thus, if the hypothesis is true, then from empirical investigation, we should expect to find the productivity of the tariff protected industries lower than the productivity of the export and domestic industries. Those economists who have argued that the tariffs are conducive to low productivity levels in Canada have attempted to substantiate their thesis by characterizing the three groups of industries in the following fashion: Export industries are those industries in which Canada has a comparative advantage. By virtue of their access to foreign markets these industries are able to avail themselves of cost cutting economies of large scale production and specialized operations. Therefore, productivity of these industries can be expected to be relatively high. Protected or import competing industries are those in which Canadian comparative advantage is low or she has a comparative disadvantage. Facing a small domestic market with a small scale and unspecialized nature of manufacturing operations, productivity of these industries can be expected to be low. It is argued that in general these industries are producing too many product lines to achieve the length of production runs required for the unit costs to be at a minimum. The Canadian tariff provides producers with a useful "rule of thumb" by which their prices may exceed those of foreign producers. Consequently, there is less incentive to reduce product diversification and improve efficiency. Domestic industries are those industries in which Canada's comparative advantage or disadvantage is so low or whose goods are of such a nature that they cannot bear the cost of transport and cannot move from one country to the other. Output, therefore, must be consumed domestically. Nothing in general can be said about the relative productivity levels in the domestic industries. There is no presumption in trade theory that domestic industries will have a higher or lower productivity level relative to the other two categories. Many goods, which on the basis of comparative costs alone might appear proper objects of international commerce must be relegated to the category of domestic goods when transport costs have to be incurred. The export and import capacity of a country thus does not depend solely upon its cost of production, it depends also on the cost of transport. No categorical statement can, therefore, be made about the relative productive efficiency ranking of domestic industries. Thus through the comparison of the productivity and the concomitant tariffs of the three industry categories it may be possible to shed some light on the mooted question of whether or not there is a relationship between tariffs and productivity.

Table 7.1 below shows the range within which the industry value added falls within each group and Table 7.2 shows the average productivity for the three kinds of industries. In order to ensure that the differing price movements in the different sectors do not colour our results we decided to compute the necessary statistic in constant dollars also. This is presented in Tables 7.3 and 7.4. Table 7.3 shows the range for the industry values and Table 7.4 presents average productivity for each industry category.

Tables 7.2 to 7.4 show that productivity in the protected industries is clearly the lowest in both periods. The percentage differences in the productivity between the three groups of industries are large enough to give some indication of a possible relationship between labour productivity and the tariffs. It has already been noted in Chapter III that the capital-labour ratios in the three group of industries in Canada are almost equal and, therefore, differences in the productivity between the three group of industries can scarcely be accounted for by differences in the quantity of capital. The labour productivity ratios in the following tables will, therefore, seem to give a fair indication of the relative performance of the three group of industries, and the results would appear to support the view that tariffs cause lower labour productivity levels in Canada.

One thing, however, is not clear in the tables below. Table 7.2 shows that in both periods productivity in the domestic industries was higher than that of the export industries. The same pattern is shown by Table 7.4 for the latter period (1962-65). In the light of the

TABLE 7.1

RANGE OF VALUE ADDED IN THE THREE GROUPS OF CANADIAN INDUSTRIES: CURRENT U.S. DOLLARS

Industry Groups	A* (000 $)	B* (000 $)	C* ($)
1949-52			
Export Industries	4.7 - 16.9	3.5 - 13.2	2.3 - 8.7
Domestic Industries	2.5 - 11.7	2.2 - 7.8	1.7 - 5.8
Protected Industries	1.9 - 9.0	1.7 - 6.0	1.4 - 4.9
1962-65			
Export Industries	6.9 - 45.4	6.2 - 26.8	3.6 - 21.3
Domestic Industries	6.8 - 36.1	6.0 - 24.5	3.2 - 16.8
Protected Industries	2.8 - 18.9	2.2 - 9.3	1.6 - 10.4

Source: Table 6.8

A* = Value Added Per Production Worker

B* = Value Added Per Employee

C* = Value Added Per Production Man-hour.

TABLE 7.2

WEIGHTED AVERAGE OF PRODUCTIVITY IN CANADIAN INDUSTRY GROUPINGS, EXPRESSED IN CURRENT U.S. DOLLARS

Industry Groups	A (000 $)	B (000 $)	C * ($)
1949-52			
Export Industries	9.1	7.4	4.0
Domestic Industries	10.4	7.0	5.0
Protected Industries	5.5	4.5	2.8
Protected Industry's Productivity as % of Export Industry's Productivity	60.4	60.8	70.0
Protected Industry's Productivity as % of Domestic Industry's Productivity	52.9	64.3	56.0
1962-65			
Export Industry	15.9	11.8	7.3
Domestic Industry	21.9	12.9	10.0
Protected Industry	9.2	6.2	4.9
Protected Industry's Productivity as % of Export Industry's Productivity	51.9	52.5	67.1
Protected Industry's Productivity as % of Domestic Industry's Productivity	42.0	48.1	49.0

Source: Table 6.8

*This computation is only for 14 industries for which man-hours data were available for 1949-52 -- consisting of 6 export industries, 4 domestic industries and 4 protected industries. The same 14 industries were picked up for 1962-65 and also for the United States for both the periods. In subsequent tables also this computation will be made for 14 industries only.

TABLE 7.3

RANGE OF VALUE ADDED IN THE THREE GROUPS OF CANADIAN INDUSTRIES: CONSTANT (1961) U.S. DOLLARS

Industry Groups	A (000 $)	B (000 $)	C ($)
1949-52			
Export Industries	3.0 - 21.0	2.3 - 14.8	1.6 - 9.7
Domestic Industries	4.4 - 20.1	3.7 - 18.7	3.3 - 5.4
Protected Industries	2.0 - 10.8	1.8 - 8.4	1.0 - 5.0
1962-65			
Export Industries	6.4 - 43.7	5.8 - 25.9	3.0 - 20.5
Domestic Industries	6.7 - 37.6	5.1 - 25.5	3.1 - 17.5
Protected Industries	3.6 - 19.8	2.2 - 8.9	1.5 - 9.9

Source: Table 6.2

TABLE 7.4

WEIGHTED AVERAGE OF PRODUCTIVITY IN CANADIAN INDUSTRY GROUPINGS, EXPRESSED IN CONSTANT (1961) U.S. DOLLARS

Industry Groups	A (000 $)	B (000 $)	C ($)
1949-52			
Export Industries	10.9	8.9	4.6
Domestic Industries	9.9	6.8	4.2
Protected Industries	6.4	5.2	3.0
Protected Industry's Productivity as % of Export Industry's Productivity	58.7	58.4	65.2
Protected Industry's Productivity as % of Domestic Industry's Productivity	64.7	76.5	71.4
1962-65			
Export Industries	15.5	12.0	6.9
Domestic Industries	22.5	13.3	10.5
Protected Industries	9.3	6.3	4.5
Protected Industry's Productivity as % of Export Industry's Productivity	60.0	52.5	65.2
Protected Industry's Productivity as % of Domestic Industry's Productivity	41.3	47.4	42.2

Source: Table 6.2

argument presented above about the factors explaining the expected productivity levels in the export and protected industries, the productivity performance of the domestic industries is rather disturbing. In so far as the export industries rest on comparative advantage and import competing industries on comparative disadvantage which in turn is determined by labour productivity[1], and, as has been stated above, that expansion of output and increased specialization through access to larger foreign markets lead to substantial improvement in productivity levels and limited market and diversified nature of production work in the opposite direction, then on *a priori* ground one would expect the productivity of the export industries to be higher and of import competing industries to be lower than that of others.[2] This is not strictly borne out in

---

[1]According to the original formulation of the classical theory, relative productivity differentials determine comparative advantage or disadvantage. It was subsequently realised that differences in wage structures and in the capital-labour ratios of industries may compensate for the productivity differentials. Still the defenders of the classical theory- among others, Taussig - expressed the view that the latter factors are not very important, see his: *International Trade*, MacMillan Company, 1927, New York, pp. 43-68. Similar conclusions have been reached in studies attempting an empirical verification of the classical theory. See for example G.D.A. MacDougall: "British-American Exports: A Study Suggested by the Theory of Comparative Costs. Part I", *Economic Journal*, Dec. 1951, particularly pp. 706-707 and Bela Balassa: "An Empirical Demonstration of classical Comparative Cost Theory", *Review of Economics and Statistics*, Aug. 1963, particularly pp. 235-237. MacDougall concluded that comparative advantage based on productivity differentials are scarcely modified by wage differentials. Balassa concluded that productivity advantages are not counterbalanced by higher wages and the introduction of capital cost as a further explanatory variable only slightly modifies the result. For the purpose of the present investigation it is, therefore, assumed that productivity differentials alone determine comparative advantage or disadvantage.

[2]As has been stated above that theoretically there is no reason to expect productivity in the export and protected industries to be higher and lower respectively relative to the domestic industries. However, the argu-

--- continued on page 151 ---

the above tables. The above tables show that while the import competing industries follow this general rule, the export industries do not, except for the first period (1949-52) in Table 7.4.

If productivity in the protected industries is kept down because of the unspecialized nature of operations and lack of volume (due to small domestic market) required for economies of scale, then the export industries by virtue of their being able to penetrate into larger foreign markets and being able to avail themselves of economies of larger scale production and specialized operations should be able to attain higher levels of productivity. Again, if a limited market with a small scale of output prevents the protected industries from achieving high levels of productivity, then by the same token domestic industries should also show low levels of productivity - at least lower than the export industries. On the contrary, our result shows that the domestic industries, operating within the same confines, are able to attain even higher levels of productivity than the export industries. Thus it cannot be said that lower productivty relates only to those industries which have a limited market and therefore, tariffs do not seem to suffice as an explanation for productivity differences.

A more desirable way of examining the proposition that the tariffs are the cause of low productivity levels in Canada, through the comparison of the three groups of industries, will be to attempt to account for the productivity differences using a larger industry sample for each group. This has the obvious advantage of limiting the chances

---

--- continued --- ment here involves considerations of size of market, nature of output, economies of scale and specialization. Taking into account these considerations, as is argued in the following pages, one would expect productivity in the export industries to be higher and in the protected industries to be lower than that in the domestic industries.

of possible bias inherent in selecting an industry sample of a limited size. It was, therefore, thought that it would be interesting to present estimates for a larger sample. Thus for 90 industries in a single year, 1965, the desired productivity statistic was computed to gain an insight into the influence and significance of tariffs in producing productivity differentials. The result of this computation is shown in Tables 7.5 and 7.6 below.

From these tables somewhat different conclusions follow as compared to Tables 7.2 and 7.4. While the results in this table compare with the results in Tables 7.2 and 7.4 in that productivity of the protected industries is the lowest among the three groups of industries, they differ in that the present table shows lower productivity levels in the domestic industries than that in the export industries. These results thus conform more to expectation and there would appear to be some credence in the hypothesis that the tariffs are associated with the low productivity levels in the Canadian manufacturing industries. However, since these results conflict with the evidence revealed in Tables 7.2 and 7.4, it is difficult to evaluate precisely the relationship of tariffs and productivity.

We may conclude that in view of the inconsistent evidence as revealed by the above tables it cannot be conclusively demonstrated whether or not tariffs are a differentiating factor in the relative productivity performance of the Canadian industries. Nevertheless, since productivity in the protected industries was found to be lowest in all the samples and periods examined, there would appear to be some evidence to support the argument that the tariff at least is accompanied by lower productivity in Canadian

TABLE 7.5

RANGE OF VALUE ADDED BY CANADIAN INDUSTRY GROUPS IN 1965, EXPRESSED IN CURRENT U.S. DOLLARS

Industry Groups	A (000 $)	B (000 $)	C ($)
Export Industries	7.3 - 50.0	5.9 - 29.4	3.4 - 22.9
Domestic Industries	5.4 - 36.5	4.8 - 25.3	2.7 - 17.2
Protected Industries	3.3 - 29.2	2.7 - 12.3	1.7 - 13.0

Source: Appendix Table J.

TABLE 7.6

WEIGHTED AVERAGE OF PRODUCTIVITY IN CANADIAN INDUSTRY GROUPINGS IN 1965, EXPRESSED IN CURRENT U.S. DOLLARS

Industry Groups	A (000 $)	B (000 $)	C ($)
Export Industries	19.0	11.8	7.6
Domestic Industries	16.8	10.3	7.8
Protected Industries	8.9	6.2	4.0
Protected Industry's Productivity as % of Export Industry's Productivity	46.8	52.5	52.6
Protected Industry's Productivity as % of Domestic Industry's Productivity	53.0	60.2	51.3

Source: Appendix Table J.

industries.

Nature of Results

In all of the alternative computations presented in the above tables, whereas the productivity in the protected industries is found to be the lowest, for the other two categories there is no clear cut pattern. The question arises what is the nature of the results? Can they be taken at their face value? Since price is an important element in our value added measure it is imperative that a clear recognition be made of price relationship between the three categories of industries in the interpretation of these results. Additionally, we must also look for any other factor tending to influence the prices and thereby distorting the established price relationship between the three categories of industries. We must take such factors into account in the interpretation of these results. As has been noted in Chapter III, in official statistics there are no separate price records for the three kinds of industries and our inter-industry productivity comparisons take the prices as given and comparable.

Whatever the original price relationship between these categories of industries, it appears, however, that there is a factor tending to distort this relationship and it is the effect of the exchange rate depreciation in 1962. Thus, our computations in the above tables for the period 1962-1965 and the year 1965 must be analysed bearing in mind this distorting influence. Devaluation has the effect of changing the established price relationship between internationally traded goods (export and import industries) and the goods that do not enter into international trade, i.e., domestic industries. In terms of domestic currency (i.e., the Canadian dollar), devaluation leads to a rise in the prices of export and import competing industries and thus inflates the reported value added of these industries. The exchange rate, however, has also depreciated (i.e., American dollar has appreciated) and we have expressed the output values in the American dollars so that this may cancel out the inflated values in the Canadian dollars. But the argument has been made that the prices of import competing industries are expected to rise more than the prices of export industries.[3] Thus, devaluation is expected to inflate the reported value added of import competing industries more than it inflates the reported value added of export industries.[4] Thus according to the reasoning of this argument our computations for export and protected industries based on published statistics presented in Tables 7.1 to 7.6 may be inflated and relatively more for protected industries. While it is impossible to estimate the relative extent of this overstatement for the two industry groups, we suggest that interpretive conclusions consider this admonition.

Theoretically, exchange rate depreciation does not affect the

---

[3]See Mrs. J. Robinson: Essays in the Theory of Employment, London, MacMillan, 1937, pp. 219-220. This is the well known argument that devaluation worsens the terms of trade. The essential condition for this to happen is that the product of two supply elasticities must exceed the product of two demand elasticities, i.e., $s_m s_x > d_x d_m$. Since Canada is more specialized in exports than in imports, she will be more dominant in world supply of goods she exports than in the world demand of goods she imports tending to make $d_x < s_m$. Additionally elasticity of demand of goods she imports also expected to be low since she imports many goods which she cannot produce domestically. Thus the terms of trade are likely to worsen, i.e., import prices rise more than the export prices.

[4]This argument assumes that prior to exchange rate depreciation the ratio of export to import prices was correct in some sense.

domestic industries. In terms of domestic currency the prices of these industries will remain unchanged and there will be no effect on the reported value added in the Canadian dollars. However, since we have expressed the output values in American dollars the value added of the domestic industries will be reduced relative to the export and import competing industries. The extent of this reduction will be exactly in proportion to the appreciation of the American dollar, assuming that domestic prices in the export and protected industries rose by the full amount of depreciation.

While it is true that theoretically the exchange rate depreciation is not supposed to affect domestic industries directly, in practice depreciation seldom spares these industries. Many domestic goods have an import content and since import prices are now up as a result of devaluation, we can expect the prices of these goods also to go up somewhat. If the prices of these goods rise exactly in proportion to exchange rate depreciation, there will be no effect on value added expressed in American dollars. However, if this increase in prices is more or less than proportionate, the value added expressed in American dollars for the period 1962-65 and the year 1965 will simply be over or understated. Although the possibility of such a distortion exists, we have no way to determine the extent and direction of this distortion.

Comparisons with the United States

Yet another way to examine the validity of the argument that Canadian tariffs depress Canadian productivity levels relative to the United States is to compare the Canadian industry categories with the same industries in the United States.[5] These groups are not necessarily export, domestic or protected for the United States. If the hypothesis is true we will expect the Canadian protected category to perform much less efficiently compared with their counterpart industries in the United States than do her export and domestic industries relative to the comparable listings in the United States. As has been previously stated, the reason for such a view is the belief that lower productivity is to a large extent associated with the smaller scale and less specialized nature of manufacturing operations. Shorter production runs and the necessity of changing over from one type of production to another usually results in lower work loads, loss of production time and less specialization of management efforts and skills. In many cases it also means that machinery must be less automatic, less specialized and slower. These disabilities stemming from relatively smaller scale of output are the principal reasons to expect the productivity of this group of industries to be lower. In contrast to this the export industries, by reason of their access to world markets, are able to benefit from long runs and specialized operations to achieve an average level of productivity not very different than that in the United States. This does not apply to the domestic industries. A few individual industries are able to achieve a large enough volume of output in local Canadian markets to be quite close to the productivity of the export industries even though it is not true for the domestic industry group as a whole.

---

[5]For the sake of convenience we will refer to these industries as X,Y and Z industry groups of the United States. These industry groups in composition will be equivalent to the export, domestic and protected industry groups of Canada respectively.

Tables 7.7 to 7.9 below show the productivity in Canada and the United States in the three groups of industries. These tables show that in all three periods 1949-52, 1962-65 and 1965, the Canadian export and domestic industries relative to the counterpart industries in the United States performed much better than did her protected industries relative to the comparable industries in the United States. These results thus appear to suggest the validity of the thesis that tariffs depress Canadian manufacturing productivity levels relative to those of the United States. But it may, however, be noted that, save for the domestic industries, such a pattern of productivity will be expected from the principle of comparative advantage as well. The principle of comparative advantage would require an inferior productivity performance of import competing industries as compared to the export industries relative to the identical listings in the United States. It is, therefore, difficult to tell whether this comparatively inferior performance of the protected industries as compared to the export industries relative to the counterpart American industries is due to the tariffs or due to comparative disadvantage itself. Unless the influence of the tariffs and comparative disadvantage can be isolated from this inferior performance of the protected industries relative to the comparable industries in the United States, no firm conclusion can be derived with confidence about the possible relationship of the tariffs and the relative American-Canadian productivity differences.[6]

---

[6]As has been stated before (p.150, footnote 1), the argument in the above paragraph assumes that comparative advantage or disadvantage rests on labour productivity alone. However, in a free trade position

--- continued on page 162 ---

TABLE 7.7

WEIGHTED AVERAGES OF PRODUCTIVITY IN CANADIAN AND AMERICAN INDUSTRY GROUPINGS in 1949-52 and 1962-65, EXPRESSED IN CURRENT U.S. DOLLARS

Industry Groups	A (000 $)	B (000 $)	C ($)
Canada: 1949-52			
Export Industries	9.1	7.4	4.0
Domestic Industries	10.4	7.0	5.0
Protected Industries	5.5	4.5	2.8
Canada: 1962-65			
Export Industries	15.9	11.8	7.3
Domestic Industries	21.9	12.9	10.0
Protected Industries	9.2	6.2	4.9
United States: 1949-52			
Industry Group X	9.2	7.4	4.3
Industry Group Y	10.9	7.8	5.3
Industry Group Z	8.7	7.3	4.4
United States: 1962-65			
Industry Group X	19.2	13.1	9.5
Industry Group Y	25.1	16.3	11.8
Industry Group Z	24.7	16.8	13.0
Canadian productivity as % of the United States: 1949-52			
Export Industries as % of X Group	98.9	100.0	93.0
Domestic Industries as % of Y Group	95.4	89.7	94.3
Protected Industries as % of Z Group	63.2	61.6	63.6
Canadian productivity as % of United States: 1962-65			
Export Industries as % of X Group	82.8	90.1	76.8
Domestic Industries as % of Y Group	87.3	79.1	84.8
Protected Industries as % of Z Group	37.3	36.9	37.7

Source: Table 6.8

TABLE 7.8

WEIGHTED AVERAGES OF PRODUCTIVITY IN CANADIAN AND AMERICAN INDUSTRY GROUPINGS IN 1965, EXPRESSED IN CURRENT U.S. DOLLARS

Canada			
Industry Groups	A (000 $)	B (000 $)	C ($)
Export Industries	19.0	11.8	7.6
Domestic Industries	16.8	10.3	7.8
Protected Industries	8.9	6.2	4.0
United States			
Industry Group X	22.4	15.5	11.9
Industry Group Y	21.8	15.3	10.7
Industry Group Z	18.3	11.8	8.3
Canadian productivity as % of the United States			
Export Industries as % of X Group	84.8	76.1	63.9
Domestic Industries as % of Y Group	77.1	67.3	72.9
Protected Industries as % of Z Group	48.6	52.5	48.2

Source: Appendix Tables H, I and J.

TABLE 7.9

WEIGHTED AVERAGES OF PRODUCTIVITY IN CANADIAN AND AMERICAN INDUSTRY GROUPINGS in 1949-52 and 1962-65, EXPRESSED IN CONSTANT (1961) U.S. DOLLARS

Industry Groups	A (000 $)	B (000 $)	C ($)
Canada: 1949-52			
Export Industries	10.9	8.9	4.6
Domestic Industries	9.9	6.8	4.2
Protected Industries	6.4	5.2	3.0
Canada: 1962-65			
Export Industries	15.5	12.0	6.9
Domestic Industries	22.5	13.3	10.5
Protected Industries	9.3	6.3	4.5
United States: 1949-52			
Industry Group X	11.5	9.5	5.5
Industry Group Y	12.8	9.5	6.4
Industry Group Z	9.1	7.5	4.6
United States: 1962-65			
Industry Group X	19.5	15.1	8.9
Industry Group Y	24.5	16.9	11.8
Industry Group Z	26.5	17.8	13.4
Canadian productivity as % of the United States: 1949-52			
Export Industries as % of the X Group	94.8	93.7	83.6
Domestic Industries as % of Y Group	77.3	71.6	65.6
Protected Industries as % of Z Group	70.3	69.3	64.2
Canadian productivity as % of the United States: 1962-65			
Export Industries as % of X Group	79.5	79.5	77.5
Domestic Industries as % of Y Group	91.8	78.7	89.0
Protected Industries as % of Z Group	35.1	35.4	33.6

Source: Table 6.2

Further, as the argument goes, since expanded output and increased specialization in production through access to larger U.S. markets allows the export industries larger potential for economies of scale, then the same argument requires that in terms of labour productivity most, if not all, Canadian export industries would perform better than do her nationally and locally confined domestic and protected industries relative to the comparable industries in the United States.[7] The logical outcome of this argument is not substantiated by the above tables. Tables 7.7 and 7.9 show that in period II (1962-65) Canadian domestic industries performed better than did her export industries relative to the counterpart American industries. In period I (1949-52), although the export industries, as compared to the other two categories showed higher productivities relative to the comparable listings in the United States, the percentage differences in the performance of export and domestic industries are too small to permit a conclusive evaluation of the results and to explain this phenomenon with confidence by the market size and specialization argument.

--- continued --- [6]comparative advantage or disadvantage may be associated with advantages or disadvantages with respect to labour, capital, natural resources or even management skills. If we consider these factors, and since these do not show up directly in labour productivity ratios, the above argument will fall down. Thus the above argument is valid only under the assumption that labour productivity differentials alone determine comparative advantage or disadvantage.

[7]As has been stated in Chapter III, since we do not know relative prices in the two countries, there is no basis to compare productivity of the Canadian domestic industries relative to the comparable industries in the United States. However, this argument and the discussion that follows assumes away the problem of relative comparable prices since the argument essentially involves considerations of relative size of market and scale economies available to the three categories of industries.

Thus the proposition that the export industries, by virtue of their being able to gain access to the world markets are able to avail themselves of economics of larger scale production and specialised operations and thereby higher levels of productivity, and the protected industries are able to attain only low levels of productivity because the tariff, by confining the producers to their relatively small domestic market, forces the producers to smaller scale and less specialised nature of manufacturing operations is not well substantiated by the above results. For if this were true then the logical outcome of the argument will be that the export industries must as a rule put up better productivity performance than the domestic industries relative to comparable industries in the United States for the producers in the domestic industries aim at the same size of market as producers in the protected industries. Further, if the tariffs confine the producers to relatively small domestic market and by restricting competition reduce manufacturers incentive to rationalize production to attain higher levels of productivity, it can well be argued that transport costs also provide "protection" from competition to domestic industries and greatly restrict the size of the market. But our results show that operating within similar conditions the domestic industries perform much better than do the protected industries relative to comparable industries in the United States. It would, therefore, appear that tariffs do not suffice as a differentiating factor in the relative United States-Canada productivity performance of the manufacturing industries.

In Table 7.8, presenting comparative productivity performance of the three groups of Canadian industries relative to the United States in

1965, we have the results that seem to conform to expectation and support the hypothesis. However, these results conflict with the evidence in Tables 7.7 and 7.9. Moreover, in the interpretation of these results it must be kept in mind that, with the exception of domestic industries, such a pattern of comparative productivity relative to identical counterpart industries in the United States will be expected from the principle of comparative advantage itself, even if there were no tariffs. In view of these problems it would, therefore, appear that it is difficult to evaluate precisely tariff-productivity hypothesis.

In conclusion, the evidence in this section regarding the tariff and the relative U.S.-Canada productivity differences is inconsistent and uncertain, and it is difficult to precisely determine the statistical significance of tariffs in the observed productivity differences between the United States and Canada.

Nature of Results

Whatever the statistical significance of the above results they cannot be taken at their face value. We advance the thesis that these computations for the two countries may be somewhat over or understated relative to each other since if data adjustments accounting for devaluation of the Canadian dollar in 1962 had been possible, somewhat differing magnitudes may have resulted. We believe that Canadian productivity relative to the identical industries in the United States is understated for export industries and overstated for protected industries. We can not venture to say anything about the domestic industries. We expect the Canadian consumers to buy and import from the United States only if they have to pay lower prices than they pay for identical products produced at home. For the same reasons Canadian exporters will be able to find customers in the United States only if they can offer goods at prices lower than those prevailing in the United States. Now since domestic prices of Canadian export industries are lower and of import competing industries are higher relative to the same industries in the United States, it implies that when value added is computed from published statistics, productivity of export industries will be understated and that of import competing industries overstated relative to counterpart industries in the United States.

Aggregate Canadian Data

There is yet another kind of analysis of tariffs and productivity which bears on the mooted question whether the tariffs depress productivity levels in Canada. By means of aggregate data for manufacturing industries (belonging to different protection groups) in a single year (1965) we are able to pursue further the test for a possible relationship between Canadian tariffs and Canadian productivity by running a rank correlation between the two. The necessary adjusted (for price effect of tariffs) productivity data for industries belonging to different protection groups is contained in Table 7.10 and 7.11 below.

Looking at these tables there appears to be no consistent relationship between the levels of the Canadian tariffs and Canadian productivity. The two tables show higher productivity for many industries with lower tariff levels, and for others an opposite relationship holds. However, the overall picture appears to be compatible with the hypothesis. The rank correlation coefficients between the levels of nominal tariffs in 1963 and the levels of Canadian productivity per production worker, per

TABLE 7.10

NOMINAL TARIFFS (1963) PROTECTION STATUS AND INDUSTRY PRODUCTIVITY (1965) DIFFERENCES IN CANADA: WEIGHTED AVERAGES IN U.S. DOLLARS

Protection Status	No. of Industries	A (000 $)	B (000 $)	C ($)
0 - 5%	15	15.1	9.6	7.0
5.1 - 10%	22	19.7	12.7	9.1
10.1 - 15%	21	14.0	10.9	6.4
15.1 - 20%	32	14.6	9.5	6.8
20.1 - 25%	28	10.3	7.0	4.8
25.1 - 30%	11	8.3	6.3	4.0
Above 30.1%	4	5.7	4.6	2.6

Source: Appendix Table H and Melvin and Wilkinson, *op. cit.*, pp. 21-28.

TABLE 7.11

EFFECTIVE TARIFFS (1963) PROTECTION STATUS AND INDUSTRY PRODUCTIVITY (1965) DIFFERENCES IN CANADA: WEIGHTED AVERAGES IN U.S. DOLLARS

Protection Status	No. of Industries	A (000 $)	B (000 $)	C ($)
Less than 0%	7	15.2	8.7	6.9
0 - 5%	13	17.8	10.7	8.3
5.1 - 10%	13	15.0	10.4	6.9
10.1 - 15%	7	23.0	13.0	10.6
15.1 - 20%	17	18.1	12.0	8.8
20.1 - 25%	15	8.5	6.0	4.0
25.1 - 30%	11	19.0	12.7	9.0
30.1 - 35%	15	10.8	6.7	5.0
35.1 - 40%	11	7.7	5.8	3.7
40.1 - 45%	8	7.0	5.1	3.2
45.1 - 65%	9	4.0	3.2	1.8
Over 65.1%	5	3.9	3.2	1.8

Source: Appendix Table J and Melvin and Wilkinson, *op. cit.*, pp. 21-28.

TABLE 7.12

NOMINAL AND EFFECTIVE TARIFFS IN 1963 AND INDUSTRY PRODUCTIVITY IN 1965 IN CANADA, EXPRESSED IN U.S. DOLLARS

S.I.C.	Industries	Nominal Tariff 1963 %	Effective Tariff 1963 %	A (000 $)	B (000 $)	C ($)
124	Flour Mills	8.8	31.9	18.2	10.4	8.6
143	Distilleries	20.0	19.3	50.0	29.4	22.9
213	Cordage and Twine	1.8	-1.4	8.3	6.8	4.2
2513	Saw and Planning Mills	7.6	13.6	8.3	6.7	3.7
252	Veneer and Plywood	14.4	24.9	7.3	6.5	3.4
271	Pulp and Paper Mills	13.0	74.9	16.4	13.7	7.5
311	Agricultural Implements	0.0	0.0	11.0	8.5	5.2
318	Office and Store Machines	11.0	11.0	23.9	15.9	10.8
326	Railroad Rolling Stock	16.6	24.3	11.5	9.1	5.4
369	Other Petroleum and Coal Products	5.0	1.6	22.6	13.4	10.2
373	Plastic and Synthetic Resins	8.2	7.1	29.9	17.2	13.0
--	Pen,Pencil & Typewriter Supplies	19.6	24.5	12.9	8.6	6.1
101	Slaughtering and Meat Processing	5.2	5.7	12.4	9.0	5.9
103	Poultry Processors	12.7	21.9	5.7	4.9	2.7
105	Dairy Processors	7.1	-15.6	17.0	7.2	7.7
112	Fruit and Vegetable Canners	9.0	6.2	10.9	8.2	5.3
123	Feed Manufacturers	7.2	8.9	15.5	8.2	7.0
376	Soap and Cleaning Compounds	19.5	31.4	39.4	16.6	17.9
125	Breakfast Cereals	13.5	17.5	25.4	19.0	12.1
128	Biscuits	8.0	5.1	10.4	7.7	5.2
129	Bakeries	8.0	7.3	11.8	5.9	5.4
131	Confectionary	17.3	26.8	10.1	7.8	5.2
135	Vegetable oils	4.7	34.5	22.4	15.7	10.5
141	Soft Drinks	4.9	1.4	25.4	19.6	11.6
172	Leather Tanneries	8.6	16.7	6.9	6.1	3.2
193	Wool, Yarn Mills	10.8	27.3	5.7	4.8	2.8
197	Wool Cloth Mills	19.3	40.4	7.2	6.2	3.1
221	Canvas Products	18.5	18.4	6.9	4.9	3.4
223	Cotton and Jute Bags	14.7	48.5	7.8	6.4	3.7
289	Printing and Publishing	1.3	0.4	20.2	9.3	10.1
292	Steel,Pipe and Tube Mills	10.0	14.6	14.5	11.0	6.6
294	Iron Foundaries	15.4	24.6	8.6	7.4	3.9
296	Aluminum Rolling & Casting	4.2	2.2	12.1	8.7	5.6
306	Hardware, Tool and Cutlery	15.5	19.3	11.0	8.3	5.1
315	Miscellaneous Machines & Equipment	9.5	7.9	13.7	8.8	6.2
327,328	Ship,Boat Building and Repairs	17.5	24.9	9.2	7.5	4.3
335	Communication Equipment	14.2	17.4	11.7	7.6	5.5

Table 7.13 continued -

S.I.C.	Industries	Nominal Tariff 1963 %	Effective Tariff 1963 %	A (000 $)	B (000 $)	C ($)
336	Electrical Industrial Equipment	17.7	21.4	14.6	9.4	6.8
337	Battery Manufacturing	17.4	24.4	14.6	9.7	6.9
341	Cement Manufacturing	3.4	3.1	36.3	25.0	15.9
347	Concrete Products	18.3	31.3	11.2	8.7	5.0
212	Thread Mills	0.4	-10.1	11.0	7.7	5.1
351	Clay Products	11.5	13.6	9.9	8.1	4.4
353	Stone Products	15.7	17.5	9.8	6.6	4.4
355	Asbestos Products	12.2	16.3	13.9	9.9	6.6
356	Glass and Glass Products	10.1	11.5	9.8	8.1	4.5
365	Petroleum Refineries	5.3	27.8	36.5	25.3	17.2
375	Paint and Varnish	16.7	23.1	26.8	11.1	12.4
377	Toilet Preparations	15.6	18.3	28.5	14.5	14.4
--	Venetian Blind Manufacturing	11.6	15.1	8.4	4.9	3.8
101	Animal oils and Fats	4.7	1.9	22.6	15.5	9.7
302	Fabricated Structural Metal	8.0	5.7	13.1	9.6	6.2
145	Breweries	10.0	10.7	39.0	20.8	18.1
286	Commercial Printing	19.3	24.9	11.0	7.5	5.3
331,332	Electrical Appliances	19.7	21.5	11.8	8.5	5.8
214	Narrow Fabric Mills	19.4	24.4	6.8	6.0	3.1
133	Sugar Refineries	24.2	-7.6	16.2	12.1	7.2
151-153	Tobacco Products	30.0	37.5	15.6	11.7	8.0
174	Shoe Factories	21.7	28.3	4.4	3.8	2.1
175	Leather Gloves & Mittens	23.1	34.6	3.7	2.9	1.9
201	Synthetic Textile Mills	30.3	58.2	7.7	6.1	3.5
216	Carpet, Mat and Rug	28.2	59.7	8.8	7.3	4.1
231,239	Knitting Mills	31.3	64.9	4.5	4.0	2.1
246	Fur Goods	25.0	98.9	8.2	5.8	4.1
--	Sash, Door and Plant Mills	22.5	45.1	6.5	4.8	2.9
256	Wooden Box	22.5	38.4	5.5	4.6	2.4
261	Household Furniture	25.8	41.2	5.7	4.4	2.5
264	Office Furniture	26.8	39.1	7.7	5.9	3.6
266	Other Furniture	25.8	40.1	6.2	4.8	2.9
334	Household Radio, T.V.	20.7	36.0	10.2	6.5	4.8
345	Gypsum Products	25.0	37.0	15.9	12.8	7.1
357	Abrasive Manufacturers	20.5	44.1	10.5	7.8	5.0
374	Medicine and Pharmacy	22.5	28.8	28.0	10.9	13.4
383	Broom and Brush	30.0	56.0	7.5	4.5	3.6
324	Truck body and Trailors	20.7	41.5	8.2	6.1	4.1
161,163,169	Rubber Industries	20.1	36.7	10.5	7.2	4.9
354	Mineral Wool	24.1	34.5	16.5	12.6	7.3
382	Jewellery and Silverware	22.5	42.4	7.2	5.2	3.4

Source: Appendix Table J and Melvin and Wilkinson, *op. cit.*, pp. 21-28.

employee and per man-hour in 1965 were found to be -.93, -.89 and -.93 respectively. The corresponding coefficients between the levels of effective tariffs in 1963 and the levels of productivity in 1965 were found to be -.78, -.73 and -.73. All these coefficients are significant at a 5 percent probability level.

Since the above rank correlation coefficients were computed for aggregative data for industries belonging to different protection classes, it is possible that some bias may have crept into the computations due to the arbitrary nature of the classification. To guard against this possibility it was decided to compute rank correlation coefficients between individual industry productivity levels in 1965 and the respective tariff levels in 1963. A sample of 78 industries for which comparable productivity and tariff data were available was selected for this purpose. These data are contained in Table 7.12 above. The rank correlation coefficients between the nominal tariff levels in 1963 and the productivity levels per production worker, per employee and per man-hour in 1965 were computed to be -.26, -.25 and -.24 respectively. These were found to be statistically significant at a 5 percent probability level. The rank correlation coefficients between the effective tariff levels in 1963 and the three productivity ratios in 1965 obtained were -.39, -.35 and -.46 respectively, which again were significant at the 5 percent significance level. These results thus support the view that higher tariff levels are at least accompanied by low productivity levels in the Canadian manufacturing industries.

We may now conclude the discussion of this section. We have examined the hypothesis, using different sets of data, that the tariffs are a factor in low productivity levels in Canada relative to the United States in alternative ways. There is some evidence, though by no means conclusive, that the tariffs may have been a factor in low productivity levels in Canada. On the whole, however, the evidence is inconsistent, uncertain and conflicting which makes it difficult to draw any firm conclusion in definitive terms about the possible relationship between the Canadian tariffs and the relative United States-Canada productivity differences.

Correlation and Regression Analysis

In this section the question of the possible relationship between the Canadian tariff and the United States-Canada productivity differences is further investigated through correlation and regression analysis. If the tariff-productivity hypothesis postulated is correct, then we might expect to discover that the United States-Canada productivity differences will be larger, on the average, in those industries in which the Canadian tariff is higher. Given the hypothesis, we would also expect to find that the amounts by which the tariffs are higher from one industry to another, vary roughly with the amounts by which the United States-Canada productivity difference is greater from one industry to the other. To examine this relationship correlation and regression coefficients are computed to show whether tariffs are associated with the relative United States-Canada productivity performance.

In the following pages first the results of correlation analysis are presented, then regression results follow. Three sets of tariff and productivity data are utilised for this analysis. The correlation and regressions are run between the levels of Canadian nominal and effective tariffs and the relative United States-Canada productivity levels. As has been stated in Chapter VI, it has been assumed that producers in the Canadian import competing industries price up to the U.S. level plus the Canadian tariff. The higher prices in Canada thus inflate the dollar value of her physical output leading to an overstatement of the Canadian value added relative to the United States. The Canadian productivity data utilised in the ensuing correlation and regression analysis is, therefore, the one from which the price-inflation effect of the Canadian nominal and effective tariffs has been removed and brought to a comparable level with the United States. In the ensuing correlation and regression analysis the Canadian nominal tariffs are related to the relative United States-Canada productivity levels adjusted for Canadian nominal tariffs, whereas the effective tariffs are related with the United States-Canada productivity levels adjusted to take account of the Canadian effective tariff levels.[7]

Correlation Analysis

In this section correlation analysis is carried out to determine whether the tariffs and the relative United States-Canada productivity differentials are related variables. The investigation is carried out with the help of three sets of data. The United States-Canada productivity differentials are expressed in a ratio form and are related to Canadian tariff levels. Thus correlation coefficients are computed to show the relationship (1) between the levels of the Canadian tariffs in 1949 and the relative United States-Canada productivity ratios in 1949-52; (2) between the levels of the Canadian tariffs in 1963 and the relative United States-Canada productivity ratios in 1962-65; and (3) between the levels of the Canadian tariffs in 1963 and the relative United States-Canada productivity ratios in 1965. The reason for running the last of these correlations was that the year 1965 yielded a larger sample of industries. In addition it was also possible to utilise the nominal and effective tariff rates schedules from the Melvin and Wilkinson study

---

[7]A discussion on definitions of Nominal and Effective tariffs can be found in Chapter V., pp. 83-86.

"Effective Protection in the Canadian Economy".[8]

Tables 7.13 and 7.14 below represent the industry by industry breakdown of the Canadian nominal and effective tariffs and the relative United States-Canada productivity ratios in 1949-52 and 1962-65. Looking at individual industries in these tables, there appears to be no clear-cut relationship between the levels of the Canadian tariffs and the United States-Canada productivity differences. However, the overall picture still appears to be compatible with the hypothesis. The correlation coefficients between the levels of the nominal tariffs in 1949 and the relative United States-Canada productivity ratios per production worker and per employee in 1949-52 are found to be 0.67 and 0.66 respectively. The correlation coefficient between the levels of nominal tariffs in 1963 and the relative productivity ratios per production worker, per employee and per man-hour in 1962-65 are found to be 0.67, 0.67 and 0.59 respectively. All of these correlation coefficients are statistically significant at the 1 percent probability level.[9] Thus these results lend credence to the hypothesis that high Canadian nominal tariffs are associated with the low Canadian productivity levels relative to the United States.

---

[8] Melvin and Wilkinson, op. cit., pp. 21-28.

[9] To test the statistical significance of r computed from these small samples, we computed $t = \frac{r\sqrt{n-2}}{\sqrt{1-r^2}}$ which follows the t distribution at n-2 degrees of freedom. The hypothesis tested was that correlation coefficient r = 0. The hypothesis was rejected at the 1 percent probability level. In the subsequent correlation analysis also statistical significance of r was judged in terms of t distribution at the given level of significance.

TABLE 7.13

THE LEVELS OF CANADIAN NOMINAL TARIFFS (1949 and 1963) AND THE RELATIVE UNITED STATES-CANADA PRODUCTIVITY RATIOS (1949-52 and 1962-65)

Industries	Canadian Nominal Tariff in 1949%	U.S. - Canada Productivity Ratio (Canada = 1) 1949-52 A*	B*	C*	Canadian Nominal Tariff in 1963 %	U.S. - Canada Productivity Ratio (Canada = 1) 1962-65 A*	B*	C*
Flour Mills	18.3	1.1	1.2	-	8.8	1.6	2.1	1.5
Agricultural Implements	0.3	1.7	1.7	-	0.0	1.6	1.6	1.7
Pulp and Paper	13.2	0.9	1.0	-	13.0	1.3	1.3	1.4
Veneer and Plywood	15.0	1.1	1.2	-	14.4	1.5	1.5	1.5
Saw and Planning Mills	2.3	1.5	1.9	-	7.6	1.0	1.1	1.1
Distilleries	61.9	1.3	1.4	-	20.0	1.0	1.3	1.0
Plastic and Synth. Resins	7.0	0.7	0.8	-	8.2	1.0	1.2	1.1
Soft Drinks	3.2	1.1	1.3	-	4.9	1.4	1.3	1.7
Bakeries	18.5	2.2	1.6	-	8.0	1.8	1.9	1.9
Printing & Publishing	6.0	1.7	1.7	-	1.3	1.3	1.3	1.4
Leather Tanneries	12.6	1.6	1.8	-	8.6	1.6	1.6	1.7
Vegetable Oil	9.7	1.3	1.6	-	4.7	1.3	1.4	1.2
Cement	8.6	0.8	0.7	-	3.4	0.9	1.0	1.0
Petroleum & Coal Products	5.4	1.4	1.5	-	5.3	1.0	1.0	1.1
Fabricated Structural Metal	6.6	1.3	1.3	-	8.0	1.3	1.3	1.3
Tobacco Products	70.4	5.5	5.9	-	30.0	2.2	2.6	2.3
Gypsum Products	10.2	1.5	1.6	-	25.0	1.9	2.0	1.6
Knitting Mills	19.8	2.0	2.1	-	29.4	1.9	1.9	1.8
Leather Gloves	21.1	1.6	1.6	-	23.1	1.6	1.7	1.8
Sugar Refineries	7.9	0.7	0.7	-	24.2	2.1	2.2	2.1
Medicine & Pharmacy	14.2	1.8	1.9	-	22.5	2.2	3.1	2.3
Furniture	9.8	1.7	1.8	-	25.9	1.8	2.0	1.9
Motor Vehicle & Parts	10.0	1.4	1.5	-	17.5	1.9	2.1	1.9

Sources: Tables 6.2 and 5.1

*A = Production workers
*B = Total Employment
*C = Production worker Man-hours

TABLE 7.14

THE LEVELS OF CANADIAN EFFECTIVE TARIFFS (1949 & 1963) AND THE RELATIVE UNITED STATES-CANADA PRODUCTIVITY RATIOS (1949-52 and 1962-65)

Industries	Canadian Effective Tariff in 1949 %	U.S. - Canada Productivity Ratio, (Canada = 1) 1949-52			Canadian Effective Tariff in 1963%	U.S.-Canada Productivity Ratio, (Canada = 1) 1962-65		
		A	B	C		A	B	C
Flour Mills	134.6	1.1	1.2	-	31.9	1.6	2.1	1.5
Agricultural Implements	0.0	1.7	1.7	-	0.0	1.6	1.6	1.7
Pulp and Paper	75.1	0.9	1.0	-	74.9	1.3	1.3	1.4
Veneer and Plywood	29.1	1.1	1.2	-	22.4	1.5	1.5	1.5
Saw and Planning Mills	4.5	1.5	1.9	-	13.6	1.0	1.1	1.1
Distilleries	100.2	1.3	1.4	-	19.3	1.0	1.3	1.0
Plastic & Synth. Resins	9.2	0.7	0.8	-	7.1	1.0	1.2	1.1
Soft Drinks	-34.6	1.1	1.3	-	1.4	1.4	1.3	1.7
Bakeries	38.7	2.2	1.6	-	7.3	1.8	1.9	1.9
Printing and Publishing	3.9	1.7	1.7	-	0.4	1.3	1.3	1.4
Leather Tanneries	60.0	1.6	1.8	-	16.7	1.6	1.6	1.7
Vegetable Oils	91.7	1.3	1.6	-	34.5	1.3	1.4	1.2
Petroleum and Coal	22.4	1.4	1.5	-	27.4	1.0	1.0	1.1
Fabricated Structural Metal	6.5	1.3	1.3	-	5.7	1.3	1.3	1.3
Gypsum Products	3.9	1.4	1.5	-	37.0	2.3	2.3	2.2
Knitting Mills	44.5	3.0	2.9	-	56.8	3.0	3.1	3.3
Leather Gloves	51.0	2.5	2.6	-	34.6	1.8	2.0	2.1
Sugar Refineries	9.4	0.7	0.7	-	-7.6	1.5	1.5	1.5
Medicine and Pharmacy	12.7	1.8	1.9	-	28.8	2.4	2.3	2.6
Furniture	10.5	1.7	1.8	-	40.7	2.2	2.5	2.4

Source: Tables 6.2 and 5.1

When a correlation is run between the effective tariff levels in 1949 and the relative United States-Canada productivity ratios in 1949-52, we get the insigificant coefficients of 0.008 and 0.020. The correlations between the levels of effective tariffs in 1963 and the relative productivity ratios in 1962-65 yield the three coefficients of 0.41, 0.41 and 0.40 respectively which again are not significant at the 5 percent significance level. These results thus fail to substantiate the central hypothesis and indicate that the United States-Canada productivity gap is not significantly affected by effective tariffs.

Consider now the larger sample of 78 industries (Table 7.15). For this sample, the correlation coefficients between the levels of nominal tariffs in 1963 and the realtive 1965 United States-Canada productivity ratios per production worker, per employee and per man-hour are computed to be 0.51, 0.51 and 0.53 respectively, which are statistically significant at a 1 percent probability level. When correlations are run between the levels of effective tariffs in 1963 and the relative United States-Canada productivity ratios in 1965, the three corresponding correlation coefficients are found to be 0.47, 0.59 and 0.47 respectively. These results again are significant at a 1 percent significance level. These results are consistent with the hypothesis that the level of the Canadian tariff (both nominal and effective) is a significant factor in explaining the United States-Canada productivity differences.

As has been stated in Chapter II, our hypothesis suggests that the tariffs have a two-way effect on the Canadian productivity levels tending to depress it relative to the United States. On the one hand,

TABLE 7.15

THE CANADIAN TARIFFS (1963) AND THE STATES - CANADA PRODUCTIVITY RATIOS (1965)

Industries	U.S. - Canada Ratio (Canada = 1) A	B	C	Canadian Effective Tariff 1963 %	U.S. - Canadian Ratio (Canada = 1) A	B	C
Flour Mills	1.44	1.87	1.37	31.9	1.4	1.87	1.37
Distilleries	.97	1.29	1.06	19.3	.97	1.29	1.06
Cordage and Twine	1.19	1.22	1.02	-1.4	1.19	1.22	1.16
Saw and Planning Mills	.95	1.01	1.02	13.6	.95	1.01	1.02
Veneer and Plywood	1.34	1.36	1.35	24.9	1.34	1.36	1.35
Pulp and Paper Mills	1.34	1.30	1.32	74.9	1.34	1.30	1.32
Agricultural Implements	1.57	1.55	1.65	0.0	1.57	1.55	1.65
Office and Store Machines	1.15	1.59	1.25	11.0	1.15	1.59	1.25
Railroad Rolling Stock	1.53	1.54	1.62	24.3	1.53	1.54	1.62
Other Petroleum & Coal Prod.	2.09	1.98	2.30	1.6	2.09	1.98	2.30
Plastic and Synthetic Resins	1.11	1.30	1.22	7.1	1.11	1.30	1.22
Slaughtering & Meat Processing	1.03	1.20	1.20	5.7	1.03	1.20	1.20
Poultry Processors	1.26	1.32	1.37	21.9	1.26	1.32	1.37
Dairy Factories	1.77	1.87	1.80	-15.6	1.77	1.87	1.80
Fruit and Vegetable Canning	1.23	1.43	1.33	6.2	1.23	1.43	1.33
Feed Manufacturing	1.95	2.31	1.94	8.9	1.95	2.31	1.94
Breakfast Cereals	1.65	1.83	1.73	17.5	1.65	1.83	1.73
Biscuits	1.91	2.06	1.94	5.1	1.91	2.06	1.94
Bakeries	1.64	1.81	1.75	7.3	1.64	1.81	1.75
Confectionary	1.30	1.42	1.30	26.8	1.30	1.42	1.30
Vegetable Oils	1.07	1.15	.97	34.5	1.07	1.15	.97
Soft Drinks	1.27	1.23	1.30	1.4	1.27	1.23	1.30
Leather Tanneries	1.73	1.72	1.84	16.7	1.73	1.72	1.84
Wool Yarn Mills	1.54	1.66	1.50	27.3	1.54	1.66	1.50
Wool Cloth Mills	1.47	1.50	1.61	40.4	1.47	1.50	1.61
Canvas Products	1.21	1.32	1.29	18.4	1.21	1.32	1.29
Cotton and Jute Bags	1.03	1.09	1.08	48.5	1.03	1.09	1.08
Printing and Publishing	1.00	1.32	1.02	0.4	1.00	1.32	1.02
Steel Pipe & Tube Mills	1.43	1.29	1.51	14.6	1.43	1.29	1.51
Iron Foundaries	1.54	1.55	1.56	24.6	1.54	1.55	1.56
Aluminum Rolling & Casting	1.19	1.34	1.21	2.2	1.19	1.34	1.21
Hardware, tool, cutlery	1.56	1.65	1.64	19.3	1.56	1.65	1.64
Mfg. Machines & Equip.	1.38	1.55	1.59	7.9	1.38	1.55	1.59
Ship-Boat Building & Repairs	1.16	1.20	1.23	24.9	1.16	1.20	1.23
Communication Equip.	1.55	1.55	1.63	17.4	1.55	1.55	1.63
Electrical Industrial Equip.	1.23	1.38	1.29	21.4	1.23	1.38	1.29
Battery Mfg.	1.36	1.60	1.39	24.4	1.36	1.60	1.39
Cement	.82	.97	.94	3.1	.82	.98	.94
Narrow Fabric Mills	1.35	1.36	1.45	24.4	1.35	1.36	1.45

--- continued ---

TABLE 7.15 (Continued)

Industries	Canadian Nominal Tariff 1963 %	U.S. - Canada Ratio (Canada = 1)			Canadian Effective Tariff 1963 %	U.S. - Canadian Ratio (Canada = 1)		
		A	B	C		A	B	C
Concrete Products	18.3	1.31	1.27	1.40	31.1	1.31	1.27	1.40
Commercial Printing	19.3	1.21	1.37	1.28	24.9	1.21	1.37	1.28
Clay Products	11.5	1.12	1.16	1.25	13.6	1.12	1.16	1.25
Stone Products	15.7	.93	1.13	1.04	17.5	0.93	1.13	1.04
Asbestos Products	12.2	1.30	1.45	1.31	16.3	1.30	1.45	1.31
Glass and Glass Products	10.1	1.58	1.65	1.71	11.5	1.58	1.65	1.71
Petroleum Refineries	5.3	1.22	1.26	1.32	27.8	1.22	1.26	1.32
Paint and Varnish	16.7	1.26	1.67	1.33	23.1	1.26	1.67	1.33
Toilet Preparations	15.6	2.17	2.70	2.22	18.3	2.17	2.70	2.22
Electrical Appliances	19.7	1.60	1.51	1.62	30.5	1.60	1.51	1.62
Soap and Cleansing Compounds	19.5	1.55	2.43	1.70	31.4	1.55	2.43	1.70
Pen, Pencil & Typewriter Supplies	19.6	1.59	1.77	1.71	24.5	1.59	1.77	1.71
Venetian Blind Mfg.	11.6	1.59	1.93	1.68	15.1	1.59	1.93	1.68
Animal Oils and Fats	4.7	1.07	1.14	1.08	1.9	1.07	1.14	1.08
Fabricated Structural Metal	8.0	1.34	1.19	1.20	5.7	1.34	1.19	1.20
Breweries	10.0	.86	1.08	.95	10.7	0.86	1.08	0.95
Thread Mills	.4	.87	1.05	.88	-10.1	0.87	1.05	0.88
Jewellery and Silverware	22.5	2.04	2.16	1.81	42.4	2.74	2.92	2.46
Sugar Refineries	24.2	2.14	2.17	2.26	-7.6	1.50	1.53	1.59
Tobacco Products	30.0	2.13	2.53	2.25	37.5	2.38	2.83	2.52
Shoe Factories	21.7	1.76	1.80	1.95	28.3	1.97	1.97	2.10
Leather Gloves	23.1	1.66	1.85	1.83	34.6	2.45	2.77	2.60
Synthetic Textile Mills	30.3	1.38	1.60	1.38	58.2	2.32	2.67	2.29
Carpet, Mat & Rug	28.2	1.84	1.88	1.79	59.7	3.29	3.39	3.18
Knitting Mills	31.1	1.95	1.97	2.16	64.9	3.86	3.88	4.18
Fur Goods	25.0	1.90	2.37	2.13	98.9	1.44	1.78	1.59
Sash, Door & Plant Mills	22.5	1.80	1.78	2.00	45.1	2.55	2.53	2.83
Wooden Box	22.5	1.35	1.49	1.52	38.4	1.69	1.86	1.89
Household Furniture	25.8	1.79	1.95	1.96	41.2	2.28	2.49	2.50
Office Furniture	26.8	2.18	2.32	2.24	39.1	2.62	2.76	2.70
Other Furniture	25.8	2.19	2.22	2.30	40.1	2.72	2.74	2.87
Household Radio, T.V.	20.7	1.48	1.90	1.57	36.0	1.84	2.37	1.94
Gypsum Products	25.0	1.72	1.66	1.71	37.0	2.05	1.98	2.05
Abrasive Manufacturing	20.5	2.53	2.24	2.66	44.1	3.61	3.20	3.79
Pharmacy and Medicine	22.5	2.21	3.10	2.32	28.8	2.41	3.38	2.53
Broom and Brush	30.0	2.01	2.73	2.15	56.0	3.21	4.39	3.43
Truckbody and Trailer	20.7	1.62	1.75	1.59	41.5	2.21	2.40	2.16
Rubber Industries	20.1	1.70	1.90	1.81	36.7	2.16	2.41	2.28
Mineral Wool	24.1	1.22	1.27	1.28	34.5	1.41	1.47	1.53

Source: Appendix Tables H & I and Melvin and Wilkinson, op. cit., pp. 21-28.

there is the effect of the Canadian tariffs, on the other there is also the effect of the American tariffs which, by erecting barriers to entry into the United States' market, have intensified the dependence of Canadian manufacturers on the relatively small Canadian market and have prevented them from obtaining economies of mass production and thus higher productivity. It is, therefore, necessary to examine the validity of the second part of the argument also. In order to do so we decided to run a correlation between the levels of American tariff protection and the relative United States-Canada productivity levels. Basevi's work provided us with schedules of the American nominal and effective tariff rates.[10] However, of the 70 industries for which Basevi computed tariff schedules only 18 were comparable with the Canadian industries. We had, therefore, to be content with this very small sample. Table 7.16 below provides data on the United States' tariff rates and the relative United States-Canada productivity ratios.

The data in Table 7.16 does not suggest any necessary tendency for the relative United States-Canada productivity to be associated with the levels of the United States' tariff. The correlation coefficients between the levels of the United States' nominal tariff and the relative American-Canadian productivity ratios per production worker, per employee and per man-hour are computed to be .21, .44 and .17 respectively. At the most, these coefficients can be interpreted as being a reflection of a weak relationship between the levels of the American nominal tariffs and the United States-Canada productivity ratios. As against this, when we examine

---

[10]Basevi, op. cit., pp. 147-60.

TABLE 7.16

THE LEVEL OF THE AMERICAN TARIFF (1958) AND THE RELATIVE UNITED STATES - CANADA PRODUCTIVITY RATIOS (1965)

Industries	U.S. Nominal Tariff 1958 %	U.S.-Canadian Ratio: Canada = 1			U.S. Effective Tariff 1958 %	U.S. - Canadian Ratio Canada = 1		
		A	B	C		A	B	C
Canned Fruit & Vegetables	25.0	1.24	1.44	1.34	46.6	1.24	1.44	1.34
Flour Mills	30.0	1.44	1.88	1.37	54.3	1.44	1.88	1.37
Leaf Tobacco Processing	13.8	0.88	0.87	0.78	69.9	0.88	0.87	0.78
Hosiery Mills	27.2	1.90	1.90	2.00	61.1	3.20	3.23	3.41
Paper and Plastic Bags	15.0	1.68	1.75	1.79	40.3	1.97	2.07	2.12
Corrugated Boxes	15.0	1.46	1.56	1.53	49.1	2.66	2.86	2.74
Petroleum Refining	5.0	1.22	1.26	1.33	7.5	1.22	1.26	1.33
Leather Gloves	33.3	1.65	1.85	1.83	68.6	2.00	2.17	2.20
Iron Foundaries *1	9.6	1.55	1.55	1.56	12.8	1.55	1.55	1.56
Slaughtering & Meat Processing	10.1	1.03	1.20	1.20	22.0	1.03	1.20	1.20
Veneer and Plywood	16.8	1.34	1.37	1.35	37.9	1.34	1.37	1.35
Venetian Blinds	40.0	1.60	1.94	1.68	106.6	1.60	1.94	1.68
Farm Machinery	0.1	1.57	1.55	1.65	-7.6	1.57	1.55	1.65
Air Craft and Parts	12.5	1.97	1.86	1.98	18.0	1.97	1.86	1.98
Clock and Watch	51.9	1.49	1.66	1.48	143.1	1.47	1.63	1.45
Aluminum Rolling & Casting *2	13.7	1.19	1.34	1.21	26.5	1.19	1.34	1.21
Communication Equipment	14.5	1.56	1.55	1.64	20.7	1.56	1.55	1.64
Household Ratio & T.V.	12.5	1.48	1.90	1.57	20.2	1.83	2.35	1.94

*1 Effective and Nominal Tariffs are weighted Averages.

*2 Weighted Averages.

Source: Appendix Table J and G. Basevi: "The United States Tariff Structure: Estimates of Effective Rates of Protection of United States Industries and Industrial Labour", Review of Economics & Statistics, May 1966, pp. 155-156.

the relationship between the levels of the American effective tariff and the relative United States-Canada productivity ratios, we obtain the corresponding statistically insignificant r values of .19, .18 and .15 respectively. Thus the hypothesis is not supported by the evidence of the above correlations. However, even though these tests do not indicate that the American tariffs are an important factor in lower Canadian productivity relative to the United States, we do not rule out entirely the possibility that the American tariff may be an important factor tending to depress Canadian productivity. The reason for arguing so is that the number of obersvations permitting the calculation of correlation coefficients may be too few to result in a true reflection of the strength of this relationship.

Changes in Tariffs and Changes in Productivity in Canadian Manufacturing Industries

Is high productivity performance associated with the industries where a decrease in tariff rates has occurred? Is there any necessary relationship between the degree of change in productivity and degree of change in tariff rates? These are the questions to which we now turn in this section. If the hypothesis that tariffs have caused low productivity in Canada is true, then we will expect that the industries which experienced the greatest tariff reductions will also be the ones to register the greatest gains in productivity. To examine this relationship over time changes in productivity and changes in tariffs (both nominal and effective) are computed to see if there is any systematic relationship between these two. For the two series thus generated correlation coefficients are calculated.

TABLE 7.17

THE CHANGES IN NOMINAL TARIFFS AND CHANGES IN PRODUCTIVITY IN CANADA

Industries	Over Time Changes in Nominal Tariffs (1963-1949) Percentage Points	Over Time Changes in Productivity per production worker (000 $) (1962-65 to 1949-52)	Over Time Changes in Productivity per employee (000 $) (1962-65 to 1949-52)
1. Flour Mills	-9.5	3.9	0.6
2. Agricultural Implements	-0.3	3.4	2.2
3. Pulp and Paper	-0.2	2.4	1.9
4. Veneer and Plywood	-0.6	1.9	2.6
5. Saw and Planning Mills	5.3	4.1	3.6
6. Distilleries	-41.9	24.7	11.1
7. Plastic and Synthetic Resins	1.2	10.5	4.5
8. Soft Drinks	1.7	8.3	-1.0
9. Bakeries	-10.5	5.2	0.9
10. Printing and Publishing	-4.7	9.4	4.4
11. Leather Tanneries	-4.0	2.4	2.2
12. Vegetable Oils	-5.0	12.7	8.9
13. Petroleum & Coal Products	0.1	26.4	17.8
14. Fabricated Structural Metal	1.4	2.4	1.2
15. Cement	-5.2	11.7	3.6
16. Tobacco Products	-40.4	8.5	6.6
17. Gypsum Products	14.8	1.2	1.0
18. Knitting Mills	9.6	1.9	1.7
19. Leather Gloves	2.0	1.0	0.6
20. Sugar Refineries	16.3	2.2	1.0
21. Medicine and Pharmacy	8.2	13.3	3.0
22. Furniture	16.1	0.9	0.4
23. Motor Vehicle & Parts	2.8	5.1	2.9

Source: Tables 6.2 and 5.1

TABLE 7.18

THE CHANGES IN EFFECTIVE TARIFFS AND CHANGES IN PRODUCTIVITY IN CANADA

Industries	Over Time Changes in Effective Tariffs (1963-1949) Percentage Points	Over Time Changes in Productivity per production worker (000 $)	Over Time Changes in productivity per employee (000 $)
1. Flour Mills	-102.7	3.9	0.6
2. Agricultural Implements	0	3.4	2.2
3. Pulp and Paper	-0.2	2.4	1.9
4. Veneer and Plywood	-4.2	1.9	2.6
5. Saw and Planning Mills	9.1	4.1	3.6
6. Distilleries	-80.7	24.7	11.1
7. Plastic and Synthetic Resins	-2.1	10.5	4.5
8. Soft Drinks	36.0	8.3	-1.0
9. Bakeries	-31.4	5.2	0.9
10. Printing and Publishing	4.2	9.4	4.4
11. Leather Tanneries	-43.3	2.4	2.2
12. Vegetable Oils	-57.2	12.7	8.9
13. Petroleum & Coal Products	5.0	26.4	17.8
14. Fabricated Structural Metal	-0.8	2.4	1.2
15. Gypsum Products	33.1	-1.9	-1.4
16. Knitting Mills	12.3	1.1	0.8
17. Leather Gloves	-16.4	1.4	1.0
18. Sugar Refineries	17.0	7.4	4.9
19. Medicine and Pharmacy	16.1	11.1	2.1
20. Furniture	30.2	-0.1	-0.4

Source: Tables 6.2 amd 5.1

Table 7.17 above presents data on changes in nominal tariffs and changes in productivity and Table 7.18 on changes in effective tariffs and changes in productivity.

At first glance, the data in Table 7.17 do not appear to show a systematic relationship between the amounts of changes in tariffs and changes in productivity. However, the overall picture still seems to be consistent with the hypothesis. The correlation coefficients for the whole group between changes in the amount of nominal tariffs and changes in productivity per production worker and productivity per employee are found to be -.49 and -.44 respectively. These are significant at the 5% probability level. These results show that decreases in tariffs are associated with an increase in productivity and are thus consistent with thy hypothesis.

Looking at Table 7.18 containing data on changes in effective tariffs and changes in productivity there again is no clear cut evidence that tariff reductions and productivity increases are systematically related. Given increases in productivity are sometimes associated with large reductions in tariffs. In a few other instances given increases in productivity are associated with somewhat smaller reductions in tariffs. In fact the individual industry's behaviour appears to be independent of the degree and direction of tariff change. Nevertheless, changes in effective tariffs and changes in productivity move in opposite directions in a number of individual industries. However, for the entire group of industries there is no close relationship between these two variables. For the entire group the test of correlation between changes in effective tariffs and changes in productivity per production worker and per employee yielded weak coefficients of -.28 and -.27 respectively. Though the signs of these coefficients are in conformity with the hypothesis they are statistically insignificant at the 5% level of probability. These findings thus suggest that changes in effective tariffs do not contribute much to an explanation of changes in productivity.

The absence of correspondence between changes in productivity and changes in effective tariffs is clearly contrary to assumption that these are closely connected processes and also contrary to results obtained by running correlations between changes in nominal tariffs and changes in productivity. Even though a negative relationship exists for some particular industries in the relative changes in effective tariffs and productivity, this relationship is not strong enough to control the aggregate rate of change in productivity of all the industries and effective tariffs.

Although these results are seemingly contrary to the expectation of the hypothesis being examined, they still do not entirely rule out the possibility of a correspondence between changes in effective tariffs and changes in the productivity. It is possible that our assumptions necessary to arrive at the effective rate estimates may have imparted a bias to our computations of over time changes in tariff rates and value added[11] (productivity). For example, our effective rates computations assumed that the imposition of the tariff does not change production functions (ratios of

---

[11] For a detailed examination of, in the event of non-fulfillment of these assumptions, the possible directions in which effective rates and value added (productivity) may be distorted see: Melvin and Wilkinson, op. cit., pp. 45-54.

inputs to outputs) in any industry, but this may not be true in the long run. Thus there is some possibility of distortion in our computations from this source. It is also possible that there may have occured some factor substitution in the longer run as input prices are altered by the tariff structure. If allowance is made for factor substitution, the result will be lower rates of effective protection than our computations show.[12] Since we ignored the possibility of factor substitution in our computations, our estimates of effective protection may be somewhat overstated, and the extent of this overstatement may vary from industry to industry depending upon the extent and possibilities of factor substitution. Given these limitations, over time changes in productivity and their relationship with effective tariff rates are difficult to compute accurately. The moral of this discussion is not to emphasize that our correlation coefficients necessarily understate the relationship between changes in tariffs and changes in productivity. We only wish to stress that in view of the limiting assumptions necessary to compute over time changes in effective tariffs and the relationship they bear to inter-temporal changes in value added imply that the evidence as revealed by the above correlation coefficients must be qualified in the light of these assumptions.

In summary, correlation analysis between the Canadian nominal tariffs and the United States - Canada productivity differences are generally statistically significant. These results thus substantiate the hypothesis that the Canadian nominal tariffs are associated with the United States-Canada productivity differences. However, our results do not in-

[12]See Corden, op. cit., pp. 233-35.

dicate that the United States-Canada productivity differences are significantly related to the Canadian effective tariff levels. The American tariffs are seemingly not related to the United States-Canada productivity gap.

Regression Analysis

In this section the technique of regression analysis is used to assist in illuminating our thesis further. Though correlation analysis has already been used to establish a relationship between the tariff levels and the United States-Canada productivity differences, this analysis may be subject to criticism. Since the underlying theory suggests a functional relationship between the tariff levels and the United States-Canada productivity differences, regression analysis is a better analytical approach. Regression analysis seeks to impute a functional relationship between the two variables; correlation analysis on the other hand, seeks to discover if a mutual variation exists or whether the two variables habitually move together, but it does not suggest that the variations in productivity are caused by variations in tariff or vice versa. Generally speaking, therefore, the knowledge of correlation coefficients will not enable one to predict productivity from tariffs. Through the use of regression analysis of a cross section of industry, we have, therefore, attempted to explore further the general applicability of the hypothesis and the significance of the influence of the tariffs on the United States-Canada productivity differences.

The organization of this section is as follows. First, we present regression results and their interpretation. Then follows a brief discussion of the problems of specification (possible influences of other factors which are not allowed for specifically in the regression model) and statistical problems as we move from normal distribution to "t" distribution (problems arising from disaggregating the sample into subsamples and the consequent loss of degrees of freedom).

As has been stated in Chapter II, there are two tariffs, the American and the Canadian, the effects of which have to be considered in analysing the existing United States-Canada productivity differences. However, since the American and the Canadian productivity and tariff data were not comparable for all industries, this precluded the possibility of running a multiple regression analysis. We, therefore, had to settle for a single variate regression analysis between the American and Canadian tariff levels and the relative United States-Canada productivity differentials. Given the paucity of comparable data, we decided to use the simple regression model $Y = a + B_X + e$. The least square method was used to estimate the parameters.

The analysis utilises three sets of data. Regressions are run (i) between Canadian tariffs in 1949 and the relative productivity in 1949-52, (ii) between Canadian tariffs in 1963 and the relative productivity in 1962-65, (iii) between Canadian tariffs in 1963 and the relative productivity in 1965, (iv) between United States' tariffs in 1958 and the relative productivity in 1965 and (v) between changes in Canadian tariffs and changes in productivity.

To begin with, we pool the three categories of industries - export, domestic and protected - and regress the overall comparative productivity levels on their respective tariff rates. Subsequently each category is analyzed separately, in each case regressing productivity on the respective tariff levels.

Regression Results and Their Interpretation

As mentioned above, we had three sets of industry samples available to us and separate regressions are run for each set. Later each set is split into three sub-sets - exporting, domestic and protected industry groups - with separate regressions being run for each of these sub-sets. Each tariff-productivity regression is run twice - in the first instance the independent variable is the nominal tariff, whereas in the second instance, the effective tariff is sued as independent variable. In these regressions the dependent productivity variable, unless otherwise specified, is defined as the United States-Canada ratio.

Consider first the regression coefficients for the entire sample and then for the disaggregations. Regression results for the first set of data (Canadian tariffs in 1949 and the United States-Canada productivity ratio in 1949-52) are presented in Table 7.19. Part I of the table contains the results using nominal tariffs as the independent variable, whereas Part II contains regression results using the effective tariff measure as independent variable. For the two measure of productivity - per production worker and per employee, the regression coefficients for the independent variable nominal tariffs are found to be 0.0370 and 0.0390 respectively, both of which are significant at a 1 percent probability level. The $\bar{R}^2$ shows that about 44 percent of the industry to industry variance is associated with differences in the nominal tariff levels. This result is consistent with the hypothesis

TABLE 7.19

THE CANADIAN TARIFFS (1949) AND PRODUCTIVITY LEVELS (1949-52):REGRESSION RESULTS

Identification	Productivity measure	Constant	Reg. Coeff.	S.E. of B	t Value	R^2 Adjusted ($\bar{R}^2$)	Elasticity	Observations
I. The United States-Canada Productivity Ratios (1949-52) regressed on the Canadian Nominal Tariffs (1949).								
(i) Entire Sample	A	0.9940	0.0370	0.0090	4.108**	0.4455	0.3631	23
	B	1.0464	0.0390	0.0096	4.046**	0.4380	0.3632	23
	C	- ----	- ----	- ----	- ---	- ----	- ----	--
(ii) Export Group	A	1.1990	-0.0007	0.0073	0.108	0.0023	-0.0111	7
	B	1.3449	-0.0018	0.0081	0.222	0.0097	-0.0233	7
	C	- ----	- ----	- ----	- ---	- ----	- ----	--
(iii) Domestic Group	A	0.9111	0.0582	0.0261	2.228	0.4528	0.3605	8
	B	1.2570	0.0204	0.0278	0.733	0.0821	0.1255	8
	C	- ----	- ----	- ----	- ---	- ----	- ----	-
(iv) Protected Group	A	0.6269	0.0684	0.0061	11.135**	0.9538	0.6904	8
	B	0.6300	0.0738	0.0071	10.319**	0.9466	0.7052	8
	C	- ----	- ----	- ----	-- ---	- ----	- ----	-
II. The United States-Canada Productivity Ratios (1949-52) regressed on the Canadian Effective Tariffs (1949)								
(i) Entire Sample	A	1.4962	0.0001	0.0032	0.034	0.0000	0.0025	20
	B	1.5615	0.0002	0.0030	0.083	0.0003	0.0053	20
	C	- ----	- ----	- ----	- ---	- ----	- ----	--
(ii) Export Group	A	1.2661	-0.0015	0.0028	0.570	0.0610	-0.0678	7
	B	1.4205	-0.0021	0.0030	0.682	0.0850	-0.0800	7
	C	- ----	- ----	- ----	- ---	- ----	- ----	-
(iii) Domestic Group	A	1.4530	0.0022	0.0038	0.598	0.0666	0.0404	7
	B	1.4651	0.0028	0.0016	1.787	0.3898	0.0503	7
	C	- ----	- ----	- ----	- ---	- ----	- ----	-
(iv) Protected Group	A	1.1044	0.0338	0.0106	3.170*	0.7152	0.4029	6
	B	1.1891	0.0323	0.0108	2.992*	0.6911	0.3741	6
	C	- ----	- ----	- ----	- ---	- ----	- ----	-

Source: Tables 7.13 and 7.14
* Significant at 5% probability level
** Significant at 1% probability level

that nominal tariff levels in Canada are associated with the United States-Canada productivity differences. The elasticity coefficient shows that for the entire 1949-52 industry sample, a one percent increase in nominal tariffs tended, on the average, to generate 0.36 percent United States-Canada productivity differences. When the regression is run between the effective tariffs and the relative United States-Canada productivity ratios, we get extremely low regression coefficients, $\bar{R}^2$, and elasticities. This would seem to suggest that the United States-Canada productivity differences are not related to effective tariffs. These results, though contrary to expectations, are in conformity with our correlation analysis which also led us to identical conclusions.

Consider now the second set of data where we relate the Canadian tariffs in 1963 to the United States-Canada productivity ratios in 1962-65. The regression results are presented in Table 7.20. The regression run between the nominal tariffs and the three measures of productivity - per production worker, per employee and per man-hour, yielded regression coefficients of 0.0284, 0.0370 and 0.0247 respectively. All these coefficients are statistically significant at the one percent probability level. The $\bar{R}^2$ is also high showing that more than one third of the industry to industry variance in the values of productivity can be explained or estimated from the concomitant variation in the values of the nominal tariffs. The elasticity coefficient, which measures the sensitivity of changes in the dependent variable with respect to the independent variable, shows that one percent increase in the tariffs produce 0.20 to 0.30 percent United States-Canada productivity difference. These results are

TABLE 7.20

THE CANADIAN TARIFFS (1963) AND PRODUCTIVITY LEVELS (1962-65): REGRESSION RESULTS

Identification	Productivity measure	Constant	Reg. Coeff.	S.E. of B	t Value	R^2 Adjusted ($\bar{R}^2$)	Elasticity	Observations
I. The United States-Canada Productivity Ratios (1962-65) regressed on the Canadian nominal tariffs (1963).								
(i) Entire Sample	A	1.1428	0.0284	0.0068	4.146**	0.4500	0.2532	23
	B	1.1686	0.0370	0.0090	4.087**	0.4430	0.3018	23
	C	1.2411	0.0247	0.0072	3.387**	0.3533	0.2135	23
(ii) Export Group	A	1.4666	-0.0175	0.0186	0.943	0.1549	-0.1407	7
	B	1.5596	-0.0113	0.0233	0.488	0.0453	-0.0809	7
	C	1.5564	-0.2210	0.0158	1.402	0.2821	-0.1715	7
(iii) Domestic Group	A	0.9564	0.0667	0.0381	1.750	0.3380	0.2781	8
	B	0.9564	0.0760	0.0392	1.710	0.3276	0.2743	8
	C	1.0692	0.0621	0.0452	1.374	0.2393	0.2429	8
(iv) Protected Group	A	1.6856	0.0107	0.0207	0.516	0.0424	0.1355	8
	B	2.2111	-0.0004	0.0458	0.010	0.0000	-0.0050	8
	C	1.7981	0.0066	0.0255	0.261	0.0112	0.0837	8
II. The United States-Canada Productivity Ratios (1962-65) regressed on the Canadian Effective Tariffs (1963)								
(i) Entire Sample	A	1.3534	0.0106	0.0055	1.931	0.1715	0.1514	20
	B	1.4378	0.0129	0.0066	1.931	0.1715	0.1688	20
	C	1.4280	0.0113	0.0061	1.842	0.1585	0.1524	20
(ii) Export Group	A	1.2561	0.0012	0.0051	0.238	0.0111	0.0230	7
	B	1.4269	0.0006	0.0060	0.108	0.0023	0.0110	7
	C	13.0480	0.0009	0.0047	0.207	0.0085	0.0178	7
(iii) Domestic Group	A	1.4790	-0.0069	0.0079	0.878	0.1336	0.0673	7
	B	1.4593	-0.0044	0.0093	0.478	0.0437	-0.0423	7
	C	16.3889	-0.0125	0.0083	1.500	0.3102	-0.1138	7
(iv) Protected Group	A	1.5605	0.0201	0.0066	3.039*	0.6978	0.2906	6
	B	1.7670	0.0215	0.0114	1.879	0.4688	0.2787	6
	C	1.5854	0.0241	0.0069	3.493*	0.7531	0.3253	6

Source: Tables 7.13 and 7.14
* Significant at 5 percent probability level
** Significant at 1 percent probability level

thus once again consistent with the hypothesis that the Canadian nominal tariffs and the United States-Canada productivity differences are related variables. In comparison, however, the corresponding coefficients for regression between the effective tariffs and the United States-Canada productivity ratios are found to be rather small. Though the signs of all the variables are as anticipated, neither variable's coefficient is statistically significant. Once again we may conclude that the effective tariffs do not appear to be significantly related to the United States-Canada productivity gap.[13]

Finally, consider the third set of data where we relate the Canadian tariffs in 1963 to the United States-Canada productivity differences in 1965. Regression results are presented in Table 7.21. For the three measures of productivity - per production worker, per employee and per man-hour - the regression coefficients for the independent variable nominal tariffs are found to be 0.0242, 0.0286 and 0.0268 respectively. The corresponding values for the independent variable effective tariffs are computed to be 0.3508, 0.4183 and 0.3543. All these coefficients bear the right sign and are significant at the one percent probability level. These results seem to substantiate our earlier correlation analysis and in general are consistent with the hypothesis. Also, these results parallel those obtained in Tables 7.19 and 7.20, with the difference that in this particular regression run we get statistically significant regression coefficients for the independent variable effective tariffs also.

---

[13]In the previous section on correlation analysis, the objections raised on pages 185-186 regarding the quality of computations of over time changes in effective tariffs and value added may not be valid here because the present effective tariff estimates and the relationship they bear to value added refer to point in time computations.

TABLE 7.21

THE CANADIAN TARIFFS (1963) AND PRODUCTIVITY LEVELS (1965): REGRESSION RESULTS

Identification	Productivity measure	Constant	Reg. Coeff.	S.E. of B	t Value	R^2 Adjusted ($\bar{R}^2$)	Elasticity	Observations
I. The United States-Canada productivity Ratios (1965) regressed on the Canadian nominal tariff (1963).								
(i) Entire Sample	A	1.1274	0.0242	0.0046	5.157**	0.2591	0.2456	78
	B	1.2074	0.0286	0.0055	5.194**	0.2620	0.2647	78
	C	1.1560	0.0268	0.0049	5.479**	0.2831	0.2605	78
(ii) Export Group	A	1.4958	-0.0166	0.0168	0.990	0.0981	-0.1209	11
	B	1.5235	-0.0070	0.0154	0.456	0.0226	-0.0467	11
	C	1.5154	-0.0140	0.0197	0.709	0.0529	-0.0981	11
(iii) Domestic Group	A	1.2082	0.0129	0.0078	1.659	0.0601	0.1128	45
	B	1.3115	0.0157	0.0097	1.615	0.0571	0.1248	45
	C	1.2377	0.0157	0.0078	1.995	0.0847	0.1309	45
(iv) Protected Group	A	1.6162	0.0092	0.0208	0.445	0.0097	0.1241	22
	B	1.4781	0.0223	0.0268	0.837	0.0338	0.2715	22
	C	1.6812	0.0104	0.0223	0.469	0.0108	0.1331	22
II. The United States-Canada Productivity Ratios (1965) regressed on the Canadian Effective Tariffs (1963)								
(i) Entire Sample	A	-5.1661	0.3508	0.0778	4.508**	0.2109	2.5451	78
	B	-6.3082	0.4183	0.0933	4.479**	0.2088	2.6434	78
	C	-5.1615	0.3543	0.0785	4.509**	0.2110	2.5031	78
(ii) Export Group	A	1.3580	-0.0012	0.0050	0.249	0.0068	-0.0176	11
	B	1.4814	-0.0013	0.0043	0.314	0.0108	-0.0187	11
	C	1.4501	-0.0030	0.0054	0.556	0.0332	-0.0412	11
(iii) Domestic Group	A	1.3434	0.0009	0.0036	0.275	0.0017	0.0121	45
	B	1.4853	0.0007	0.0044	0.178	0.0007	0.0088	45
	C	1.4021	0.0013	0.0036	0.361	0.0030	0.0155	45
(iv) Protected Group	A	-33.647	0.9890	0.243	4.069**	0.4528	5.0032	22
	B	-40.5206	1.1838	0.2192	4.055**	0.4511	5.1282	22
	C	-33.8874	0.9984	0.2454	4.068**	0.4527	4.9567	22

Source: Table 7.15

* Significant at 5 percent probability level

** Significant at 1 percent probability level

The $\bar{R}^2$ for the respective nominal tariff regression is found to be 0.2591, 0.2620 and 0.2831 respectively, and for the independent variable effective tariffs the corresponding figures are 0.2109, 0.2088 and 0.2110. This simply means that about 26 to 28 percent of variance in the relative productivity in industries is associated with the change in nominal tariffs and about 21 percent is explained by the effective tariffs. These are significant results and affirm the analytic value of the hypothesis, assuming that there is no other correlated variable being reflected in tariffs.

The elasticity coefficients for the three measures are found to be 0.2456, 0.2647 and 0.2605 respectively when the nominal tariffs are used as independent variables. The corresponding figures for the independent variable effective tariffs are found to be 2.5451, 2.6434 and 2.5031 respectively. The interpretation of these results is that one percent increase in the nominal tariffs tend, on the average, to generate about .25 percent increase in United States-Canada productivity ratios, while a one percent increase in the effective tariffs generate a 2.5 percent increase in the United States-Canada ratios.

We may conclude the discussion of this section. The statistical evidence obtained indicates a definite relationship between the Canadian nominal tariffs and the U.S.-Canada productivity gap. On the other hand, there is inconclusive evidence that the Canadian effective tariffs appreciably affect U.S.-Canada productivity differentials. Out of the three samples used to examine the relationship between the Canadian effective tariffs and the relative U.S.-Canada productivity performance, we get statistically insignificant regression coefficients for the first two regression runs. However, on the third regression run, we get highly statistically significant regression and elasticity coefficients. In view of this conflicting evidence it appears that a definite relationship between the effective tariffs and the relative U.S.-Canada productivity levels cannot be definitely established.

The American Tariffs and the Relative United States-Canada Productivity

In this section the relationship between American tariffs and the relative U.S.-Canada productivity levels is examined. Table 7.22 presents the regression results for the American tariffs (Nominal and Effective) and the United States-Canada productivity ratios. As can be seen from the table, the regression coefficients between the tariffs and the productivity measures are extremely small with the weakness of the relationship evident in the low $\bar{R}^2$ and the low elasticities. Though the signs of all the variables are as anticipated and, therefore, consistent with the hypothesis, the coefficients of the variables are not statistically significant. These results would appear to be contrary to the belief that the American tariffs are also an important factor in low relative productivity levels in Canada. There are, however, statistical reasons which could be put forward to explain weakness of the relationship. It must be borne in mind that all the weaknesses inherent in small sample statistical analysis prevail in this industry sample. Secondly, the respective settings for the productivity analysis are not strictly comparable. The American tariffs that have been analysed are for 1958, whereas our relative United States-Canada productivity data is for 1965. In

TABLE 7.22

THE AMERICAN TARIFFS (1958) AND PRODUCTIVITY LEVELS (1965): REGRESSION RESULTS

Identification	Productivity measure	Constant	Reg. Coeff.	S.E. of B	t Value	R^2 Adjusted ($\bar{R}^2$)	Elasticity	Observations
I. The United States-Canada Productivity Ratios (1965) regressed on the American Nominal Tariffs (1958)								
(i) Entire Sample	A	1.3715	0.0045	0.0052	0.867	0.0448	0.0594	18
	B	1.3856	0.0100	0.0051	1.978	0.1964	0.1227	18
	C	1.4404	0.0039	0.0057	0.690	0.0288	0.0498	18
(ii) Export Group	A	1.6482	-0.0038	0.0067	0.574	0.0990	-0.0552	5
	B	1.6099	0.0024	0.0061	0.396	0.0405	0.0324	5
	C	1.6918	-0.0056	0.0068	0.821	0.1834	-0.0803	5
(iii) Domestic Group	A	1.2004	0.0083	0.0075	1.113	0.1984	0.1050	7
	B	1.1818	0.0170	0.0052	3.229	0.6758	0.1952	7
	C	1.2841	0.0082	0.0065	1.258	0.2403	0.0975	7
(iv) Protected Group	A	1.0791	0.0220	0.0168	1.312	0.3007	0.2845	6
	B	1.2542	0.0197	0.0208	0.947	0.1829	0.2344	6
	C	1.0284	0.0285	0.0204	1.392	0.3262	0.3504	6
II. The United States-Canada Productivity Ratios (1965) regressed on the American Effective Tariffs (1958).								
(i) Entire Sample	A	1.5915	0.0013	0.0038	0.347	0.0075	0.0360	18
	B	1.6666	0.0026	0.0039	0.670	0.0272	0.0659	18
	C	1.6779	0.0009	0.0041	0.223	0.0031	0.0241	18
(ii) Export Group	A	1.6323	-0.0015	0.0023	0.658	0.1262	-0.0477	5
	B	1.6520	0.0001	0.0021	0.056	0.0010	0.0035	5
	C	1.6612	-0.0020	0.0023	0.872	0.2020	-0.0649	5
(iii) Domestic Group	A	1.2504	0.0026	0.0027	0.969	0.1581	0.0678	7
	B	1.2653	0.0058	0.0019	3.308	0.6485	2.1383	7
	C	1.3303	0.0026	0.0023	1.133	0.2042	0.0650	7
(iv) Protected Group	A	2.2314	-0.0027	0.0205	0.134	0.0044	-0.0676	6
	B	2.8183	-0.0108	0.0204	0.531	0.0659	-0.0480	6
	C	2.3886	-0.0036	0.0228	0.162	0.0065	-0.0865	6

Source: Table 7.16

* Significant at 5 percent probability level

** Significant at 1 percent probability level

the interm several changes in the American tariff levels took place as a consequence of Dillon Round of GATT negotiations. Although these changes, on the average, were not of great magnitude, it is not possible to determine the extent to which these changes affect our regression analysis. It is quite possible that this irregularity may have produced a bias in our computations. In view of this uncertainty, on the basis of our regression results, it would be highly speculative to establish a definite relationship between the American tariffs and the relative United States-Canada productivity levels.

Changes in the Canadian Tariffs and Changes in Productivity Levels

Next the relationship between changes in Canadian tariffs and changes in the Canadian productivity levels is investigated. The central hypothesis for the study had posited that the Canadian tariff is an instrumental variable in determining the relative productivity position of Canada. Pursuing the logic of this hypothesis further, one would expect the greatest gains in productivity to be experienced by those industries encountering the greatest reductions in tariffs. The results appropriate to the testing of this hypothesis are contained in Table 7.23.

The regression relationship between changes in the Canadian nominal tariff schedule and changes in the respective productivity levels per production worker and per employee yielded regression coefficients of -0.2375 and -0.1266 respectively. The negative signs of the coefficients are as anticipated and the coefficients are statistically significant at a 5 percent probability level. These coefficients show that over the two periods - 1949-52 - 1962-65 - a one percent decline in the tariffs resulted,

TABLE 7.23

THE CHANGES IN THE CANADIAN TARIFF AND CHANGES IN PRODUCTIVITY: REGRESSION RESULTS

Identification	Productivity measure	Constant	Reg. Coeff.	S.E. of B	t Value	R^2 Adjusted ($\bar{R}^2$)	Elasticity	Observations
I. Changes in Productivity (1962-65 to 1949-52) and Changes in Canadian Nominal Tariffs (1963-1949).								
(i) Entire Sample	A	6.6667	-0.2375	0.0933	2.545*	0.2356	0.0621	23
	B	3.3164	-0.1266	0.0571	2.217*	0.1897	0.0663	23
	C	- ----	- ----	- ----	- ---	- ----	- ----	--
(ii) Export Group	A	4.3239	-0.4485	0.1049	4.275**	0.7852	0.4053	7
	B	2.6382	-0.1746	0.0548	3.182*	0.6694	0.3031	7
	C	- ----	- ----	- ----	- ---	- ----	- ----	-
(iii) Domestic Group	A	11.0321	0.3723	0.0750	0.496	0.0393	-0.1224	8
	B	5.4097	0.2014	0.5919	0.340	0.0189	-0.1389	8
	C	- ----	- ----	- ----	- ---	- ----	- ----	-
(iv) Protected Group	A	4.6497	-0.1053	0.0884	1.192	0.1914	-0.0908	8
	B	2.5146	-0.0992	0.0191	5.177**	0.8170	-0.1696	8
	C	- ----	- ----	- ----	- ---	- ----	- ----	-
II. Changes in Productivity (1962-65 to 1949-52) and Changes in Canadian Effective Tariffs (1963-1949).								
(i) Entire Sample	A	6.0013	-0.0589	0.0446	1.319	0.0765	0.0698	20
	B	2.8441	-0.0345	0.0264	1.305	0.0750	0.0851	20
	C	- ----	- ----	- ----	- ---	- ----	- ----	--
(ii) Export Group	A	5.0545	-0.0858	0.0705	1.216	0.2282	0.3048	7
	B	3.2463	-0.0208	0.0325	0.641	0.0760	0.1424	7
	C	- ----	- ----	- ----	- ---	- ----	- ----	-
(iii) Domestic Group	A	10.1498	0.0495	0.1122	0.433	0.0361	0.0636	7
	B	4.6554	-0.0207	0.0888	0.233	0.0107	0.0526	7
	C	- ----	- ----	- ----	- ---	- ----	- ----	-
(iv) Protected Group	A	3.7905	-0.0455	0.1400	0.290	0.0205	-0.1970	6
	B	1.7158	-0.0350	0.0594	0.600	0.0825	-0.4707	6
	C	- ----	- ----	- ----	- ---	- ----	- ----	-

Source: Tables 7.17 and 7.18

* Significant at 5 percent probability level

** Significant at 1 percent probability level

on the average, in .12 to .24 percent increase in the output per unit of labour input. The results are thus in line with expectations and seemingly consistent with the hypothesis that the industries registering reductions in the tariffs experienced gains in productivity. The $\bar{R}^2$ for the two regression specifications are found to be 0.2356 and 0.1897 respectively. It follows that approximately 19 to 24 percent of the variance in industry to industry productivity gains can be accounted for by changes in the tariffs. The elasticity coefficient, reflecting the response in productivity increases to tariff declines, is found to be low.

Turning to the results for regression between the changes in the effective tariffs and changes in productivity, we get the two corresponding weak regression coefficients of -0.0589 and -0.0345, with the weakness reflected in low $\bar{R}^2$ and the elasticities. Though the variables have the anticipated signs, coefficients of the variables are not statistically significant. These results thus suggest that reductions in the effective tariffs do not contribute significantly to increases in productivity. As has been stated earlier, it may, however, be noted that these results may be biased due to problems involved in computing accurately over time changes in effective tariffs and their relationship with over time changes in value added.

The Disaggregated Data

In this section the sample data is disaggregated into export, domestic and protected groups, with separate analysis being carried out for each set. The results of these runs are presented in Tables 7.19 through 7.23. A cursory glance at the regression coefficients contained in these tables indicates that, on the average, the regression coefficients tend to be small with some coefficients bearing inexplicable signs. Consider the results contained in Table 7.19 first. In analysing the 1949 Canadian nominal tariffs and the United States-Canada productivity ratios per production worker and per employee in the export group, the two regression coefficients are found to be -0.0007 and -0.0018 respectively. The corresponding values for the independent variable effective tariffs are computed to be -0.0015 and -0.0021. All these coefficients are statistically insignificant at the 5 percent probability level. Also, as can be seen from the table, this weak relationship is reflected in low $\bar{R}^2$ and elasticities. Further, not only are the regression coefficients statistically insignificant, they bear the "wrong sign".[14] In the case of domestic industries, for the two measures of productivity - per production worker and per employee -, the regression coefficients for the independent variable nominal tariffs are obtained to be 0.0582 and 0.0204 respectively, and for the independent variable effective tariffs the two corresponding coefficients obtained are 0.0022 and 0.0028. These coefficients are also statistically insignificant, although the coefficients carry the right sign. For the protected group, the regression run between the nominal tariffs and the two measures of productivity, yields coefficients of 0.0684 and 0.0738 respectively. In comparison the corresponding coefficients for regression between the effective tariffs and the two pro-

---

[14]Theoretically Canadian tariffs are not supposed to affect productivity in the export and domestic industries. But as has been stated in Chapter I, the export and domestic industries as classified in this thesis may also include some protected goods receiving tariff protection. Hence it becomes necessary to consider relationship between the tariffs and productivity in the export and domestic industries.

ductivity ratios are found to be 0.0338 and 0.0323. All these coefficients are statistically significant. These results are thus in agreement with the belief that the tariffs affect the average Canadian productivity through their effects on the protected industries. The $\bar{R}^2$ indicates that about 95 percent of industry to industry variance in productivity is associated with the nominal tariffs and about 70 percent is associated with the effective tariffs. The elasticity coefficients show that the realtive Canadian productivity decreases by about .70 percent in response to a 1 percent increase in the nominal tariffs and by about .37 to.40 percent if effective tariffs increase by 1 percent. These are significant results and seem to suggest the validity of the hypothesis.

An examination of the relationship of the Canadian tariffs (nominal and effective) in 1963 and the United States-Canada productivity ratios in 1962-65 (Table 7.20) for different industry groups reveals that while many of the results fail to substantiate the central hypothesis, other results appear to contradict it. For example, in the case of the exporting group, the regression run between the nominal tariffs and the three measures of productivity - per production worker, per employee and per man-hour - yields regression coefficients of -0.0175, -0.0113 and -0.2210. Aside from the problem of statistical significance, these coefficients carry a negative sign. As can be seen from the table, the elasticity coefficients also carry a negative sign indicating that a 1 percent decrease in the Canadian nominal tariffs produces about .08 to .17 percent increase in the United States-Canada productivity gap. This result is clearly inconsistent with the hypothesis. When we regress the three measures of productivity for the domestic group on the nominal tariff rates, we get the three statistically insignificant regression coefficients of 0.06670, 0.0760 and 0.0621 respectively, although the coefficients carry the right sign. The $\bar{R}^2$ for this group of industries indicates that 24 to 34 percent industry to industry variation in productivity is explained by the nominal tariffs. The elasticity coefficient shows that a 1 percent hypothetical increase in the nominal tariffs creates about .24 to .28 percent productivity gap between the United States and Canada. In the case of protected industries, the corresponding three regression coefficients are found to be 0.0107, -0.0004 and 0.0066. The $\bar{R}^2$ and the elasticity coefficients are found to be rather low. The regression coefficients are not only statistically insignificant, the negative signs for the regression and elasticity coefficients for the productivity measure per employee is inexplicable. Further, a comparison between the domestic and protected groups shows that the regression coefficients for the domestic group are larger than the same for the protected group. This implies that the tariffs affect the domestic group more than they do to the protected group. This is clearly contrary to expectations.

In the case of effective tariffs as the independent variable, for the three measures of productivity in the export group the regression coefficients are computed to be 0.0012, 0.0006 and 0.0009 respectively (Table 7.20), which though carrying the anticipated sign, are found to be statistically insignificant. As can be seen from the table the weakness of this relationship is reflected in low $\bar{R}^2$ and elasticities also. For the domestic industries, the three corresponding regression coefficients are computed to be -0.0069, -0.0044 and -0.0125. The negative sign of the coefficients contradicts the hypothesis. The elasticity coefficients bear a negative sign which again is inconsistent with the hypothesis. The three regression coefficients for the protected group are found to be 0.0201, 0.0215 and 0.241 which are statistically significant. The $\bar{R}^2$ indicates that 47 to 75 percent industry to industry variance in productivity is associated with differences in the effective tariff levels. The elasticity coefficient shows that for the sample industries a 1 percent increase in the effective tariffs depresses Canadian productivity by .28 to .33 percent relative to the United States. These are significant results and are in conformity with the hypothesis.

Focussing attention on the regression results for the Canadian nominal tariffs in 1963 and the United States-Canada productivity ratios in 1965 (Table 7.21), we find that regression coefficients for neither group are statistically significant and the $\bar{R}^2$ is low. In the case of the export group, for the three productivity measures - per production worker, per employee and per man-hour - the regression coefficients for the independent variable nominal tariffs are found to be -0.0166, -0.0070 and -0.0140 respectively. For the domestic group, the corresponding coefficients obtained are 0.0129, 0.0157 and 0.0157. In contrast, the comparable coefficients for the protected group are found to be 0.0092, 0.0223 and 0.0104. From these coefficients it would appear that the nominal tariff effect is not only insignificant but unpredictable in behaviour. For example, it is difficult to logically substantiate the results indicating that the tariff effect on the domestic group of industries is larger than on the protected sector. This result is contrary to the hypothesis. One would expect the tariff impact on the protected sector to be greater, for it is clearly the protected sector which is mainly affected by the tariffs. Further the negative sign of regression and elasticity coefficients for the export group is also inexplicable.

In contrast to the above results, the effective tariff data substantiate expectations. The three regression coefficients for the protected group are computed to be 0.9890, 1.1838 and 0.9984 (Table 7.21) which are significant at the 1 percent probability level. These results are consistent with the hypothesis that the tariffs realize greater effect on the protected industries. The $\bar{R}^2$ is also found to be high showing that more than one third of the industry to industry variation in productivity can be estimated from the concomitant variation in the values of the tariffs. The elasticity coefficient shows that a 1 percent increase in tariffs adds about 5 percent to the U.S.-Canada productivity gap. These are all significant results and affirm the analytic value of the hypothesis. However, the problem arises in examining the coefficients for the export group in that the statistically insignificant regression and the elasticity coefficients carry the negative sign. For the export group the three regression coefficients are found to be -0.0012, -0.0013 and -0.0030, with the respective elasticity coefficients being -0.0176, -0.0187 and -0.0412. For the domestic group also, as can be seen from the table, all the regression coefficients are found to be statistically insignificant with low respective $\bar{R}^2$ and elasticity coefficients.

Considering now the American tariffs and the relative United States-Canada productivity ratios (Table 7.22), in case of both the nominal and the effective tariffs, we find that the regression coefficients of neither variable in any of the industry groups are statistically significant. Also, as can be seen from the table, in the case of both nominal and effective tariffs, the sign of the regression and elasticity coefficients for the export group are negative as they are for the protected group in the case of effective tariffs. These negative signs are inconsistent with the hypothesis. Further, as the table shows, the regression coefficients and $\bar{R}^2$ of the domestic and protected group are more significant than the same coefficients of the export group. To be consistent with the hypothesis, we would expect the regression coefficients of the export group to be more significant than the regression coefficients of the other two groups, for the American tariffs will have far greater effect on the Canadian export industries than on the other two groups.

Finally, in considering changes in the Canadian tariffs and changes in Canadian productivity, many of the results not only fail to substantiate the hypothesis but also appear to be contrary to expectation. Looking at Table 7.23, we find that in case of nominal tariffs, the domestic industry group yields a positive sign. In addition, the regression coefficient for the export group is larger than for the protected group. These results are contrary to the hypothesis. Further, problems arise in evaluating the elasticity coefficients because of inconsistency of signs. In the regression run between the changes in the effective tariffs and changes in productivity, in general, the signs of the coefficients are as anticipated, but the coefficients are statistically insignificant.

In conclusion, for the pooled data our regression results for the independent variable the nominal tariffs are generally statistically significant and, therefore, consistent with the hypothesis. With respect to relationship between the Canadian effective tariffs and the United

States-Canada productivity differences, there is no clear cut evidence. In general, it appears that the United States-Canada productivity differences are not significantly affected by effective tariffs. The apparent relationship between the American tariffs and the United States-Canada productivity differences is weak, but in view of the irregularities in our data it is difficult to reach a definitive conclusion about this relationship.

When the sample is split into sub-sets with separate regressions being run for each group of industries, we find that, on the average, the regression coefficients tend to be small with some coefficients bearing inexplicable and unpredictable signs. Some of the results are in agreement with the hypothesis, others fail to substantiate it. On the whole the evidence is very baffling. One possible explanation for these insignificant, inconsistent and inexplicable results could be the problems associated with small samples and the concomitant degrees of freedom problem. As we move from an assumed normal distribution to a "t" distribution resulting from the disaggregation of the sample, we lose degrees of freedom and experience an increase in variance of the distribution. In other words, the standard error of the estimate increases. Since the standard error of measurement is an indication of the reliability of the values of dependent variable (productivity) estimated from the observed values of the independent variable (tariffs), the consequence of a large standard error due to decrease in the sample size and loss of degrees of freedom consequent to our splitting the sample into subsets is obvious. Thus it is possible that our rather insignificant, inconsistent and inexplicable results could be due to these problems associated with the small sample estimation.

Despite the above overall bewildering evidence, the results indicate that the protected group with respect to the effective tariffs comes closest to the hypothesis. A look across tables 7.19 to 7.21 indicates that for the protected group of industries, regression coefficients for the independent variable, the effective tariffs, are generally statistically significant. These results at least support a suspicion that there is some substance in the hypothesis that tariffs depress Canadian productivity levels relative to the United States.

A final brief comment is necessary regarding the regression model. The sole independent variable used in the analysis, tariff, explains only 25 to 45 percent of the variation in productivity among the industries. A number of considerations important for the United States-Canada productivity differences have been ignored, such as the relative education and skill levels of the work force and mangement, relative research and development efforts, relative length of production runs and lines of products produced, relative size of market, etc. to mention a few. The apparent influence of any one independent variable depends on what other variables have been allowed for in the regression model. Failure to take account of variables in addition to the one of immediate interest (the tariffs) can result in biased or otherwise misleading results.[15]

---

[15]Bias that originates in this way is called specification bias. This may explained as follows.

The regression model used to measure the effect of the tariff on productivity utilized the simple least squares specification:

$$Y = a + B_1x_1 + e', \text{ --------------------(1)}$$

where Y is U.S.-Canada productivity ratio, x_1 the tariff levels and e' is a disturvance.

Assume that the above model is specified wrongly. Assume there is another variable, x_2, which has roughly as important effect on Y, and which has been omitted from the model. Then an adequate specification would be

$$Y = a + B_1x_1 + B_2x_2 + e \text{ ---------------(2)}$$

where x_2 is, say, relative market size and e is a random disturbance. With this specification e is a random disturbance with a mean of zero and is independent of the values assumed by x_1 and x_2.

--- continued on page 209 ---

Thus, only a thorough and simultaneous testing of the influences of all relevant factors mentioned above will reveal the true significance of the tariffs for the United States-Canada productivity differences. However, such an ambitious undertaking is beyond the scope of this study. Our object is much less ambitious. Through the use of simple regression analysis we have attempted to explore the significance of the tariffs in accounting for the United States-Canada productivity differences. It is likely that some bias may have crept into our results because of the omissions of other important variables. Although our regression results must be taken with due qualification, they do provide some guidance on the significance of the American and Canadian tariff levels for the United States-Canada productivity gap.

--- continued from page 208 ---

Now the question may be raised what effects are introduced in our estimate of B_1 if we leave out x_2. In other words, the question is if we measure B_1 in the first equation instead of estimating B_1 in the second equation, what will be the difference between them. To examine this, we may restate the above equations in a simplified form.

Incorrect: $Y = B_{1_w} x_1 + e'$

Correct: $Y = B_{1_r} x_1 + B_{2_r} x_2 + e$, where lower-case letters w referring to wrong specification and r referring to correct specification.

If we estimate B_1 in the incorrect equation by least squares method, we multiply throughout by x_1 and sum each of the terms over the observations, i.e.

$$\Sigma Y x_1 = B_{1_w} \Sigma x^2_1 + \Sigma e x_1$$

leading to

$$\Sigma Y x_1 = B_{1_w} \Sigma x^2_1 \quad \text{---------------------(3)}$$

and

$$\hat{B}_{1_w} = \frac{\Sigma Y x_1}{\Sigma x^2_1}$$

If we do the same calculation with the correct specification, we have

$$\Sigma Y x_1 = B_{1_r} \Sigma x^2_1 + B_{2_r} \Sigma x_1 x_2 + \Sigma e x_1$$

Dividing throughout by Σx^2_1, we obtain

$$\hat{B}_{1_w} = \frac{\Sigma Y x_1}{\Sigma x^2_1} = B_{1_r} + B_{2_r} \frac{\Sigma x_1 x_2}{\Sigma x^2 1} + \frac{\Sigma e x_1}{\Sigma x^2_1} \quad \text{---(4)}$$

--- continued on page 210 ---

--- continued from page 209 ---
The left-hand side is the estimate $\hat{B}_{1_w}$ from the incorrect specification. The first term on the right hand side is the correct population value of the coefficient we are estimating B_{1_r}. The second term on the right hand side contains two parts - the first is the correct population value of the effect of x_2 on the relative productivity B_{2_r} when the effect of the tariffs is eliminated. The second part $\Sigma x_1 x_2 / \Sigma x^2_1$ is the measured or estimated regression coefficient of x_2 on x_1. We may write this as B_{21_r}. So we have

$$\hat{B}_{1_w} = B_{1_r} + B_{2_r} B_{21_r} + \frac{\Sigma e x_1}{\Sigma x^2_1} \text{ ----------(5)}$$

Now since e is uncorrelated with x_1 and the distribution of e is assumed to have a zero mean, we drop the last term and rewrite (5) as

$$\hat{B}_{1_w} = B_{1_r} + B_{2_r} \cdot B_{21_r} \text{ -----------------(6)}$$

The problem of bias mentioned above arises out of the term $B_{2_r} \cdot B_{21_r}$ in the above equation. The estimate of B_1 from the least square estimation of (3) when the correct specification is (2) is a biased estimate of parameter B_1. The bias $(B_{2_r} B_{21_r})$ depends on two terms, namely, the regression coefficient of the left out variable in the true relation (B_{2_r}) and the covariance of the left out variable (B_{21_r}).

When a variable x_2 from the true relation is left out, a part of its influence in explaining the movement of the dependent variable productivity is captured by x_1. If x_1 has a large partial relation to the left out variable x_2, then the extent of this bias in its coefficient will be large. As can be seen from equation (6) above if the explicit independent variable x_1 has a high positive correlation or covariance with the left out variable x_2 then B_{21_r} would be greater than zero and the estimated regression coefficient of the independent variable x_1 would be biased towards a larger value. On the other hand, if it is negatively correlated then the estimated regression coefficient for x_1 would have a bias towards smaller value.

If the left out variable x_2 is not correlated with x_1, the slope of B_{21_r} will be zero and then of course regression coefficient of x_1 will not be biased.

Thus it is possible that due to regression of omitted variables on that included (tariff) some bias may have crept into our results. No factor has a unique effect isolated from others. Economic variables interact and the impact of any one depends on the values of the others. Failure to take explicit account of interactions can lead to misleading results.

CHAPTER VIII

SUMMARY AND CONCLUSIONS

The purpose of this chapter is to restate briefly the arguments of the preceding chapters; to recall significant findings; to state conclusions that follow therefrom; and to indicate the direction which future work might take in the light of these findings.

Summary:

Labour productivity levels in the Canadian manfacturing industries have historically been below the American levels. A number of factors are held responsible for this phenomenon. Among the important factors are: differences in the quality and skill of work force and management, differences in the quantity and quality of capital equipment and machinery, the relatively small size of the domestic Canadian market resulting in less efficient production runs, the effects of the tariffs - both the Canadian and American, to name a few.[1] It is the last of these factors which has received greatest attention from economists. In fact, there is a growing consensus in Canada that the tariffs have been a significant factor preventing the Canadian industry from achieving the benefits of scale and specialization and thereby higher levels of productivity.

The argument has been advanced that the Canadian tariffs permit producers to fix a high price behind the tariff wall, thereby sheltering

---

[1] A more complete discussion of these factors can be found in Chapter II, pp. 17-33.

inefficiency in the Canadian industry by encouraging product diversification and shorter production runs. On the other hand, the American tariffs, by creating barriers to entry into the United States' markets, have intensified the dependence of the Canadian manufacturers on the relatively small Canadian market and have thus prevented them from obtaining maximum economies of mass production and specialised operations. The result of these two tariffs has been to depress the Canadian productivity levels relative to the United States.

The purpose of this study was to investigate empirically the validity of this hypothesis positing a relationship between the tariffs and productivity. The thesis initially examined the existing productivity differences between Canada and the United States. Data for the periods 1949-52, 1962-65 and 1965 were used to facilitate the analysis. On finding the existence of significant productivity differences between the two countries an attempt was made to examine the hypothesis that tariffs cause lower productivity levels in Canada relative to the United States.

Throughout this study, productivity was defined as a ratio between output and labour input. The limitations of this partial productivity measure are well known.[2] In spite of its inherent limitations, it was held that this approach could offer useful insights into the moot issue.

Value added was chosen as a measure of output. An important assumption in this thesis was that producers in Canadian protected industries price at the U.S. level plus the Canadian tariff. The reported value added in the Canadian protected industries was, therefore, believed to be

---

[2] A discussion on the limitations of labour productivity can be found in Chapter III, pp. 36-37.

overstated relative to the comparable industries in the United States. Further under free trade conditions, the price level of international goods is nearly the same throughout the trading area, with the difference that may arise from transport cost. Since export and import shipment values are on an f.o.b. at plant basis, it was believed that the reported value added of the Canadian import competing industries will be overstated and that of export industries will be understated relative to the comparable industries in the United States. With respect to the domestic industries no definite conclusion was possible since their prices are assumed to be independent of the foreign prices. After appropriate adjustment or approximations had been made to ensure the comparability of the published value added measure between the two countries,[3] international productivity comparisons were made. Labour input was measured in terms of production workers, all employees and man-hours of production workers. The resulting productivity measures were calculated both in current and constant dollars to facilitate inter-temporal comparisons. In using value added as a measure of comparative productivity it was assumed that the pricing procedure for input materials and outputs of the industries of the sample in the two countries were comparable.

We enquired into the meaning of productivity, paying particular attention to the data base and the precise content of the measure. The productivity measure used in this study was determined by the data available. Using the published input and output data implied that our computed productivity ratios as a measure of performance of industries may reflect

---

[3]For data reconciliation see Chapter VI, pp. 126-128 and 135-137.

differences in product mixes, differing factor proportions and factor prices, quality of inputs, competitive structure of the industry, pricing procedures of output and input materials, and a number of other factors that influence prices.

The hypothesis that the tariffs were associated with low productivity levels in Canada relative to the United States was tested with respect to both the nominal and effective tariffs.[4] The analysis showed that the effective tariffs were significantly higher than the nominal rates for a large majority of individual industries. This resulted from typically lower tariffs on the raw materials and partially manufactured goods than on finished products.

In general, the analysis of the data for the periods 1949-52, 1962-65 and 1965, both in current and constant dollars, showed that the American productivity levels were higher than those existing in comparable Canadian industries. In a few anamalous cases Canadian industry productivity performance levels exceeded those of the United States. However, the great preponderence of cases reflected higher American productivity. On the whole, productivity differences were found to be of a magnitude of 17 to 37 percent depending on the period examined and productivity measure considered.

In addition to the selected industries in the above periods, productivity comparisons were also made for total manufacturing sector for the period 1947-66. A productivity gap of nearly 25 percent was found between the two countries.

---

[4]Explanation of definitions of nominal and effective tariffs can be found in Chapter V, pp. 83-85.

The above results were derived from data taken directly from published government records. When data was adjusted to take into account the price inflation effect of the Canadian tariffs, the relative Canadian productivity levels tended to decline by a further 4 to 8 percent depending on whether productivity was measured in terms of production workers, all employees or man-hours.

An examination of relative rates of productivity change yielded interesting results. During the period 1949-52, the rate of growth of productivity in Canada exceeded that in the United states, whereas during the period 1962-65, United States' productivity growth exceeded that in Canada. However, for the period 1947-66, the American average annual rate of change of productivity, for total manufacturing, was lower than than in Canada.

Observing the existence of lower Canadian productivity levels, an attempt was made to examine the hypothesis that this lower Canadian productivity reflected the effects of the tariffs. To facilitate hypothesis testing, an attempt was made to determine the relative productivity differentials existing in the Canadian export, domestic, and protected industries. In the three periods examined, the productivity levels in the protected industries were found to be the lowest. For the period 1949-52, in current dollars, the productivity of the protected industries was found to be about 53 to 64 percent of domestic industries and about 60 to 70 percent of the export industries. For the latter period 1962-65, the productivity of the protected industries was about 42 to 49 percent of the domestic industries and about 52 to 67 percent of the export industries. In constant dollars, for the period 1949-52, the productivity of the protected industries was about 65 to 77 percent of the domestic industries and about 58 to 65 percent of the export industries. For the latter period 1962-65, the productivity of the protected industries was computed to be about 41 to 47 percent of the domestic industries and about 53 to 65 percent of the export industries. In 1965, the productivity of the protected industries was about 51 to 60 percent of the domestic industries and about 47 to 63 percent of the export industries. Thus all these comparisons showed lower productivity levels in the protected industries relative to the other two categories. Although these results seemingly supported the hypothesis, some other evidence seemed to cast doubt on it.[5]

The second method of empirical testing of the hypothesis was to make comparisons of these three groups of the Canadian industries with the comparable listings in the United States. To be consistent with the hypothesis, we had expected that the Canadian exporting industries would perform much better relative to the comparable industries in the United States than do the Canadian protected industries relative to the counterpart industries in the United States. Our comparisons yielded results which apparently substantiated this belief. In current dollars, for the period 1949-52, productivity of Canadian protected industries was found to be 62 to 64 percent of the productivity levels of the same industries in the United States. In contrast, the productivity of the

---

[5]See the discussion in the concluding section of this chapter.

domestic and export industries relative to the identical industries in the United States was about 90 to 95 and 93 to 99 percent respectively. For the latter period, 1962-65, the three sets of corresponding figures were about 37 to 38, 79 to 87, and 77 to 90 percent respectively. In terms of constant dollars, for the period 1949-52, relative to comparable industries in the United States, the productivity of the Canadian protected industries was about 64 to 70 percent as compared to about 66 to 77 percent of the domestic group and about 87 to 95 percent of the export group. For the latter period, 1962-65, the three corresponding figures were about 34 to 35 percent, 79 to 92 percent and 78 to 80 percent respectively. For the larger sample of industries in 1965, the three sets of comparable figures were about 48 to 53 percent, 67 to 77 percent and 64 to 85 percent respectively.

The above results seemingly substantiated the hypothesis. However, a critical examination of the above empirical evidence revealed some inconsistencies and uncertainties and it was not possible to derive a firm conclusion about the relationship of tariffs and the relative United States-Canada productivity differences.[6]

The third method of examination of the hypothesis utilised the technique of rank correlation analysis. Rank correlation coefficients were computed between the Canadian productivity levels in 1965 and the tariff levels (both the nominal and effective) in 1963. All the rank correlation coefficients yielded a negative sign and were found to be significant at the 5 percent probability level. These results thus supported the proposition that high tariff levels were conducive to low

---

[6]See the following section on conclusions.

productivity levels in Canada.

Finally, the hypothesis was tested by means of correlation (r) and regression analysis. Correlation and regression coefficients were computed (1) between the levels of the Canadian tariffs in 1949 and the relative United States-Canada productivity ratios in 1949-52; (2) between the levels of the Canadian tariffs in 1963 and the relative United States-Canada productivity ratios in 1962-65; (3) between the levels of the Canadian tariffs in 1963 and the relative United States-Canada productivity ratios in 1965; (4) between the levels of the American tariffs in 1958 and the relative United States-Canada productivity ratios in 1965; and (5) between changes in Canadian tariffs and changes in Canadian productivity. Each of these tests was run twice - first for the nominal tariffs and then for the effective tariffs.

The correlation analysis relating the levels of the Canadian nominal tariffs in 1949 and 1963 to the relative 1949-52 and 1962-65 United States-Canada productivity ratios respectively yielded coefficients which were found to be significant at a 1 percent probability level and thus suggested that the levels of the Canadian tariffs and the United States-Canada productivity differences are connected variables.

The correlation between the levels of the effective Canadian tariffs in 1949 and 1963 and the relative United States-Canada productivity ratios in 1949-52 and 1962-65 respectively yielded statistically insignificant coefficients. These results thus did not indicate that the United States-Canada productivity differences were significantly affected by the effective tariffs.

For the larger sample of 78 industries, the correlation coefficients between the levels of the Canadian tariffs (both the nominal and effective) in 1963 and the relative 1965 United States-Canada productivity ratios were found to be significant at a 1 percent probability level and thus suggested that the Canadian tariffs and the United States-Canada productivity differentials were closely connected variables.

The proposition that the American tariffs were associated with the productivity differences between the two countries was also investigated by running a correlation between the levels of the American nominal and effective tariffs in 1958 and the relative productivity differences in 1965. The correlation coefficients computed were found to be statistically insignificant. These results thus seemingly did not substantiate the hypothesis that the American tariffs depress the Canadian productivity levels relative to the United States.

An attempt was also made to investigate whether reductions in tariffs lead to an increase in productivity levels. To examine this, correlation coefficients were computed between changes in Canadian tariffs and Canadian productivity levels. While the correlation coefficients computed between changes in nominal tariffs and changes in productivity were found to be statistically significant at a 5 percent significance level, the correlation coefficients between changes in the effective tariffs and changes in productivity obtained were statistically insignificant. These results thus showed that productivity gains were associated with reductions in the nominal tariffs but not with reductions in the effective tariffs.

The validity of the proposition that the tariffs were related with the United States-Canada productivity differences was further explored through the use of regression analysis. The regression analysis utilised the same five sets of data for which correlation coefficients were computed. First, the regression coefficients were computed for the pooled data, latter these data were disaggregated into the exporting, domestic and protected industry categories and separate regressions were run for each category.

For the first set of data (Canadian tariffs in 1949 and the relative United States-Canada productivity ratios in 1949-52), the regression coefficients for the independent variable nominal tariffs were computed to be statistically significant at a 1 percent significance level. The $\bar{R}^2$ was found to be about 0.44. The elasticity coefficient showed that a 1 percent increase in the tariffs, on the average, generated about 0.36 percent United States-Canada productivity gap. The corresponding regression coefficients, $\bar{R}^2$ and elasticities for the independent variable effective tariffs obtained were statistically insignificant at a 5 percent probability level.

For the second set of data (Canadian tariffs in 1963 and the United States-Canada productivity ratios in 1962-65), the regression runs between the nominal tariffs and the productivity ratios again yielded statistically significant coefficients. The $\bar{R}^2$ indicated that more than one third of the industry to industry variance in the productivity was explained by the tariffs. The elasticity coefficient showed that a 1 percent increase in the tariffs, on the average, produced about 0.20 to 0.30 percent United States-Canada productivity difference. When effective tariffs were used as independent variable, the regression coefficients computed were insignificant at a 5 percent probability level, although all the variables carried the anticipated signs. These results thus once again indicated that the productivity gap between the two countries was not significantly associated with the effective tariffs.

For the regression analysis between the Canadian tariffs in 1963 and the relative United States-Canada productivity differentials in 1965, regression coefficients for the independent variables, nominal as well as the effective tariffs, were found to be statistically significant at a 1 percent significance level. These results thus seemed to substantiate the earlier regression results and supported the mooted hypothesis. The $\bar{R}^2$ indicated that about 21 to 28 percent of the industry to industry variance in productivity could be estimated from the concomitant variation in the tariffs. The elasticity coefficients were found to be numerically small, although the coefficients carried the right signs.

The regression coefficients between the American tariffs (both the nominal and the effective) and the United States-Canada productivity ratios were found to be statistically insignificant with low $\bar{R}^2$ and low elasticities, although the variables had the anticipated signs. However, this sample had certain statistical irregularities and weaknesses.[7] Therefore, on the basis of the evidence, it was not possible to derive definitive conclusions about the possible relationship between the American tariff levels and the United States-Canada productivity differentials.

The logic of the hypothesis was further pursued by regressing the over time changes in Canadian productivity on the over time changes

---

[7]A discussion of these irregularities can be found in Chapter VII, pp. 196 and 198.

in Canadian tariff levels. For the independent variable nominal tariffs, the regression coefficients were found to be significant at a 5 percent significance level. These results thus were in line with the expectation and were consistent with the hypothesis. The $\bar{R}^2$ indicated that about 19 to 24 percent of the variance in industry to industry gains in productivity were accounted for by changes in the tariffs. The regression results between the changes in the effective tariffs and changes in productivity were computed to be statistically insignificant, with the variables carrying the right signs.

Finally, the sample data were disaggregated into the export, domestic and protected industry groups, and a separate analysis was carried out for each of these sets. On the average, the regression results obtained were very weak. Some of the coefficients carried the right sign in line with the hypothesis, others bore inexplicable signs. Firm conclusions were, therefore, difficult to draw because of the inconsistency of signs and the statistical insignificance of many regression coefficients. One possible explanation for such results could be the problem associated with small sample statistical analysis.

In Tables 8.1 and 8.2 below we present, in a summary form, all the results of our empirical tests of the hypothesis examined.

TABLE 8.1

SUMMARY OF EMPIRICAL TESTS: CROSS-TABULAR ANALYSIS

Method of Empirical Testing of the hypothesis	Productivity data adjusted for price inflation effect of the Canadian tariff, Expressed in:	Number of Observations	Nature of Results
A. Comparisons of the three groups of the Canadian Industries			
1. Comparisons of relative productivity in the export, protected and domestic industry groupings during 1949-52.	Current U.S. Dollars	30	Inconsistent with the hypothesis
	Constant (1961) U.S. Dollars	23	Consistent with the hypothesis
2. Comparisons of relative productivity in the export, protected and domestic industry groupings during 1962-65.	Current U.S. Dollars	30	Inconsistent with the hypothesis
	Constant (1961) U.S. Dollars	23	Inconsistent with the hypothesis
3. Comparisons of relative productivity in the export, protected and domestic industry groupings in 1965.	Current U.S. Dollars	100	Consistent with the hypothesis
B. Comparisons of the three groups of the Canadian Industries with Identical Listings in the United States.			
1. Relative productivity in the Canadian and American industry groupings during 1949-52.	Current U.S. Dollars	30	Inditerminate
	Constant (1961) U.S. Dollars	23	Inditerminate
2. Relative productivity in the Canadian and American industry groupings during 1962-65.	Current U.S. Dollars	30	Inconsistent with the hypothesis
	Constant (1961) U.S. Dollars	23	Inconsistent with the hypothesis

TABLE 8.1 (continued)

Method of Empirical Testing of the hypothesis	Productivity data adjusted for price inflation effect of the Canadian tariff, Expressed in:	Number of Observations	Nature of Results
3. Relative productivity in the Canadian and American industry groupings in 1965	Current U.S. Dollars	100	Consistent with the hypothesis
C. Aggregate Canadian Data: Industry Protection (1963) Status and Industry Productivity (1965) levels: Rank correlation analysis	Constant (1961) U.S. Dollars	78	Significant at the 5 percent Probability level (consistent with the hypothesis)

TABLE 8.2

SUMMARY OF EMPIRICAL TESTS: CORRELATION AND REGRESSION ANALYSIS

Method of Empirical Testing	Productivity data adjusted for price inflation effect of the Canadian tariff, Expressed in:	Number of Observations	Nature of Results
A. CORRELATION ANALYSIS: The Canadian tariffs and relative United States-Canada productivity			
1. The levels of the Canadian nominal tariffs in 1949 and the relative United States-Canada Productivity ratios in 1949-52.	Constant (1961) U.S. Dollars	23	Statistically significant at a 1% probability level (consistent with the hypothesis)
2. The levels of the Canadian nominal tariffs in 1963 and the relative United States-Canada productivity ratios in 1962-65.	Constant (1961) U.S. Dollars	23	Statistically significant at a 1% probability level (consistent with the hypothesis).
3. The levels of the Canadian nominal tariffs in 1963 and the relative United States-Canada Productivity ratios in 1965.	Constant (1961) U.S. Dollars	78	Statistically significant at a 1% probability level (consistent with the hypothesis)
4. The levels of the Canadian effective tariffs in 1949 and the relative United States-Canada productivity ratios in 1949-52.	Constant (1961) U.S. Dollars	20	Statistically insignificant at a 5% probability level (inconsistent with the hypothesis)
5. The levels of the Canadian effective tariffs in 1963 and the relative United States-Canada productivity ratios in 1962-65	Constant (1961) U.S. Dollars	20	Statistically insignificant at a 5% probability level (inconsistent with the hypothesis).

TABLE 8.2 (continued)

Method of Empirical Testing	Productivity data adjusted for price inflation effect of the Canadian tariff, Expressed in:	Number of Observations	Nature of Results
6. The levels of the Canadian effective tariffs in 1963 and the relative United States-Canada productivity ratios in 1965	Constant (1961) U.S. Dollars	78	Statistically significant at a 1% probability level (consisten with the hypothesis)
B. CORRELATION ANALYSIS: The American tariffs and relative United States-Canada Productivity.			
1. The levels of the American nominal tariffs in 1958 and the relative United States-Canada productivity ratios in 1965	Constant (1961) U.S. Dollars	18	Statistically insignificant at a 5% probability level (Unpredictable).
2. The level of the American effective tariffs in 1958 and the relative United States-Canada productivity ratios in 1965.	Constant (1961) U.S. Dollars	18	Statistically insignificant at a 5% probability level. (unpredictable)
C. CORRELATION ANALYSIS: Over time changes in Tariffs and Productivity in Canada.			
1. Changes in the Canadian nominal tariffs (1963-1949) and changes in the Canadian productivity (1962-65 - 1949-52)	Constant (1961) U.S. Dollars	23	Statistically significant at a 5% probability level (Consisten with the hypothe
2. Changes in the Canadian effective tariffs (1963-1949) and changes in the Canadian productivity (1962-65 - 1949-52)	Constant (1961) U.S. Dollars	20	Statistically insignificant at 5% probability level (Inconsis with the hypoth

TABLE 8.2 (continued)

Method of Empirical Testing	Productivity data adjusted for price inflation effect of the Canadian Tariff, Expressed in:	Number of Observations	Nature of Results
D. REGRESSION ANALYSIS: The Canadian tariff and the relative United States-Canada Productivity. (Pooled Data)			
1. The levels of the Canadian nominal tariffs (1949) and the relative United States-Canada productivity ratios in 1949-52.	Constant (1961) U.S. Dollars	23	Statistically significant at a 1% probability level (Consistent with the hypothesi
2. The levels of the Canadian nominal tariffs (1963) and the relative United States-Canada productivity ratios in 1962-65.	Constant (1961) U.S. Dollars	23	Statistically significant at a 1% probability level (Consistent with the hypothesi
3. The levels of the Canadian nominal tariffs (1963) and the relative United States-Canada productivity ratios in 1965.	Constant (1961) U.S. Dollars	78	Statistically significant at a 1% probability level (Consistent with the hypothesi
4. The levels of the Canadian effective tariffs (1949) and the relative United States-Canada productivity ratios in 1949-52.	Constant (1961) U.S. Dollars	20	Statistically insignificant at a 5% probability lev (Inconsistent with the hypothesis).
5. The levels of the Canadian effective tariffs (1963) and the relative United States-Canada productivity ratios in 1962-65.	Constant (1961) U.S. Dollars	20	Statistically insignificant at a 5% probability level (Inconsister with the hypothesi
6. The levels of the Canadian effective tariffs (1963) and the relative United States-Canada productivity ratios in 1965.	Constant (1961) U.S. Dollars	78	Statistically significant at a 1% probability level (Consistent with the hypothes

TABLE 8.2 (continued)

Method of Empirical Testing	Productivity data adjusted for price inflation effect of the Canadian Tariff, Expressed in:	Number of Observa- tions	Nature of Results
E. <u>REGRESSION ANALYSIS</u>: <u>The American Tariffs and the relative United States-Canada productivity: (Pooled data)</u>			
1. The levels of the American nominal tariffs (1958) and the relative United States-Canada productivity ratios in 1965.	Constant (1961) U.S. Dollars	18	Statistically insignificant at a 5% probability level (Unpredictabl
2. The levels of the American effective tariffs (1958) and the relative United States-Canada productivity ratios in 1965.	Constant (1961) U.S. Dollars	18	Statistically insignificant at a 5% probability level (Unpredictabl
F. <u>REGRESSION ANALYSIS</u>: <u>Changes in the Canadian tariffs and changes in the Canadian Productivity</u>: <u>(Pooled Data)</u>			
1. Changes in the Canadian Nominal tariffs (1963-1949) and changes in the Canadian productivity (1962-65 - 1949-52)	Constant (1961) U.S. Dollars	23	Statistically significant at a 5% probability level (Consistent with the hypothesis
2. Changes in the Canadian effective tariffs (1963-1949) and changes in the Canadian productivity (1962-65 - 1949-52)	Constant (1961) U.S. Dollars	20	Statistically insignificant at a 5% probability level (Inconsistent with the hypothesis

TABLE 8.2 (continued)

Method of Empirical Testing	Productivity data adjusted for price inflation effect of the Canadian tariff, Expressed in:	Number of Observa-tions	Nature of Results
G. REGRESSION ANALYSIS: The Canadian tariffs and the relative United States-Canada productivity: (Disaggregated data)			
1. The level of the Canadian tariffs (1949) and the relative United States-Canada productivity ratios in (1949-52)	Constant (1961) U.S. Dollars	Exp. = 7 Prot.= 7 Dom. = 6	Most regression coefficients statistically insignificant at a 5% probability level, some with "wrong" signs. (Unpredictable due to inconsistency)
2. The levels of the Canadian tariffs (1963) and the relative United States-Canada productivity ratios in 1962-65.	Constant (1961) U.S. Dollars	Exp. = 7 Prot.= 6 Dom. = 6	Most regression coefficients statistically insignificant at 5% probability level (Unpredictable due to inconsistency)
3. The levels of the Canadian tariffs (1963) and the relative United States-Canada productivity ratios in 1965.	Constant (1961) U.S. Dollars	Exp. =11 Prot.=22 Dom. =45	Most regression coefficients statistically insignificant at 5% probability level, with some carrying "wrong" signs (Unpredictable due to inconsistency)

TABLE 8.2 (continued)

Method of Empirical Testing	Productivity data adjusted for price inflation effect of the Canadian tariff, Expressed in:	Number of Observations	Nature of Results
H. REGRESSION ANALYSIS: The American Tariffs and the relative United States-Canada productivity. (Disaggregated data)			
1. The levels of the American tariffs (1958) and the relative United States-Canada productivity ratios in 1965.	Constant (1961) U.S. Dollars	Exp. = 5 Prot.= 7 Dom. = 6	Regression coefficients of neither variable statistically significant at a 5% probability level, with some coefficients bearing wrong signs (Inconsistent with the hypothesis)
I. REGRESSION ANALYSIS: Changes in the Canadian Tariffs and changes in the Canadian productivity (Disaggregated data)			
1. Changes in the Canadian tariffs (1963-1949) and changes in the Canadian productivity (1962-65 - 1949-52)	Constant (1961) U.S. Dollars	Exp. = 7 Prot.= 6 Dom. = 7	Regression coefficients statistically insignificant at a 5% probability level, with some results contrary t hypothesis (Inconsistent with the hypothesis)

Conclusions:

On the basis of the findings of this study it can be concluded that the evidence regarding the possible relationship between the tariffs and productivity in Canada is by no means conclusive. While a majority of the tests do not substantiate the central hypothesis, a few seem to suggest that productivity levels in Canada relative to the United States are significantly affected by tariffs. Still, evidence from other tests is uncertain and cannot be evaluated precisely. Overall, the present evidence suggests that the effects of tariff levels on productivity in Canada relative to that in the United States is small at best. In particular, the following four main conclusions derive from the work.

(1) First, despite the fact that productivity levels in the Canadian protected industries are found to be lowest in all the samples and periods examined, it cannot be demonstrated conclusively that the tariffs are a differentiating factor in the relative productivity performance of the three Canadian industry categories. For if diversified production patterns and limited size or extent of the market (due to tariffs) prevent the protected industries from achieving economies of scale and thereby high levels of productivity, then the export industries must be able to attain higher levels of productivity since they are able to realize economies of scale and specialization through penetration into larger export markets. Further, the domestic industries should also show low productivity levels since they operate in the same size of domestic market which protected industries do. On the contrary, our investigation revealed that operating within the same confines domestic industries are

able to attain even higher levels of productivity than the export industries. Hence it cannot be concluded in definite terms that inefficiency is associated only with those industries which are confined to a limited domestic market and operate on a small scale. The difficulty of reaching a definitive conclusion is further heightened because the evidence on the relative productivity levels in the protected industries derived from the alternative industry samples is conflicting and inconsistent.

(2) Second, tariffs do not adequately explain relative United States-Canada productivity differences in the three industry categories. Our investigation revealed that Canadian export and domestic industries performed much better than did her protected industries relative to the comparable industries in the United States. Even though the results are apparently consistent with the hypothesis, it is difficult to evaluate them precisely and conclusively for such a pattern of productivity, with the exception of domestic industries, will emerge from the principle of comparative advantage as well,from either country's point of view, even if there were no tariffs. Unless the influence of tariffs and comparative disadvantage can be isolated from low productivity performance of Canadian protected industries relative to the comparable industries in the United States no firm conclusion can be derived about the validity of the hypothesis.

(3) The relationship between the American tariffs (both the nominal and effective) and the relative United States-Canada productivity levels appears to be uncertain. Though the statistical evidence derived from this study suggests that the American tariffs and the United States-Canada productivity differentials are not connected variables, too great a signifi-

cance cannot be attached to these results because of irregularities in the data and problems associated with small sampling statistical analysis.

(4) The results of the correlation and regression analysis of this study indicate that whereas the United States-Canada productivity differences are significantly associated with the nominal tariffs, analysis for the effective tariffs do not provide significant explanation for this relationship. In view of this finding, one may well question the argument of those who believe that effective tariffs are more important in judging the protection afforded a particular industry, and more pertinent in discovering the resource allocation effect of tariff structure.[8] While it is beyond the scope of the present paper to set out on a theoretical analysis of effective protection and resource allocation and to dig out reasons for the statistically insignificant coefficients for the independent variable effective tariffs, some possible hypothesis can be advanced to show that computed effective tariffs are of limited usefulness in explaining the resource allocative effect of tariff structure and hence its relation to productivity. These hypothesis, it is hoped, will be subject of some future research.

The main message of the theory of effective protection is to tell us the direction in which the tariff structure causes resources to be pulled as between different activities producing goods. Domestic production will shift from low to high effective protective rate activities. If three activities can be ordered along a scale X, Y, Z in an ascending order of effective rates, the theory tells us that resources will shift

---

[8] See Corden, op. cit., p. 222.

from X to Y to Z. The higher the effective tariffs, the higher will be the resulting percentage increase in value added per unit of output and consequently in the returns to the primary factors of production. Factors will then move to those industries experiencing the greatest percentage increases in value added. The shift of resources may be from more efficient to less efficient uses where their marginal physical product is low and thus induce the economy to move from higher level of production to a lower level and thereby depress productivity. The social product must, therefore, be damaged whenever through some influence with the free play of economic forces, such as tariffs, factors of production are retained in an employment where their marginal productivity is lower.

The above is a simple argument of the resource allocation effect of effective protection, some qualification to this simple argument may be stated to indicate limitations of our computed effective rates in providing guidance on how resources have shifted in response to the tariff structure.

For effective protection to exist it is necessary that the producers in the protected industries should be able to realise higher prices by the full margin or some percentage of the tariff. But, assuming an elastic demand for goods, this price rise will lead to a decrease in the quantity demanded. Also, since many industries in the economy, in particular services and utilities, do not enjoy effective protection, their employees will not experience an increase in their incomes from the tariff structure. Hence the quantity of the protected goods that they would want to demand will normally decrease when their prices rise. To the extent that these influences affect different industries differently, the output may not expand and, therefore, the resources may not shift in accordance with the sequence suggested by the ranking of the industries according to their effective tariffs. This will indicate that the computed effective rates are only of limited use in explaining how resources have shifted in response to tariff structure. Thus one possible explanation for the insignificant relationship between our computed effective tariffs and the United States-Canada productivity differences, in addition to the possible biases in the computed effective rates due to the limiting assumptions, may be that the mechanism of resource allocation sketched above may not hold.

Also, if firm conclusions about resource allocation effects of the tariff structure are to be derived, it is necessary that the impact of the effective tariff structure on the balance of payments and hence on exchange rate should be determined. After these considerations resource allocation effect of the tariffs on the international goods relative to domestic goods will have to be reassessed.[9]

It would thus seem that the computed effective rates are only crude indicators and provide little guidance on the resource allocation effects of the tariff structure. Much more intensive research on individual industry characteristics and problems is required before any firm statement can be made about the possible relationship between effective tariffs and the United States-Canada productivity differences.

---

[9] For a rigorous and extended discussion on this, see Corden, _ibid._, pp. 224-226.

The above are the theoretical arguments to show that computed effective rates may not accurately reflect the relationship they bear to productivity. However, despite the fact that our analysis do not provide significant relationship between the effective tariffs and the United States-Canada productivity differentials, there is at least some evidence in support of this relationship. Out of the three sets of data utilized to examine this relationship, one sample yielded statistically significant regression coefficients for the independent variable, the effective tariffs. Also, the analysis for the disaggregated data indicates that the potential group (protected industries) came closest to the hypothesis, and the regression coefficients for the independent variable, the effective tariff, were generally statistically significant. These results, coupled with the measurement problems due to the limiting assumptions on which the effective rate computations are based, support and strengthen at least a suspicion that the United States-Canada productivity differences and the effective tariffs may be connected variables.

It is also interesting to note that even though our correlation and regression analysis suggests that the nominal tariffs are significantly associated with the low Canadian productivity levels relative to the United States, it may be difficult to conclude that tariffs are a factor causing inefficiency in the Canadian industries for a positive correlation between the tariffs and the United States-Canada productivity differences can well be utilized to argue that the inefficiency or low productivity of industries itself generates a demand for tariff protection. The argument can be seen more clearly if the hypothesis stating that "the tariffs cause low productivity in Canada relative to the United States" is reversed to state that "low productivity industries in Canada relative to the United States require tariff protection", and a statistically significant positive correlation coefficient is then interpreted accordingly.

Thus it is a chicken and egg kind of problem - which came first and which followed. Satisfactory answer to this question will require a much more intensive research of individual industry characteristics and problems. Perhaps a detailed industry by industry study of over time tariffs and productivity levels may shed some light on this problem. We have not made any attempt in this direction; in fact such an attempt has been beyond the scope of this study. However, the problem is worthy of future research. As far as we know no attempt has been made on this problem.

BIBLIOGRAPHY

BIBLIOGRAPHY

A. Books, Studies and Official Documents

Abramovitz, Moses: Resources and Output Trends in the United States Since 1870, occasional papers No. 52, New York, National Bureau of Economics Research, 1956.

Aganbegian, A.G.: "Indexes and Methods of comparing International Labour Productivity", Paper presented at the conference on Labour Productivity, Cadenabbia, Lake Commo, Italy, 1961, Chapter 12, Labour Productivity, New Yor, McGraw Hill, 1964.

Aitken, H.G.J.: "Defensive Expansionion: The State and Economic Growth in Canada" in Aitken (ed): State and Economic Growth, New York, 1959.

Allen, R.G.D.: Mathematics for Economists, MacMillan, London, 1967.

Alterman, J. and Jacobs, E.E.: "Estimates of Real Product in the United States by Industrial Sector": Output, Input and Production Measurement, N. B. E. R., Studies in Income and Wealth, Vol. 25, Princeton University Press, 1967.

American Assembly: Wages, Prices, Profits and Productivity, New York, Columbia University, 1959.

American Management Association: Meeting the Productivity Challenge: The Nature of the Challenge and Some practical Approaches, New York, American Management Association, 1960.

Auer, L.: Canadian Agricultural Productivity, Staff study No. 24., Economic Council of Canada, Queen's Printer, Ottawa, Dec. 1969.

Bain, J.S.: Barriers to Competition, Harvard University Press, Cambridge, 1956.

Bakke, E.W.: "Organizational Factors in Productivity", Paper Presented at conference on Labour Productivity, Cadenbbia, Lake Commo, Italy, 1967, Chapter 26, Labour Productivity, New York, McGraw Hill, 1964.

Balassa, Bela: Studies in Trade Liberalization Problems and Prospects of Industrial Countries, Baltimore, John Hopkins Press, 1967.

________. Trade Liberalization among Industrial Countries: Objectives and Alternatives, McGraw Hill, 1967.

Behrens, Friedrich: "The Concept of Labour Productivity", Paper Presented at Conference on Labour Productivity, Cadenbbia, Lake Commo, Italy, 1961, Chapter 7, Labour Productivity, New York, McGraw Hill, 1964.

Bernolak, Imre: Concepts and Measures of Productivity in the Private and Public Sectors, Paper Presented at the Canadian Economic Association, Annual Meeting, May 1970, Winnipeg, Canada.

Berlinguette, V.R. and Leacy, F.H.: "The Estimation of Real Domestic Product by Final Expenditure Categories and by Industry of origin in Canada" in Output, Input and Productivity Measurement, Report of the N.B.E.R., Princeton University Press, 1961, (Studies in Income and Wealth).

Bernstein, E.M.: "American Productivity and the Dollar Payments Problem" in Allen and Allen (ed.) Foreign Trade and Finance, Macmillan Company, New York, 1959.

Bhagwati, J.: Trade, Tariffs and Growth, M.I.T. Press, Cambridge, 1969.

Bidwell, P.W.: What Tariff means to American Industries, Harper Brothers, New York, 1966.

Bodkin, R.G.: The Wage-Price, Productivity Nexus, University of Pennsylvania Press, 1966.

Brecher, I. and Reisman, S.S.: Canada-United States Economic Relations, Royal Commission on Canada's Economic Prospects, Ottawa, Queen's Printer, 1957.

Brennen, M.J.: Theory of Economic Statistics, Prentice Hall International, 1970.

Canada: Parliament, Senate Special Committee on Manpower and Employment: Proceedings 24th Parliament, 4th Session, No.2, Dec. 8, 1960. Ottawa, Queen's Printer, 1960.

Clague, Ewan: Price, Wages and Productivity, Washington, U.S. Dept. of Labour, Bureau of Labour Statistics, U.S. Government Printing Office, Washington D.C., 1959.

______. Productivity: What it is and how it is Measured, U.S. Dept. of Labour, Bureau of Labour Statistics, U.S. Government Printing Office, Washington D.C., 1959.

Clark, Colin: The Conditions of Economic Progress, New York, MacMillan, Company, St. Martin Press, 1957.

Clark, M.G.: Canada and World Trade, Economic Council of Canada, Staff Study No. 7, Queen's Printer, Ottawa, 1964.

Clement, Pfister and Rothwell: Theoretical Issues in International Economics, Houghton Miffin Company, Boston, 1967.

Cooper, R.N. : "Competitive Position of the United States" in S.E. Harris (ed) The Dollar in Crisis, Hartcourt Brace & World, Inc., New York, 1961.

Creamer, Daniel: Output trends in Manufacturing Industries, Occasional paper 41, N.B.E.R., 1954.

Dales, J.H.: The Protective Tariff in Canadian Development: Eight Essays in Trade and Tariff When Factors Move with Special Reference to Canadian Protectionism, Univ. of Toronto Press, Toronto, 1966.

Daly, D.J.; Keys, B.A. and Spence, E.J.: Scale and Specialization in Canadian Manufacturing, Economic Council of Canada, Ottawa, Queen's Printer, 1967.

Davidson, J.P.: Productivity and Economic Incentives, Birmingham University, 1958.

Davidson, J.P. and Ross, N.S.: "Productivity and Earnings in Manufacturing", Chapter II in Productivity and Economic Incentives, London, George Allen S. Unwin, 1958.

Denison, E.F.: Why Growth Rates Differ, Post-War Experience of Nine Western Countries, Brookings Institute, Washington, 1967.

_______. Measurement of Labour Input: Some Questions of Definition and the Adequacy of Data, N.B.E.R., Studies in Income and Wealth, Vol. 25, Princeton University Press, 1967.

_______. The Sources of Economic Growth in the United States and the Alternatives Before Us, New York, Committee on Economic Development, 1962.

Dept. of Labour, Bureau of Labour Statistics: A Handbook of Labour Statistics, Annual, U.S. Government Printing Office, Washington D.C.

Dept. of Commerce: Annual Survey of Manufactures and Census of Manufactures, Washington, Bureau of the Census, U.S. Government Printing Office, Washington D.C.

Dept. of Labour, Economic and Research Branch: Wage Rates, Salaries and Hours of Work, Annual, Queen's Printer, Ottawa.

Dept. of Labour; Indexes of Output per Man-hour for selected Industries 1947-63, Annual Industry series, Bureau of Labour Statistics, U.S Government Printing Office, Washington D.C.

_______. Productivity, Changing Technology and Employment, Bureau of Labour Statistics, U.S. Government Printing Office, Washington D.C.

_______. Wholesale Price and Indexes, Annual, Bureau of Labour Statistics, U.S. Printing Office, Washington D.C.

Deutsch, J.J., Keirstead, B.S., Levitt, K. and Will, R.M.: The Canadian Economy: Selected Readings, Macmillan, Toronto, 1965.

Dhrymes, P.G.: Econometrics: Statistical Foundations and Applications, Harper and Row, New York, 1970.

Dominion Bureau of Statistics: Earnings and Hours of Work in Manufacturing, Ottawa, Queen's Printer, Annual, Catalogue No. 72-204.

_______. Employment and Payrolls, Ottawa, Queen's Printer, Monthly, Catalogue No. 72-002.

_______. Fixed Capital Flows and Stocks, Manufacturing, Canada 1926-60. Ottawa, Queen's Printer, Occasional Catalogue No. 13-523.

_______. General Review of Manufacturing Industries in Canada, Ottawa, Queen's Printer, Annual, Catalogue No. 31-201.

_______. Index of Real Domestic Product by Industry, Ottawa, Queen's Printer, Occasional, Catalogue No. 61-605 and 61-506.

_______. Indexes of Indust. Production, Ottawa, Queen's Printer, Occasional, Catalogue No. 61-502.

_______. Industry Reports, Ottawa, Queen's Printer, Annual.

_______. Industry Selling Price Indexes, Ottawa, Queen's Printer, Occasional, Catalogue No. 62-515.

_______. Manufacturing Industries of Canada, Section A, Summary for Canada, 1961, Ottawa, Queen's Printer, Annual, Catalogue No. 31-203.

_______. Private and Public Investment in Canada: Outlook, Ottawa, Queen's Printer, Annual, Catalogue No. 61-205.

_______. Private and Public Investment in Canada, Ottawa, Queen's Printer, Annual, Catalogue No. 61-504.

_______. Price and Price Indexes, Ottawa, Queen's Printer, Catalogue No. 62-002, Annual.

_______. Review of Employment and Payrolls, Ottawa, Queen's Printer, Annual, Catalogue No. 72-201.

_______. Revised Indexes of Industrial Production, 1935-57, Ottawa, Queen's Printer, 1959, Catalogue No. 61-502.

_______. Standard Industrial Classification, Queen's Printer, Dec. 1960, occasional, Catalogue No. 12-501.

_______. Trade of Canada, Ottawa, Queen's Printer, Annual, Catalogue No. 65-007.

_______. The Input-Output Structure of the Canadian Economy, 1961, Vols I & II, Queen's Printer, Ottawa, 1969.

Dresch, F.W.: Productivity in Manufacturing in the Post-War Period in Canada, Europe and the United States, Applied Research Centre, Standford Research Institute, Standford, California, 1953.

Dunlop, J.T., and Diatchenko, V.P.: Labour Productivity, New York, McGraw Hill, 1964.

Easterbrook, W.T. and Aitken, H.G.J.: Canadian Economic History, MacMillan, Toronto, 1963.

Eastman, H.C. and Stykolt, S.: Tariff and Competition in Canada, MacMillan, Toronto, 1967.

Easterfield, T.E.: Productivity Measurement in Great Britain: A Survey of Recent Work, Dept. of Scientific and Industrial Research, Regent St. London, 1959.

Economic Council of Canada: IInd, IIIrd, IVth, Vth and VIth Annual Reviews, Ottawa, Queen's Printer.

Ellsworth, P.T.: International Economics, Macmillan Company, Toronto, 1947.

English, H.E. (ed.): Canada and New International Economy, University of Toronto Press, 1961.

_______. Industrial Structure in Canada's International Competitive Position, Canadian Trade Committee, Private Planning Association of Canada, Montreal, 1964.

_______. The Impact of Trade Liberalisation, Oxford University Press, 1970.

European Productivity Agency: Productivity Measurements, Concepts and Measures, Vol. I and II, Paris, OECC, 1956.

Ezekiel, M. and Fox, K.A.: Methods of Correlation and Regression Analysis, John Wiley & Sons, Inc., London, 1966.

Fabricant, Solomon: Basic Facts on Productivity Change, New York, National Bureau of Economic Research, (Occasional Paper No. 63), 1959.

_______. "Meaning and Measurement of Labour Productivity", Paper Presented at the Conference on Labour Productivity, Cadenabbia, Lake Commo, Italy, 1961, Chapter 2, Labour Productivity, New York, McGraw Hill, 1964.

_______. "Productivity Measurement", Third Annual Conference on Labour, 1950, Dept. of Labour, Bureau of Labour Statistics, U.S. Government Printing Office, Washington D.C., 1951.

Fullerton, D.H. and Hampson, H.A.: Canadian Secondary Manufacturing Industries, Royal Commission on Canada's Economic Prospects, Ottawa, Queen's Printer, 1957.

Fourastie, Jean: Productivity, Price and Wages, Project 235, Paris, OEEC, European Productivity Agency, 1957.

Frankel, Marvin: British and American Manufacturing Productivity, Bureau of Economic and Business Research, University of Illinois, Urbana, 1957.

Gilbert,M. and Beckerman, W.D.:"International Comparisons of Real Product and Productivity by final Expenditure and by Industry", Output, Input and Productivity Measurement, NBER Studies in Income and Wealth, Princeton University Press, 1961.

Gilbert, M. and Associates: Comparative National Products and Price Levels, OEEC, Paris, 1958.

Gilbert, M. and Kravis,I.: An International Comparison of National Products and the Purchasing Power of Currencies, O.E.E.C., Paris, 1954.

Greenberg, Leon: "Data Available for the Measurement of Output per Manhour", Output, Input and Productivity Measurement, NBER, Studies in Income and Wealth, Vol. 25, Princeton University Press, 1961.

_______. Data for Measurement of Industrial Productivity, U.S. Dept. of Labour, Bureau of Labour Statistics, U.S. Government Printing Office, Washington D.C., 1966.

_______. Productivity in American Industry, Washington, Dept. of Labour, Bureau of Labour Statistics, U.S. Government Printing Office, Washington D.C., 1957.

_______. "Productivity Measurement for Economic Analysis", Paper Presented at the Conference on Labour Productivity, Cadenabbia, Lake Commo, Italy, 1961, Chapter 5. Labour Productivity, New York, McGraw Hill, 1964.

Haberler,G.V.: The Theory of International Trade with its Application to Commercial Policy, Augustine M. Kelley, Publishers, New York, 1965.

Hicks, J.R.: "The Long Run Dollar Problem" in Caves and Johnson (ed.) Readings in International Economics, Richard D. Irwin Inc., Homewood,Illinois, 1958.

Harris, S.E.: International and Inter-regional Economics, McGraw Hill, Toronto, 1967.

Heller, H.R.: International Trade, Theory and Empirical Evidence, Prentice-Hall Inc., Englewood Cliffs, New Jersey, 1968.

Henderson, J.M. and Quandt, R.E.: Microeconomic Theory, McGraw Hill, 1958.

Hirach, S.: Location of Industry and Industrial Competitiveness, Oxford, Clarendon Press, 1967.

Hood, W.D. and Scott, A.: Output, Labour and Capital in the Canadian Economy, Royal Commission on Canada's Economic Prospects, Ottawa, Queen's Printer, 1957.

Hutton ,G.: We too can Prosper, The Promise of Productivity, British Productivity Council, London, 1954.

I. L. O. : Higher Productivity in Manufacturing Industries, Geneva,International Labour Office, 1954.

_______. Measuring Labour Productivity, Geneva,International Labour Office, 1969.

_______. Methods of Labour Productivity Statistics, Geneva, International Labour Office, 1951.

_______. Raising Productivity: Conclusions of Three International Meetings of Experts, Geneva, International Labour Office, 1959.

Joberstein, Ro.: International Economies, Harper & Row, New York, 1970.

Johnson, H.G. : "Increasing Productivity, Income - Price Trends and Economic Growth", in Studies in Pure Theory of International Trade, Unwin University Books, London, 1958.

Karmel, D.H. and Polasek, M.: Applied Statistics for Economists, Sir Isaac Pitman & Son Ltd., 1970.

Kendrick, J.W.: "Productivity, Costs and Prices, Concepts and Measures", Chapter 2, Wages, Prices and Productivity, New York, Columbia University, American Assembly, 1959.

_______. Productivity Trends in the United States, NBER, New York, Princeton University Press, 1961.

_______. Productivity Trends: Capital and Labour, occasional paper 53, NBER, 1956.

_______. What is Productivity? Solving Problems of Productivity in a Free Society. Madison, University of Wisconsin, School of Commerce, Centre for Productivity Motivation, 1962.

Kennen, Peter: United States Economic Policy: A Program for 1960's, Joint Economic Committee, Congress of the United States, 1962.

Kerr, Clark: "Productivity and Labour Relations", Labour and Management in Industrial Society, Double day and Co., Inc., Garden City, New York, 1964.

Kinderberger, C.P.: International Economics, Richard D. Irwin, Inc., Homewood, Illinois, 1963.

Knox, F.A., Barber, C.L. and Slater, D.: Canadian Electrical Manufacturing Industry, Canadian Electrical Manufacturing Association, 1955.

Kravis, K.B., Lipsey, R.E. and Bourque, P.J.: Measuring International Price Competitiveness, a Preliminary Report, New York, NBER, Columbia University Press, 1965.

Lary, H.B.: Problems of the United States as World Trader and Banker, Princeton University Press, 1963.

Lee, Sperry: A Canada - United States Free Trade Arrangement: Survey of Possible Characteristics, Canadian-American Committee, Private Planning Association of Canada, Montreal, 1963.

Lewis, T.W. and Fox, W. : Managing with Statistics, Oliver & Boyd Ltd., Edinburgh, 1970.

Lithwick, N.H.: Prices and Productivity in Canada's Competitive Position, Canadian Trade Committee, Private Planning Association of Canada, 1967.

Lougheed, W.F.: Secondary Manufacturing Industry in Canadian Economy, Baxter Publishing Company, Toronto, 1961.

Lucas, H.: Statistical Methods, Buttermouth & Co. Ltd., 1970.

MacDougall, Sir. Donald: The Dollar Problem; A Reappraisal, International Finance Section, Dept. of Economics, Princeton University, 1960.

MacDougall, Sir Donald: "A Lecture on the Dollar Problem" in Allen & Allen (ed.) Foreign Trade and Finance, Macmillan Company, New York, 1959.

McDiarmid, O.J.: Commercial Policy in Canadian Economy, Harvard University Press, Cambridge, Massachussets, 1946.

Mark, J.A.: *Productivity Programs of the Bureau of Labour Statistics*, U.S. Dept. of Labour, Bureau of Labour Statistics, U.S. Government Printing Office, Washington D.C., 1960.

Mason, Francis: *Barriers to Trade Between U.S. and Canada*, Canadian-American Committee, Private Planning Association of Canada, Montreal, 1960.

Maule, C.J.: *Productivity in the Farm Machinery Industry*, Royal Commission on Farm Machinery, Staff Study No.3, Queen's Printer, Ottawa, 1969.

Mehta, M.M.: *Measurements of Industrial Productivity*, Calcutta, World Press, 1955.

Melman,S.: *Dynamic Factors in Industrial Productivity*, Basil Blackwell, Oxford, 1956.

Melvin,J. and Wilkinson ,B.: *Effective Protection in the Canadian Economy*, Economic Council of Canada, Ottawa, Queen's Printer, 1968.

Minc,B.: "*Problems in the Measurement and Analysis of Labour Productivity*", Paper Presented at the Conference on Labour Productivity, Cadenabbia, Italy, 1961, Chapter 3, *Labour Productivity*, New York, McGraw Hill, 1964.

Mills, F.C.: *Productivity and Economic Change*, occasional Paper 38, NBER, New York, 1952.

Moss, Milton: "Industrial Activity and Productivity," *American Statistical Association, Proceedings of the Business and Economic Statistics Section*, 1957.

National Bureau of Economic Research: *Output, Input and Productivity Measurement*, Studies in Income and Wealth, Vol. 25, Princeton University Press, 1961.

National Bureau of Economic Research: *Output, Employment and Productivity in the United States after 1800*, Studies in Income and Wealth, Vol. 30, New York, 1966.

National Bureau of Economic Research: *The Theory and Empirical Analysis of Production*, Studies in Income and Wealth, New York, 1967.

Olley, R.E.: *Memorandum on Productivity*, Bell Canada, April 1969.

Paige,D. and Adler,S.: *International Comparison of Real Product, An Appraisal by Industry of Origin*, Studies in Income and Wealth, Series IV, 1955.

Paige,G. and Bombach,G.: *A Comparison of Real Products and Productivity*, OECD, Paris, 1959.

Pearce, I.F.: International Trade, Macmillan Co. Ltd., 1970.

Postner, Harry H.: An Analysis of Canadian Manufacturing Industries: Some Preliminary Results, Staff Study No. 31, Economic Council of Canada, Information Canada, Ottawa, 1971.

Prudensky, G.A.: "Labour Productivity, Concepts, Factors and Growth Reserves", Paper Presented at Conference on Labour Productivity, Cadenabbia, Lake Commo, Italy, 1961, Chapter I, Labour Productivity, New York, McGraw Hill, 1964.

Roman, Zoltan: "Methods of International Comparisons of Productivity Levels", Paper Presented at Conference on Labour Productivity, Cadenabbia, Lake Commo, Italy 1961, Chapter 8, Labour Productivity, New York, McMillan, 1964.

Rosenbluth, G.: Concentration in Canadian Manufacturing Industries, NBER, New York, Princeton University Press, 1957.

Rostas, L.: Alternative Productivity Concepts, Productivity Measurement Vol. I, European Productivity Agency, OECC, 1955.

_______. Comparative Productivity in British and American Industry, National Institute of Economic and Social Research, occasional Paper No. 13, Cambridge University Press, 1948.

_______. Productivity, Prices and Distribution in Selected British Industries, National Institute of Social and Economic Research, Cambridge University Press, 1948.

Russel,P.: "Protection, Immigration and Canadian Nationalism" in Peter Russel (ed.) Nationalism in Canada, Toronto, 1966.

Safarian, A.E.: Foreign ownership of Canadian Industry, McGraw Hill, Toronto, 1960.

Salter, W.E.G.: Productivity and Technical Change, Cambridge University Press, 1960.

Siegel, I.H.: Concepts and Measurement of Production and Productivity, Bureau of Labour Statistics, U.S. Department of Labour, 1952.

Solow, Robert, M.: "Comment (On G.J. Stigler: Economic Problems in Measuring Changes in Productivity)", Output, Input and Productivity Measurement, N.B.E.R., Studies in Income and Wealth, Vol. 25, Princeton University Press, 1961.

Southworth,C. and Buchaman, W.W.: Changes in Trade Restrictions between Canada and the United States, Canadian American Committee, Private Planning Association of Canada, Montreal, 1960.

Sreenivasan,K.: Productivity and Social Environment, New York, Asia Publishing House, 1964.

Staley, J.D. and Delloff, I.A.: Improving Industrial Productivity, New York, American Management Association, 1963.

Stewart, M.D.: Concentration in Canadian Manufacturing and Mining Industries, Background Study to the Interim Report on Competition Policy, Economic Council of Canada, Queen's Printer, Ottawa, 1970.

Stigler, G.J.: Capital and Rate of Return in Manufacturing Industries, NBER, Princeton University Press, 1963.

_______. "Economic Problems in Measuring Changes in Productivity", in Output, Input and Productivity Measurement, NBER, Studies in Income and Wealth, No. 25, Princeton University Press, 1967.

Stykolt, S.: Efficiency in the Open Economy, Oxford University Press, 1970.

Suits, D.B.: The Theory and Application of Econometric Models, Centre for Economic Research, Athens, 1963.

Taussig, F.W.: International Trade, Macmillan company, New York, 1927.

Tlusty, Zdenek: "The Concept of Social Productivity of Labour", Paper Presented at Conference on Labour Productivity, Cadenabbia, Lake Commo, Italy, 1961, Chapter 6, Labour Productivity, New York, McGraw Hill, 1964.

Travis, W.P.: The Theory of Trade and Protection, Harvard University Press, Cambridge, Massachussets, 1964.

United Nations: Index Numbers of Industrial Production, Studies in Methods, No.1, New York, 1960.

United States: United States Board of Governors of the Federal Reserve System, Federal Reserve Bulletins, various years.

Vaccara, B.N.: Employment and Output in Protected Manufacturing Industries, Washington, Brookings Institution, 1960.

Van Aukum, K.G.: Post-War Productivity Growth in the United States, Division of Productivity and Technological Development, Bureau of Labour Statistics, Dept. of Labour, U.S. Government Printing Office, Washington D.C., 1957.

Viner, Jacob: Studies in the Theory of International Trade, Harper & Bros., London, 1937.

Walters, A.A.: An Introduction to Econometrics, MacMillan & Co. Ltd., 1968.

Walters, Dorothy: Canadian Income Levels and Growth: An International Perspective, Economic Council of Canada, Staff Study No. 23, Queen's Printer, Ottawa, 1969.

West, E.C.: Canada-United States Price and Productivity Differences in Manufacturing Industries, 1963, Staff Study No. 32, Economic Council of Canada, Information Canada, Ottawa, 1971.

Wiles, P.G.D.: Prices, Cost and Output, Basil Blackwell Oxford, 1961.

Wilkinson, B.W.: Canadian International Trade. An Analysis of Recent Trends and Patterns, Canadian Trade Committee, Private Planning Association of Canada, Montreal, 1968.

Wonnacott, R.J. and Wonnacott, P.: Free Trade Between United States and Canada, The Potential Economic Consequences, Cambridge, Harvard University Press, 1967.

_______. United States - Canadian Free Trade. The Potential Impact on Canadian Economy, Canadian-American Committee, Private Planning Association of Canada, Montreal, 1968.

Young, J.H.: Canadian Commercial Policy, Ottawa, Queen's Printer, 1955.

B. Journal Articles

Aganbegian, A.G.: "Overtake and Surpass the U.S.A. in the Productivity of Labour", Problems of Economics, Dec. 1959.

Allen, R.G.D.: "Economic Theory of Index Numbers", Economica, New Series, Vol. 16, (1949).

Altenkirchi, F.: "Methods of Productivity Measurement in Industry", Productivity Measurement Review, No. 9, May, 1959.

Arrow, K.J.; Chenry, H.B.; Minhas, B.S. and Solow, R.M.: "Capital - Labour Substitution and Economic Efficiency", Review of Economics and Statistics, Aug., 1961.

Balassa, B. and Krenin, M.E.: "Trade Liberalization under Kennedy Round, The Static Effects", Review of Economics and Statistics, May, 1967.

Balassa, B.: "Tariff Protection in Industrial Countries: An Evaluation", Journal of Political Economy, June, 1965.

_______. "Tariff Reductions and Trade in manufactures among Industrial Countries", American Economic Review, June, 1966.

_______. "The Impact of Industrial Countries' Tariff Structure on their import of Manufactures from less developed Countries", Economica, Nov. 1967.

_______. "An Empirical Demonstration of Classical Comparative Cost Theory", Review of Economics and Statistics, August 1963.

Ball, D.S.: "United States' Effective Tariff and Labour's Share", Journal of Political Economy, April, 1967.

Bannock, Graham: "Productivity in Manufacturing: Pre-War to 1960", Productivity Measurement Review. Nov. 1962.

Bardhan,P.: "External Economies, Economic Development and Theory of Protection", Oxford Economic Papers, March, 1964.

Barber, C.L.: "Canadian Tariff Policy", Canadian Journal of Economics and Political Science, Nov., 1955.

Barna, T.: "Note on Productivity of Labour, Its Concept and Measurement", Bull. Inst. Statistics, Vol. 8, No.7, 1946.

Basevi, G.: "United States Tariff Structure. Estimates of Effective Rates of Protection in U.S. Industry and Industrial Labour", Review of Economics and Statistics, May, 1966.

Bell, D.A.: "What Makes Productivity Grow", Journal of Industrial Economics, Oct., 1957.

Bello, Francis: "The Technology Behind Productivity", Monthly Labour Review, Aug., 1962.

Borch, Karl: "Causes of Increases in National Productivity", Productivity Measurement Review, Nov. 1956.

Borch, Karl: "Productivity and Size of Firm", Productivity Measurement Reviews, Feb., 1958.

Blyth, C.A.: "An International Comparison of Trend, Acceleration and variation of Rate of Growth of Productivity", Productivity Measurement Review, Nov. 1964.

Bowley, A.L. and Robertson, D.H.: "Production and Efficiency", Journal of Royal Statistical Society, Vol. 102, 1939.

Brakel, L.: "A Comparison of Productivity and Recent Productivity Trends in various Countries", Review of Economics and Statistics, May,1962.

Burkhead, J.: "Living Standards and Productivity", Review of Economics and Statistics, Aug., 1951.

Cahen, L.: "Measurement and Comparison of Productivity at Industrial Branch Level", Productivity Measurement Review, Nov., 1963.

Candler, W. and Hampton,P.: "Industrial Protection in New Zealand", Australian Economic Papers, June, 1966.

Clark, Colin: "International Comparison of Productivity Trends", Journal of Business, Oct., 1958.

Clemhout, Simone: "The Ratio Method of Productivity Measurement", Economic Journal, June, 1963.

Conrad, A.H.: "Productivity, Prices and Incomes", Review of Economics and Statistics, May, 1958.

Corden, W.M.: "Australian Tariff Policy", Australian Economic Papers, Dec., 1967.

_______. "Protection", Economic Record, March, 1966.

_______. "The Effective Protection Rate, the Uniform Tariff Equivalent and the Average Tariff", Economic Record, June, 1966.

_______. "The Structure of a Tariff System and the Effective Protective Rate", Journal of Political Economy, June, 1966.

_______. "The Tariff" in Alex Hunter ed. The Economics of Australian Industry, Melbourne University Press, 1963.

Dales, J.H.: "Some Historical and Theoretical Comments on Canada's National Policies", Queen's Quarterly, Vol. LXXI, No.3, Autumn 1964.

_______. "The Cost of Protectionism with high International Mobility of Labour", Canadian Journal of Economics and Political Science, Nov. 1964.

Daly, D.J. and Walters, W.: "Factors in Canada-United States Real Income Differences," International Review of Income and Wealth, Dec. 1967.

David, P.A.: "Deflation of Value Added", Review of Economics & Statistics, May, 1962.

_______. "Measuring Real Net Output", Review of Economics and Statistics, Nov. 1966.

Deutsch, J.J.: "A Canadian Look at American Trade Policy", American Economic Review, May, 1960.

Domar, E.D.: "Total Productivity and Quality of Capital", Journal of Political Economy, Dec. 1963.

_______. "On Total Productivity and All That", Journal of Political Economy, Dec. 1962.

Domar, E.D. and Scott, M.: "Economic Growth and Productivity in the United States, Canada, United Kingdom, Germany and Japan in the Post-War Period", Review of Economics and Statistics, Feb. 1964.

Eastman, H.C.: "Some Aspects of Tariff Protection in Canada", International Journal, Summer, 1963.

_______. "The Canadian Tariff and Efficiency of the Canadian Economy", American Economic Review, May, 1964.

Fabricant, Solomon: "Productivity and Prices", Challenge, Dec., 1962.

_______. "Productivity and Wage", Challenge, Nov. 1962.

_______. "Productivity: Its Meaning and Trend", Research Series, No.1, Challenge, Oct. 1962.

_______. "Which Productivity? Perspective on a Current Question", Monthly Labour Review, June, 1962.

Farrel, M.J.: "The Measurement of Productivity Efficiency", Journal of Royal Statistical Society, March, 1957.

Fowke, V.C.: "The National Policy - Old and New", Canadian Journal of Economics and Political Science, Aug., 1953.

Frankel, Marvin: "Anglo-American Productivity Differences: Their Magnitude and Some Causes", American Economic Review, May, 1955.

_______. "International Differences in Productivity and in Plant Size", Productivity Measurement Review, Feb., 1957.

Flux, A.W.: "Industrial Productivity in Great Britain and the United States", Quarterly Journal of Economics, Nov., 1933.

Gabriel, S.L.: "Wages and Labour Productivity", Productivity Measurement Review, Feb., 1957.

Gold, Bela: "When Productivity Rises", Challenge, June - July, 1957.

Greenberg, Leon: "Some Concepts and Limitations of Productivity Measures", Iowa Business Digest, Nov. 1955.

Grubel, H.G. and Johnson , H.G.: "Nominal Tariff Rates and the U.S. Valuation Practices - Two Case Studies", Review of Economics and Statistics, May, 1967.

_______. "Nominal Tariff, Indirect Taxes and Effective Rates of Protection in Common Market Countries", Economic Journal, Dec., 1967.

Haldi, J. and Whitcomb, D.: "Economies of Scale in Industrial Plants", Journal of Political Economy, Aug., 1967.

Hardin, Einar: "Measuring the Rate of Productivity Growth", Productivity Measurement Review, Nov., 1963.

Heath, J.B.: "British - Canadian Industrial Productivity", Economic Journal, Vol. LXVII, 1957.

Hoffman, W.G.: "On Forecasting Productivity Changes in an Expanding Economy", International Economic Papers, 1950.

Johnson, H.G.: "The Bladen Plan for Increased Protection of the Canadian Automotive Industry", Canadian Journal of Economics and Political Science, May, 1963.

_______. "The Cost of Protection and Scientific Tariff", Journal of Political Economy, Aug., 1960.

_______. "Tariff and Economic Development", Journal of Development Studies, Oct. 1964.

_______. "International Competitive Position of the United States", Review of Economics & Statistics, Feb., 1966.

_______. "The Theory of Tariff Structure with special Reference to World Trade and Development", Trade and Development, Etudes et Travanx de l institut Universitaire de Hantes Etudes Internationales, Geneva, Libraric Droz, 1965.

Kendrick, J.W. and Sato, R.: "Factor Prices, Productivity and Economic Growth", American Economic Review, Dec., 1963.

Keesing, D.B.: "Labour Skills and International Trade", Review of Economics & Statistics, Aug., 1965.

Kendrick, J.W.: "Productivity: Contribution of Capital and Labour", The Conference Board Business Record, June, 1958.

Khromer, P.: "The Size of Industrial Enterprize and Labour Productivity", Problems of Economics, Dec., 1963.

Krause, L.B. : "Discussion" (on H.C. Eastman's, "Canadian Tariff and Efficiency of the Canadian Economy"), American Economic Review, May, 1964.

_______. "United States' Imports and Tariff", American Economic Review, May, 1959.

Kravis, I.B.: "Wages and Foreign Trade", Review of Economics & Statistics, Feb., 1956.

Kreinin, M.E.: "Effects of Tariff Changes on the Prices and volume of Imports", American Economic Review, March, 1961.

MacDougall, G.D.A.: "Does Productivity Rise Faster in the United States", Review of Economics and Statistics, May, 1956.

MacDougall, G.D.A.: "British-American Exports: A Study Suggested by the Theory of Comparative Costs", Parts I and II, Economic Journal, December 1951 and September 1952.

Maddison, A.: "Productivity in an Expanding Economy", Economic Journal, Sept., 1952.

_______. "Productivity in Canadian Manufacturing, 1935-48: Notes and Memoranda", Canadian Journal of Economics and Political Sciences, May, 1953.

_______. "Productivity in U.S.A., U.K. and Canada", Oxford Economic Papers, Oct., 1952.

Mark, J.A.: "Industry Indexes of Output per Man-hour", Monthly Labour Review, Nov., 1962.

_______. "Technical Note Industry Indexes of Output per - man-hour", Monthly Labour Review, Nov., 1962.

Martin, H.W.: "Productivity Measurement and Control", Productivity Measurement Review, May, 1960.

_______. "Towards a Common Measurement of Productivity", Productivity Measurement Review, Nov., 1959.

Massel, B.F.: "Determinants of Productivity Change in United States Manufacturing", Yale Economic Papers, Fall, 1962.

_______. "The Resource Allocation Effects of a Tariff and Effective Protection of Individual Inputs", Economic Record, Sept. 1968.

McKinnon, R.I.: "Intermediate Products and Differential Tariffs. A Generalization of Lerner's Symmetry Theorem", Quarterly Journal of Economics, Nov., 1968.

Mehta, M.M.: "Measurement of Industrial Efficiency", Economic Journal, Dec., 1950.

Melman, Seymour: "Industrial Productivity in Relation to Cost of Management", Productivity Measurement Review, May, 1956.

Melman, Seymour: "What does Productivity Measure", Productivity Measurement Review, Aug., 1956.

Nageshi, T.: "Productivity of the Infant Industry and Dynamic Internal Economics", Economic Record, March, 1968.

Nelson, R.R.: "International Productivity Differences", American Economic Review, Dec., 1968.

Niculescu, B.M.: "Protection and Tariff", Economic Record, Dec., 1963.

O'Connel, D.E.: "Why Measure Input Productivity", Productivity Measurement Review, Nov., 1961.

Olley, R.: "Comparative Productivity in Canada and the United States", Industrial Canada, July 1966.

Papenak, C.F.: "Tariff Protection, Import Substitution and Investment Efficiency: A Comment", Pakistan Development Review, Spring, 1966.

Passinette, L.L.: "On Concepts and Measurement of Changes in Productivity", Review of Economics and Statistics, Aug., 1959.

Remry, R.: "The Use of Value Added as an Approach to Measurement of Global Productivity", Productivity Measurement Review, Feb., 1959.

Roberts, J.W.: "Take a Look at Indirect Labour Productivity", Plant Management and Engineering, Jan., 1961.

Rostas, L.: "Changes in Productivity of British Industry 1945-1951", Economic Journal, Vol. 62, 1952.

_______. "Industrial Production, Productivity and Distribution in Britain, Germany and the United States", Economic Journal, Vol. 53, 1943.

Rothbarth, E.: "Causes of Superior Efficiency of U.S.A. Industry as Compared with British Industry", Economic Journal, Sept., 1946.

Sahota, G.S. : "An Analysis of Nominal and Effective Tariffs," Foreign Trade Review, Vol. 3, July, 1968.

Saunders, C.T.: "International Comparisons of Productivity Growth in the 1950's, Journal of the Royal Statistical Society, Series A, Part II, 1963.

Searle, A.D.: "Relationship between Productivity measures", Monthly Labour Review, May, 1954.

Saligo,R. and Stern, J.H.: "Tariff Protection, Import Substitution and Investment Efficiency", Pakistan Development Review, Summer, 1965.

_______. "Tariff Protection, Import Substitution and Investment Efficiency: A Reply", Pakistan Development Review, Spring, 1966.

Scitovsky, T.: "Economies of Scale, Competition and European Integration", American Economic Review, March, 1956.

Siegel, I.H.: "Next Tasks in the Measurement of Production and Productivity", IASI Estadistica, Sept.-Dec., 1955.

Sorrentino, Constance: "Comparing Employment Shifts in 10 Countries", Monthly Labour Review, Oct., 1971.

Stern, Robert, M.: "British-American Productivity and Comparative Costs in International Trade", Oxford Economic Papers, Oct., 1962.

_______. "The U.S. Tariff and the Efficiency of the U.S. Economy", American Economic Review, May, 1964.

Stykolt, S. and Eastman, H.C.: "A Model for the Study of Protected Oligopolies", Economic Journal, Jan., 1960.

Sutton ,G.D.: "Productivity in Canada", Canadian Journal of Economics and Political Science, May, 1953.

Taylor, G.W.: "Wages, Incentives and Productivity", Management Record, Aug., 1959.

Walker, C.R.: "American Productivity", Fortune, Jan., 1946.

_______. "American Productivity", Fortune, Feb., 1946.

Watanabe, T.: "Some Problems of the Infant Industry Argument for Protection", Osaka Economic Papers, July, 1965.

Winsten, C.B. and Hall, M.: "The Ambiguous Notion of Efficiency", Economic Journal, March, 1959.

Wonnacott, P.: "Canadian Protection, Content Provisions, Bladen Plan and Recent Tariff Changes", Canadian Journal of Economics and Political Science, Feb., 1965.

Young, J.H.: "Comments" (On H.C. Eastman: "The Canadian Tariff and Efficiency of the Canadian Economy"), American Economic Review, May, 1964.

Young, J.H.: "Comparative Economic Development: Canada and the United States", American Economic Review, May, 1955.

APPENDICES

APPENDIX TABLE A

SAMPLE INDUSTRIES OF CANADA: 1949-52 and 1962-65
CURRENT CANADIAN DOLLARS

		All Employees		Production Workers					
Industries		Total no. (000)	Total Earnings $ Mill.	Total no. (000)	Man-Hrs. Mill.	Wages $ Mill.	Value Added $ Mill.	Cost of Fuel Electricity and Material $ Mill.	Selling Value of Factory Shipments $ Mill.
EXPORT INDUSTRIES									
1. Flour Mills -	1949	5.0	12.0	3.7	8.5	8.3	28.3	216.8	245.3
	1950	4.9	11.9	3.6	8.4	8.2	31.8	215.3	247.1
S.I.C.	1951	4.9	13.6	3.6	8.4	9.4	37.1	243.8	280.9
124	1952	5.0	14.7	3.6	8.2	10.2	36.4	237.8	274.2
	1962	4.3	18.3	2.6	5.4	10.3	46.5	190.1	234.3
	1963	4.4	19.3	2.5	5.4	10.6	44.2	194.3	235.6
	1964	4.5	21.4	2.6	5.8	12.0	59.3	240.2	295.1
	1965	4.3	20.3	2.5	5.2	11.1	50.2	196.1	244.5
2. Agricultural Implements									
	1949	16.6	44.1	13.9	30.2	34.7	79.2	97.8	177.0
S.I.C.	1950	16.6	43.3	13.2	26.9	33.9	68.4	81.1	149.5
311	1951	17.2	52.2	14.0	28.2	41.5	72.7	98.5	171.2
	1952	18.0	62.4	14.8	31.1	49.7	93.8	112.0	205.8
	1962	10.0	48.9	7.3	15.2	34.9	69.1	78.5	140.8
	1963	11.2	58.4	8.6	18.4	44.1	100.0	99.5	182.8
	1964	12.5	68.4	9.6	20.5	51.5	122.2	137.7	244.0
	1965	13.7	75.6	10.6	22.3	56.3	135.4	165.3	285.1
3. Air craft and Parts									
	1949	10.7	27.4	7.5	16.8	17.9	35.7	25.4	61.1
S.I.C.	1950	10.5	30.2	7.0	16.3	18.7	35.8	19.3	55.2
321	1951	19.2	59.6	13.7	30.9	40.1	79.4	37.8	117.2
	1952	33.4	108.7	23.6	50.1	74.1	127.3	117.3	244.6
	1962	27.7	138.0	17.9	38.4	83.0	192.7	187.9	381.2
	1963	24.4	139.8	16.5	35.4	79.4	190.6	178.2	360.6
	1964	28.7	159.2	18.0	38.3	90.4	219.3	196.3	403.8
	1965	27.8	159.4	17.2	36.2	88.7	246.4	187.1	394.4
4. Pulp and Paper									
	1949	52.1	157.7	43.8	109.6	124.9	423.4	412.8	836.1
S.I.C.	1950	52.3	169.2	43.8	112.2	133.5	511.1	443.0	954.1
271	1951	57.3	213.2	47.9	121.6	169.0	679.3	558.6	1237.9
	1952	57.8	225.4	48.3	117.4	177.2	584.1	573.7	1157.9
	1962	64.6	354.2	53.7	177.8	281.9	886.1	838.6	1716.3
	1963	65.0	364.5	54.0	118.7	290.1	922.4	876.2	1793.2
	1964	67.7	394.1	56.4	125.3	316.0	1011.4	984.8	1984.1
	1965	69.9	423.7	58.1	120.0	339.4	1042.4	1075.6	2104.4

continued .....

APPENDIX TABLE A (continued)

5. Veneer and Plywood									
	1949	5.8	12.1	5.3	N.A.	10.5	22.8	20.2	43.1
S.I.C.	1950	6.5	14.2	6.0	N.A.	12.3	29.8	24.7	54.4
252	1951	7.2	18.2	6.6	N.A.	15.8	40.7	31.8	72.5
	1952	7.8	20.6	7.1	N.A.	17.9	38.4	34.7	73.1
	1962	12.1	47.2	10.8	--	40.1	74.6	90.8	166.0
	1963	13.0	52.3	11.7	--	44.9	86.5	105.5	190.9
	1964	13.8	58.1	12.4	--	49.9	94.8	112.9	206.5
	1965	14.3	64.7	12.8	--	55.3	102.1	120.7	222.4
6. Saw and Planning Mills									
	1949	72.8	183.1	60.0	90.8	150.0	338.4	433.2	771.8
S.I.C.	1950	79.5	151.8	64.2	123.7	124.9	307.5	364.6	662.0
2513	1951	83.5	176.6	67.5	127.4	146.5	345.4	440.8	706.1
	1952	91.9	134.6	65.1	156.3	111.7	247.6	299.3	556.9
	1962	50.0	178.0	40.3	85.7	146.4	310.0	397.4	699.2
	1963	51.7	196.5	41.5	88.4	159.3	348.9	443.1	782.6
	1964	52.4	209.2	43.6	93.8	173.7	376.3	500.7	855.3
	1965	52.7	223.9	44.4	95.5	188.3	389.1	521.8	896.2
7. Distilleries									
	1949	4.0	9.9	3.1	6.1	6.6	47.0	29.9	76.9
S.I.C.	1950	4.1	10.6	3.2	6.4	7.1	56.4	32.0	88.4
143	1951	4.6	12.5	3.7	7.3	9.0	68.1	45.6	113.7
	1952	4.8	14.1	3.8	7.0	10.0	70.7	45.3	116.0
	1962	4.7	24.4	2.9	6.0	13.2	115.8	58.3	172.7
	1963	4.6	24.8	2.7	5.7	13.1	129.1	62.7	187.2
	1964	4.7	26.4	2.7	5.8	14.0	144.7	68.2	207.8
	1965	5.0	30.2	2.9	6.3	16.0	157.1	74.9	228.4
8. Plastic & Synthetic Resins									
	1949	1.3	3.5	0.8	N.A.	2.0	9.7	11.4	21.0
S.I.C.	1950	1.4	4.0	0.9	N.A.	2.4	16.1	14.6	30.7
373	1951	1.6	5.4	1.0	N.A.	3.1	18.1	21.3	39.4
	1952	1.9	6.5	1.2	N.A.	3.8	15.1	19.5	34.6
	1962	3.5	20.1	2.0	--	10.5	64.1	69.5	128.1
	1963	3.6	21.0	2.0	--	11.1	67.9	74.4	139.1
	1964	3.8	22.7	2.2	--	12.1	81.0	80.3	155.7
	1965	3.8	23.9	2.2	--	12.8	75.2	84.4	155.5
DOMESTIC INDUSTRIES									
1. Soft Drinks									
	1949	7.8	14.6	6.0	N.A.	9.9	51.7	34.0	85.7
S.I.C.	1950	7.7	15.6	5.8	N.A.	10.4	52.0	35.2	87.1
141	1951	7.4	16.0	5.4	N.A.	10.2	55.1	35.4	90.5
	1952	7.6	10.4	5.4	N.A.	11.6	66.9	38.1	105.1

APPENDIX TABLE A (continued)

	1962	13.5	50.9	5.3	--	19.6	121.0	60.7	180.3
	1963	13.5	53.8	5.2	--	18.2	129.7	71.3	203.6
	1964	13.6	57.5	5.2	--	19.2	141.0	77.0	218.5
	1965	13.7	61.6	5.2	--	20.2	147.3	78.1	225.7
2. Bakeries									
	1949	31.8	57.5	26.9	60.2	47.0	94.7	109.0	203.7
S.I.C.	1950	31.1	60.1	26.4	60.0	49.2	98.4	116.2	214.6
129	1951	32.2	67.1	27.4	60.7	55.2	116.4	129.0	245.3
	1952	33.0	74.2	28.2	62.5	61.3	129.7	130.4	260.2
	1962	34.4	113.3	17.0	37.8	55.9	201.7	185.4	380.4
	1963	33.9	115.3	16.4	36.9	57.6	203.6	198.7	394.5
	1964	34.5	123.5	17.4	38.2	64.4	220.7	215.5	427.7
	1965	35.2	133.2	17.7	38.9	66.4	235.8	218.4	444.0
3. Printing and Publishing									
	1949	30.9	70.5	14.6	31.3	35.7	135.0	68.0	202.9
S.I.C.	1950	31.4	75.9	14.8	29.8	36.7	145.8	69.6	216.0
289	1951	31.9	84.3	15.2	32.0	42.6	156.5	78.1	234.6
	1952	32.4	93.8	15.5	31.6	47.1	174.6	85.4	259.9
	1962	32.5	157.9	15.5	31.1	77.5	287.3	99.2	385.8
	1963	32.4	161.8	15.4	30.7	78.2	289.6	100.1	389.7
	1964	32.1	163.6	15.0	30.1	79.3	305.1	102.8	406.7
	1965	33.5	--	15.4	30.9	--	--	--	--
4. Leather Tanneries									
	1949	4.6	10.3	4.0	N.A.	8.4	15.9	38.4	54.3
S.I.C.	1950	4.4	10.3	3.9	N.A.	8.3	17.1	42.0	50.1
172	1951	4.1	10.3	3.5	N.A.	8.1	12.5	45.4	57.9
	1952	3.9	10.8	3.3	N.A.	8.5	17.6	29.1	46.6
	1962	3.5	14.2	3.2	--	11.7	19.9	39.5	60.4
	1963	3.4	14.0	3.0	--	11.5	23.1	33.0	57.8
	1964	3.5	15.0	3.1	--	12.3	24.4	35.7	59.3
	1965	3.4	14.9	3.0	--	12.3	22.6	37.3	60.2
5. Lime Manufacturers									
	1949	1.1	2.6	1.0	N.A.	2.3	8.3	3.5	11.9
S.I.C.	1950	1.2	2.8	1.0	N.A.	2.5	8.8	4.1	12.8
343	1951	1.1	3.1	1.0	N.A.	2.8	10.4	4.3	14.7
	1952	1.0	3.2	0.9	N.A.	2.8	9.8	4.4	14.2
	1962	0.9	4.0	0.8	--	3.2	9.8	4.7	14.5
	1963	0.9	4.1	0.7	--	3.1	10.4	4.6	14.9
	1964	0.8	3.9	0.6	--	2.8	10.5	4.9	15.4
	1965	0.8	3.9	0.6	--	3.1	10.8	5.3	16.2

APPENDIX TABLE A (continued)

6. Vegetable oil Mills									
	1949	0.8	2.1	0.6	N.A.	1.3	9.1	42.1	51.2
S.I.C.	1950	0.8	2.2	0.5	N.A.	1.3	6.3	40.7	47.0
135	1951	0.8	2.3	0.5	N.A.	1.5	10.8	49.3	60.2
	1952	0.7	2.4	0.5	N.A.	1.5	6.9	45.1	51.9
	1962	0.6	2.8	0.4	--	1.6	8.6	60.7	69.4
	1963	0.6	3.0	0.4	--	1.8	10.7	70.4	80.4
	1964	0.6	2.9	0.4	--	1.8	10.6	73.8	83.4
	1965	0.6	3.1	0.4	--	1.9	10.9	84.5	95.0
7. Cotton and Jute Bags									
	1949	1.6	2.2	1.0	N.A.	1.4	4.4	23.3	27.8
S.I.C.	1950	1.3	2.3	1.1	N.A.	1.6	4.9	28.0	33.1
223	1951	1.3	2.5	1.1	N.A.	1.7	4.7	34.0	38.7
	1952	1.2	2.5	1.0	N.A.	1.7	3.1	28.0	30.2
	1962	1.1	3.6	0.9	--	2.3	7.9	23.1	30.6
	1963	1.0	3.5	0.9	--	2.2	7.4	23.5	30.4
	1964	1.1	3.8	0.9	--	2.5	7.7	23.5	30.8
	1965	1.1	3.9	0.9	--	2.6	8.3	23.4	31.2
8. Cement Mfg.									
	1949	1.7	4.8	1.6	N.A.	4.4	21.1	13.9	35.1
S.I.C.	1950	1.8	5.3	1.7	N.A.	4.9	23.1	15.1	38.2
341	1951	1.9	6.3	1.8	N.A.	5.8	26.6	16.1	43.0
	1952	2.3	7.9	2.1	N.A.	7.2	32.7	18.3	51.0
	1962	3.7	20.6	2.6	--	13.7	84.2	33.9	116.7
	1963	3.6	20.6	2.5	--	13.5	87.9	34.2	122.2
	1964	3.6	21.3	2.5	--	13.9	95.1	35.9	133.3
	1965	3.8	24.4	2.6	--	16.2	104.6	42.2	144.8
9. Animal oils & Fats									
	1949	0.2	0.5	0.2	N.A.	0.4	0.8	1.0	1.9
S.I.C.	1950	0.3	0.7	0.2	N.A.	0.5	1.1	2.0	3.1
101	1951	0.3	1.0	0.3	N.A.	0.8	1.7	2.8	4.6
	1952	0.3	1.0	0.5	N.A.	0.7	1.5	2.0	3.4
	1962	0.5	2.0	0.4	--	1.3	5.3	5.2	10.1
	1963	0.5	2.3	0.3	--	1.3	7.1	6.4	13.0
	1964	0.6	2.9	0.4	--	1.6	9.2	8.9	17.7
	1965	0.6	3.4	0.4	--	1.9	10.2	11.0	20.9
10. Petroleum & Coal Products									
	1949	14.6	39.8	10.6	22.7	27.9	117.8	415.9	533.7
S.I.C.	1950	15.1	44.4	10.4	22.3	29.0	144.4	471.6	616.1
365,369	1951	15.6	51.9	10.5	21.9	33.4	179.9	529.7	709.6
	1952	16.9	63.6	11.3	23.4	40.6	225.8	554.6	780.4

APPENDIX TABLE A (Continued)

	1962	11.1	67.7	7.5	16.2	43.6	286.7	1014.7	1294.1
	1963	10.7	67.0	7.3	15.7	43.4	289.5	1091.5	1364.7
	1964	10.6	69.7	7.2	15.6	44.8	292.3	1126.6	1418.5
	1965	9.9	68.9	6.8	14.5	43.4	272.0	1167.9	1430.6
11. Fabricated Structural Metal									
	1949	7.1	18.6	5.6	12.0	13.0	44.0	31.7	75.7
S.I.C.	1950	7.4	22.4	5.6	12.8	15.4	44.4	37.7	82.0
302	1951	8.6	28.3	6.6	15.1	20.2	59.9	49.8	109.7
	1952	10.8	37.4	8.6	17.9	27.2	76.3	63.4	139.7
	1962	14.8	77.5	10.8	22.3	53.2	132.0	134.4	255.0
	1963	14.2	77.6	10.2	21.1	52.1	130.2	125.8	245.2
	1964	14.6	82.1	10.7	21.7	56.7	143.2	147.0	278.1
	1965	18.1	106.1	13.2	27.7	74.4	207.6	185.0	372.3
PROTECTED INDUSTRIES									
1. Tobacco Products									
	1949	10.7	21.9	9.2	20.2	17.4	58.5	113.8	172.4
S.I.C.	1950	10.3	22.6	8.8	18.7	17.7	65.2	123.1	188.3
151,153	1951	9.8	24.4	8.4	17.1	19.0	59.0	120.1	179.2
	1952	9.3	25.4	7.9	16.0	19.9	70.8	145.1	215.9
	1962	11.1	47.6	8.4	17.0	32.0	126.8	213.5	346.5
	1963	11.0	48.0	8.6	16.8	33.9	135.6	222.4	356.0
	1964	10.9	49.6	8.2	16.0	34.3	139.2	220.2	348.8
	1965	10.3	50.8	7.9	15.6	35.3	160.0	220.4	379.8
2. Fur Goods Industries									
	1949	6.7	14.5	5.0	N.A.	9.8	23.4	37.5	61.0
S.I.C.	1950	6.3	14.6	4.7	N.A.	9.8	23.4	38.5	61.9
276	1951	6.1	14.4	4.5	N.A.	9.7	22.9	38.3	61.2
	1952	6.0	15.4	4.4	N.A.	10.4	24.1	42.1	66.2
	1962	3.6	12.7	2.6	--	9.2	22.4	36.6	58.1
	1963	3.3	12.4	2.3	--	9.0	22.4	28.6	59.9
	1964	3.3	13.1	2.4	--	9.6	24.2	39.9	62.5
	1965	3.1	13.1	2.2	--	9.6	24.6	41.4	64.7
3. Gypsum Products									
	1949	1.0	2.2	0.9	N.A.	1.9	7.6	8.1	15.7
S.I.C.	1950	1.2	2.8	0.9	N.A.	1.9	9.2	8.7	17.9
275	1951	1.1	3.3	0.9	N.A.	2.2	9.6	9.3	18.9
	1952	1.2	3.7	0.9	N.A.	2.4	9.4	8.9	18.4
	1962	1.5	6.5	1.2	--	4.7	21.4	14.7	35.7
	1963	1.5	6.6	1.1	--	4.7	22.5	15.8	37.6
	1964	1.4	7.1	1.1	--	5.4	24.6	16.0	40.2
	1965	1.4	7.4	1.1	--	5.7	25.3	17.1	41.8

Broom, Brush and Mops									
	1949	2.4	4.2	1.9	N.A.	2.9	8.4	122.1	14.8
S.I.C.	1950	2.4	4.5	1.8	N.A.	2.9	8.7	131.5	16.2
383	1951	2.3	4.9	1.8	N.A.	3.2	8.4	142.5	17.7
	1952	2.2	4.8	1.7	N.A.	3.2	8.6	140.7	16.7
	1962	2.4	9.2	1.6	--	4.1	15.9	12.2	25.5
	1963	2.5	10.2	1.7	--	4.5	18.6	13.1	28.7
	1964	2.6	11.3	1.7	--	5.0	20.2	14.3	30.9
	1965	2.9	12.2	1.7	--	5.1	20.7	15.0	33.4
5. Knitting Mills									
	1949	26.4	43.9	23.6	47.7	35.3	76.7	66.3	143.0
S.I.C.	1950	25.3	44.1	22.3	45.2	34.8	75.9	70.4	146.2
231,239	1951	25.2	49.0	22.3	45.7	39.3	83.5	86.2	169.7
	1952	23.2	49.0	20.4	41.7	38.7	80.6	82.2	162.8
	1962	22.6	61.9	19.2	40.6	47.4	103.2	133.4	233.5
	1963	22.3	64.5	19.5	41.4	49.9	110.3	146.1	254.6
	1964	22.7	70.2	19.8	42.7	54.6	122.9	159.9	294.3
	1965	23.8	76.4	20.9	44.6	59.7	135.0	176.6	308.9
6. Leather Gloves & Mittens									
	1949	2.1	2.8	1.8	N.A.	2.1	4.5	9.8	9.4
S.I.C.	1950	2.1	2.8	1.9	N.A.	2.2	4.0	5.4	9.4
175	1951	2.3	3.5	2.0	N.A.	2.7	5.5	7.3	12.8
	1952	2.2	3.4	1.9	N.A.	2.7	5.4	6.3	11.8
	1962	1.7	4.0	1.2	--	3.0	6.2	5.3	11.2
	1963	1.6	4.2	1.3	--	3.2	6.8	5.7	12.3
	1964	1.7	4.5	1.4	--	3.5	7.6	6.3	13.3
	1965	1.8	4.9	1.4	--	3.7	7.4	6.9	13.7
7. Sugar Refineries									
	1949	3.6	8.8	3.1	N.A.	7.0	23.7	93.0	116.8
S.I.C.	1950	3.9	9.5	3.4	N.A.	7.5	31.9	112.9	144.9
133	1951	3.6	10.3	3.0	N.A.	7.9	28.7	110.3	139.1
	1952	3.5	11.0	2.9	N.A.	8.5	33.0	96.0	129.0
	1962	3.1	15.2	2.4	--	10.5	49.5	93.8	141.2
	1963	3.2	16.2	2.5	--	11.1	60.0	185.2	232.7
	1964	3.2	16.9	2.5	--	11.3	46.8	171.5	228.3
	1965	3.2	17.2	2.4	--	11.2	51.9	98.4	152.8
8. Medicine & Pharmacy									
	1949	7.7	16.1	4.6	9.4	7.7	48.0	23.5	71.5
S.I.C.	1950	7.5	16.6	4.6	9.2	8.0	51.1	25.3	76.4
374	1951	7.5	18.9	4.5	9.5	9.1	60.1	29.1	89.3
	1952	7.5	20.5	4.4	8.8	9.4	59.9	28.2	88.0

APPENDIX TABLE A (continued)

	1962	10.1	48.5	4.2	9.1	14.3	129.5	52.8	175.2
	1963	10.4	52.7	4.2	9.1	15.0	145.3	55.7	193.7
	1964	10.7	56.1	4.2	8.7	15.8	152.1	63.5	207.1
	1965	11.2	62.1	4.4	9.1	17.3	171.4	78.9	237.8
9. Furniture Industry									
	1949	26.9	53.6	22.9	49.0	42.1	85.3	71.8	157.1
S.I.C.	1950	27.3	57.1	23.1	49.4	44.5	90.6	81.7	172.3
261,267,266	1951	27.3	61.4	22.7	48.7	47.2	98.5	92.4	190.9
	1952	27.2	65.9	22.5	47.8	50.2	106.1	98.2	204.3
	1962	34.6	121.1	26.7	58.5	88.0	194.4	185.1	373.0
	1963	36.0	129.8	27.8	60.9	94.4	210.5	201.9	406.5
	1964	38.1	143.5	29.5	64.6	105.1	234.1	228.6	453.9
	1965	40.5	159.1	31.7	68.8	117.6	263.7	253.7	508.1
10. Silver & Jewellery									
	1949	6.2	13.2	5.1	N.A.	9.9	23.6	27.2	50.8
S.I.C.	1950	6.3	13.8	5.1	N.A.	10.2	22.8	30.5	53.3
382	1951	5.7	13.3	4.6	N.A.	9.7	20.7	29.7	50.4
	1952								
	1962	5.0	18.1	3.4	--	11.6	30.2	35.6	63.3
	1963	5.0	19.0	3.5	--	12.1	31.7	39.8	69.0
	1964	5.1	20.5	3.7	--	13.3	34.6	41.2	73.4
	1965	5.2	22.0	3.8	--	14.4	38.3	47.0	82.4
11. Motor Vehicle & Parts									
	1949	44.9	122.3	41.2	75.6	95.3	263.2	344.1	657.3
S.I.C.	1950	49.1	150.5	40.5	90.6	117.8	386.3	516.1	902.4
323,325	1951	51.7	166.6	42.7	90.6	130.5	388.1	617.9	1006.0
	1952	52.9	186.2	43.6	90.6	144.0	394.3	649.8	1044.1
	1962	49.2	283.6	35.5	80.3	192.2	619.9	1053.7	1616.1
	1963	57.2	345.9	41.8	94.8	240.5	793.5	1355.9	2061.2
	1964	65.5	402.7	48.7	108.2	281.5	833.9	1574.6	2306.8
	1965	74.4	499.9	55.7	126.4	356.4	1066.1	1941.6	2875.9

Source: D.B.S.: General Review of Manufacturing Industries of Canada, 31-201

D.B.S.: Manufacturing Industries of Canada: Summary for Canada, 31-203.

D.B.S.: Annual Census of Manufactures, Various Industries, 1962 - 65.

APPENDIX TABLE B

SAMPLE INDUSTRIES OF THE UNITED STATES: 1949-52 AND 1962-65: CURRENT U.S. DOLLARS

Industries		All Employees		Production Workers			Value Added $ Mill.	Cost of Fuel, Electricity and Material $ Mill.	Selling Value of Factory Shipments $ Mill.
		Total no. (000)	Total Earning $ Mill.	Total no. (000)	Man-Hours Mill.	Wages $ Mill.			
EXPORT INDUSTRIES									
1. Flour Mills									
	1949	35.7	N.A.	27.4	61.0	N.A.	284.8	1518.3	1803.3
S.I.C.	1950	34.4	118.0	26.4	57.1	51.5	340.6	1530.6	1877.2
2041	1951	34.7	128.4	26.5	59.2	90.1	378.6	1795.0	2173.6
	1952	34.7	134.8	26.1	59.8	95.7	386.1	1843.1	2229.1
	1962	25.7	149.5	18.9	43.8	100.0	441.3	1929.4	2369.4
	1963	22.4	137.7	16.4	38.4	94.9	373.1	1860.4	2176.5
	1964	21.9	138.5	16.0	36.9	93.3	399.8	1791.3	2193.0
	1965	20.9	133.0	15.4	34.2	89.9	402.8	1742.5	2145.2
2. Agricultural Implements									
	1949	171.3	N.A.	136.9	268.1	N.A.	1011.5	1266.0	2277.5
S.I.C.	1950	166.3	564.4	131.6	252.8	416.2	1070.8	1266.0	2150.0
3522	1951	185.6	703.8	147.5	286.9	531.2	1271.6	2171.6	2924.3
	1952	177.3	722.1	137.0	266.9	523.9	1327.6	1665.4	2992.9
	1962	106.2	618.2	77.1	151.7	413.0	1205.9	1335.0	2482.0
	1963	112.6	689.1	84.7	168.9	476.8	1328.4	1540.1	2842.4
	1964	118.6	769.9	90.2	181.9	538.8	1526.1	1745.2	3204.1
	1965	123.2	817.8	93.9	188.5	572.3	1620.7	1888.9	3464.1
3. Air craft & Parts									
	1949	262.6	N.A.	196.7	402.8	N.A.	1344.1	1115.9	2460.0
S.I.C.	1950	289.5	1132.0	211.5	451.0	760.2	1550.6	1163.4	2714.0
372	1951	488.2	2102.9	362.7	798.3	1460.1	2663.0	1997.1	4660.0
	1952	688.9	3140.3	507.1	1091.9	2137.0	4404.8	3128.2	7533.0
	1962	715.2	5334.0	401.6	841.2	2530.2	7466.5	6315.4	13773.4
	1963	679.4	5253.7	390.3	810.5	2586.0	7867.3	6399.7	13776.4
	1964	640.8	5220.2	359.9	755.4	2602.5	7825.1	5951.1	13771.2
	1965	642.3	5241.0	374.9	781.7	2595.4	8492.7	6261.4	14527.9
4. Pulp and Paper									
	1949	191.8	N.A.	165.6	360.8	N.A.	1378.1	2084.1	3462.2
S.I.C.	1950	195.2	722.6	170.9	385.8	590.4	1745.8	2767.4	3966.8
2611,2621,	1951	206.7	827.3	177.6	400.3	670.2	2123.5	3305.7	5429.2
2631	1952	203.9	850.5	174.1	385.5	687.1	1995.5	3074.2	5069.7

	1962	204.8	1335.7	166.9	366.5	1026.7	3095.7	3288.6	6345.4
	1963	208.4	1414.3	169.2	372.9	1090.0	3339.2	3454.5	6749.9
	1964	209.2	1481.6	170.2	377.9	1140.2	3576.9	3620.4	7153.9
	1965	210.9	1538.2	170.5	382.5	1180.6	3769.0	3849.4	7599.3
5. Veneer and Plywood									
	1949	35.7	N.A.	32.8	68.8	N.A.	219.8	168.0	425.5
S.I.C.	1950	44.9	141.7	41.6	90.4	123.5	253.7	247.4	501.1
2432	1951	49.4	166.8	46.0	96.9	145.6	288.7	275.1	555.9
	1952	47.9	169.0	44.4	93.0	147.0	247.0	281.7	531.0
	1962	68.0	311.7	60.6	126.2	266.5	492.1	779.5	1269.2
	1963	66.1	324.7	60.5	124.9	281.3	559.2	837.2	1339.6
	1964	68.8	365.7	62.8	131.9	315.9	618.1	894.9	1497.4
	1965	71.7	385.7	65.2	138.1	330.3	638.1	953.4	1588.4
6. Saw and Planning Mills									
	1949	378.4	N.A.	356.6	621.4	N.A.	1276.2	1203.7	2479.9
S.I.C.	1950	458.5	962.1	431.0	751.0	860.7	1829.9	1691.9	3521.7
242	1951	424.0	996.3	398.2	693.3	879.9	1825.2	1745.2	3280.6
	1952	414.9	1052.7	389.9	687.7	934.2	1804.9	1790.5	3211.8
	1962	242.7	882.8	222.0	436.2	756.3	1484.5	1899.3	3322.1
	1963	242.9	935.7	218.6	428.3	805.8	1572.5	1992.9	3597.6
	1964	235.9	1037.6	211.0	422.0	843.1	1734.5	2086.6	3813.5
	1965	238.8	1012.4	215.0	427.5	848.4	1634.5	2157.3	3851.2
7. Distilleries									
	1949	22.7	N.A.	17.7	36.4	N.A.	403.7	445.2	848.9
S.I.C.	1950	23.8	81.8	19.2	38.8	60.5	453.5	509.0	962.5
2085	1951	22.8	94.6	17.9	39.4	67.9	412.9	529.6	938.3
	1952	19.0	80.8	14.5	31.4	56.3	351.4	413.6	755.1
	1962	18.7	113.3	14.5	30.6	80.4	451.2	483.3	923.6
	1963	18.0	110.2	14.3	28.1	80.2	623.7	479.0	1090.5
	1964	17.8	115.6	14.2	28.0	84.1	660.2	474.7	1133.8
	1965	19.0	126.1	14.9	29.6	91.6	723.3	577.1	1301.7
8. Plastic & Synthetic Resins									
	1949	29.2	N.A.	21.4	44.4	N.A.	267.1	324.9	592.1
S.I.C.	1950	30.0	114.6	22.3	46.1	76.5	385.8	406.0	791.8
2821	1951	37.3	156.0	27.5	56.3	103.1	472.6	607.9	1128.9
	1952	37.6	170.2	27.0	57.3	110.1	476.6	603.6	1136.9
	1962	57.7	401.5	39.5	82.2	245.0	1102.0	1279.2	2372.1
	1963	61.3	437.6	41.5	87.1	264.5	1202.3	1352.2	2571.5
	1964	62.6	461.5	42.0	88.9	278.2	1347.0	1425.3	2773.9
	1965	65.5	495.2	44.3	92.9	300.0	1474.5	1623.8	3096.2

DOMESTIC INDUSTRIES

1. Soft Drinks									
	1949	93.3	N.A.	41.4	87.8	N.A.	476.1	390.6	866.8
S.I.C.	1950	95.2	257.4	42.8	98.4	90.3	491.8	400.1	891.9
2086	1951	84.9	242.6	36.8	71.0	78.9	508.6	368.4	876.9
	1952	83.9	266.1	36.3	71.9	83.6	541.0	393.1	934.1
	1962	105.4	515.3	41.4	92.9	158.3	1127.9	902.7	2080.9
	1963	106.9	537.7	40.9	86.6	164.7	1233.6	962.3	2210.9
	1964	111.1	582.6	40.9	89.2	172.8	1387.8	1027.8	2408.8
	1965	113.4	611.2	41.8	89.6	187.5	1352.8	1128.5	2476.2
2. Bakeries									
	1949	246.0	N.A.	152.3	325.8	N.A.	1272.8	1290.6	2563.4
S.I.C.	1950	246.5	781.5	151.7	323.9	406.3	1313.4	1291.2	2604.6
2051	1951	258.0	869.0	156.0	328.4	448.0	1454.4	1468.3	2922.8
	1952	264.5	941.0	158.3	330.9	485.4	1572.3	1500.6	3073.0
	1962	254.2	1321.0	137.2	286.6	641.1	2333.5	2106.6	4446.3
	1963	237.0	1300.3	129.9	267.6	645.7	2403.8	2132.8	4507.0
	1964	234.4	1330.7	127.3	272.5	658.0	2492.2	2159.0	4618.2
	1965	234.5	1353.0	129.7	265.5	671.9	2509.5	2204.3	4714.9
3. Printing & Publishing									
	1949	384.5	N.A.	179.5	379.7	N.A.	2684.9	2071.2	4810.9
S.I.C.	1950	395.4	1498.2	190.7	404.5	706.0	2836.7	2123.8	6059.7
2711,2721	1951	333.3	1332.0	166.2	339.5	640.8	2484.8	2097.5	5935.2
273,2741	1952	335.7	1356.0	172.9	363.9	698.3	2444.4	1945.5	5725.8
	1962	485.3	2840.9	226.4	420.2	1254.7	5898.5	3051.8	8886.4
	1963	479.6	2871.0	223.6	418.4	1273.6	6157.9	3212.8	9250.1
	1964	496.9	3086.4	232.0	451.1	1363.2	6654.6	3373.8	10023.7
	1965	499.6	3193.0	229.9	439.0	1402.6	7044.3	3724.2	10478.3
4. Leather Tanneries									
	1949	50.2	N.A.	44.6	88.8	N.A.	291.5	587.4	878.9
S.I.C.	1950	49.6	164.9	44.9	89.1	134.8	318.5	631.5	950.0
3111	1951	45.1	159.5	40.5	79.6	129.8	286.2	697.1	983.3
	1952	44.0	162.7	39.5	78.2	134.7	285.5	510.6	796.1
	1962	31.7	157.2	27.3	53.3	123.1	263.6	491.0	765.9
	1963	31.4	163.3	27.3	54.6	129.8	273.1	486.2	758.4
	1964	31.2	169.0	27.1	54.6	131.5	300.2	481.3	783.6
	1965	31.7	178.6	27.6	56.3	137.8	332.7	531.5	850.3
5. Lime Manufacturers									
	1949	7.5	N.A.	6.3	13.8	N.A.	40.7	42.4	83.1
S.I.C.	1950	7.3	23.0	6.3	14.0	18.6	48.4	42.7	91.1
3274	1951	7.9	26.3	6.8	15.5	21.2	55.9	49.4	105.2
	1952	8.0	26.6	6.9	14.8	21.2	54.9	49.7	104.6

APPENDIX TABLE B (continued)

<u>DOMESTIC INDUSTRIES</u>

1. Soft Drinks									
	1949	93.3	N.A.	41.4	87.8	N.A.	476.1	390.6	866.8
S.I.C.	1950	95.2	257.4	42.8	98.4	90.3	491.8	400.1	891.9
2086	1951	84.9	242.6	36.8	71.0	78.9	508.6	368.4	876.9
	1952	83.9	266.1	36.3	71.9	83.6	541.0	393.1	934.1
	1962	105.4	515.3	41.4	92.9	158.3	1127.9	902.7	2080.9
	1963	106.9	537.7	40.9	86.6	164.7	1233.6	962.3	2210.9
	1964	111.1	582.6	40.9	89.2	172.8	1387.8	1027.8	2408.8
	1965	113.4	611.2	41.8	89.6	187.5	1352.8	1128.5	2476.2
2. Bakeries									
	1949	246.0	N.A.	152.3	325.8	N.A.	1272.8	1290.6	2563.4
S.I.C.	1950	246.5	781.5	151.7	323.9	406.3	1313.4	1291.2	2604.6
2051	1951	258.0	869.0	156.0	328.4	448.0	1454.4	1468.3	2922.8
	1952	264.5	941.0	158.3	330.9	485.4	1572.3	1500.6	3073.0
	1962	254.2	1321.0	137.2	286.6	641.1	2333.5	2106.6	4446.3
	1963	237.0	1300.3	129.9	267.6	645.7	2403.8	2132.8	4507.0
	1964	234.4	1330.7	127.3	272.5	658.0	2492.2	2159.0	4618.2
	1965	234.5	1353.0	129.7	265.5	671.9	2509.5	2204.3	4714.9
3. Printing & Publishing									
	1949	384.5	N.A.	179.5	379.7	N.A.	2684.9	2071.2	4810.9
S.I.C.	1950	395.4	1498.2	190.7	404.5	706.0	2836.7	2123.8	6059.7
2711,2721	1951	333.3	1332.0	166.2	339.5	640.8	2484.8	2097.5	5935.2
273,2741	1952	335.7	1356.0	172.9	363.9	698.3	2444.4	1945.5	5725.8
	1962	485.3	2840.9	226.4	420.2	1254.7	5898.5	3051.8	8886.4
	1963	479.6	2871.0	223.6	418.4	1273.6	6157.9	3212.8	9250.1
	1964	496.9	3086.4	232.0	451.1	1363.2	6654.6	3373.8	10023.7
	1965	499.6	3193.0	229.9	439.0	1402.6	7044.3	3724.2	10478.3
4. Leather Tanneries									
	1949	50.2	N.A.	44.6	88.8	N.A.	291.5	587.4	878.9
S.I.C.	1950	49.6	164.9	44.9	89.1	134.8	318.5	631.5	950.0
3111	1951	45.1	159.5	40.5	79.6	129.8	286.2	697.1	983.3
	1952	44.0	162.7	39.5	78.2	134.7	285.5	510.6	796.1
	1962	31.7	157.2	27.3	53.3	123.1	263.6	491.0	765.9
	1963	31.4	163.3	27.3	54.6	129.8	273.1	486.2	758.4
	1964	31.2	169.0	27.1	54.6	131.5	300.2	481.3	783.6
	1965	31.7	178.6	27.6	56.3	137.8	332.7	531.5	850.3
5. Lime Manufacturers									
	1949	7.5	N.A.	6.3	13.8	N.A.	40.7	42.4	83.1
S.I.C.	1950	7.3	23.0	6.3	14.0	18.6	48.4	42.7	91.1
3274	1951	7.9	26.3	6.8	15.5	21.2	55.9	49.4	105.2
	1952	8.0	26.6	6.9	14.8	21.2	54.9	49.7	104.6

10. Petroleum & Coal Products									
	1949	208.4	N.A.	166.7	335.6	N.A.	1743.8	7615.8	9317.0
S.I.C.	1950	206.8	850.3	161.9	330.2	623.8	2138.6	9103.5	11152.7
29	1951	218.1	970.1	169.9	347.0	712.1	2686.6	10856.0	13453.3
	1952	220.2	1035.7	170.3	338.4	751.1	2618.9	11154.4	13682.0
	1962	154.3	1096.9	110.0	221.3	724.2	3439.0	13786.5	17192.5
	1963	153.5	1133.8	109.4	216.7	745.1	3713.2	14178.3	17994.7
	1964	148.4	1127.1	105.4	213.6	743.2	3780.4	14570.2	18357.5
	1965	143.5	1106.9	102.3	203.0	730.0	4154.4	14924.3	19067.4
11. Fabricated Structural Metal									
	1949	212.9	N.A.	166.4	338.4	N.A.	1278.3	1268.3	2488.1
S.I.C.	1950	229.5	842.9	179.3	370.2	581.8	1556.8	1457.5	3014.3
344	1951	244.9	1014.9	190.8	399.3	707.4	1814.0	1812.4	3626.4
	1952	259.9	1125.8	202.0	420.1	785.9	1966.2	1798.5	3764.7
	1962	320.7	1880.8	235.1	489.7	1217.7	2982.2	3746.5	6788.6
	1963	325.5	1922.7	242.4	490.8	1281.1	3219.8	3942.8	7069.9
	1964	330.9	2028.6	244.9	503.6	1345.9	3458.6	4139.0	7550.7
	1965	344.6	2173.5	255.6	532.5	1435.6	3976.2	4541.6	8345.4
PROTECTED INDUSTRIES									
1. Tobacco Products									
	1949	100.7	N.A.	92.8	173.9	N.A.	778.6	1090.6	1758.9
S.I.C.	1950	92.3	212.5	84.6	159.7	177.3	806.1	1108.3	1812.1
21	1951	93.8	230.2	85.8	161.8	192.3	856.4	2234.8	3091.3
	1952	93.2	240.7	85.5	162.8	201.7	867.6	2282.6	3150.2
	1962	77.3	335.2	67.3	134.0	265.6	1644.9	2894.3	4536.0
	1963	77.3	330.5	68.6	132.0	271.5	1680.6	2863.7	4520.0
	1964	78.8	352.9	70.2	138.3	290.7	1772.1	2833.0	4651.7
	1965	75.1	352.9	66.5	125.7	286.9	1786.3	2891.6	4658.1
2. Fur Goods Industries									
	1949	142.6	N.A.	118.0	188.8	N.A.	95.5	152.8	248.3
S.I.C.	1950	N.A.	N.A.	N.A.	N.A.	N.A.	N.A	N.A.	N.A.
2371	1951	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	1952	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	1962	9.6	60.0	8.0	15.0	45.5	113.3	290.3	402.7
	1963	9.3	56.0	7.7	14.5	45.6	110.6	260.1	334.4
	1964	9.8	62.5	7.9	15.1	49.1	103.6	229.9	336.8
	1965	8.9	57.6	7.7	14.0	45.0	113.1	234.5	344.1
3. Gypsum Products									
	1949	8.7	N.A.	7.4	16.8	N.A.	92.2	74.6	166.8
S.I.C.	1950	9.0	33.4	8.0	19.6	28.7	124.1	79.5	203.6
3275	1951	9.6	37.1	8.3	19.2	29.6	120.9	113.0	224.0
	1952	8.6	35.8	7.2	18.1	29.4	119.9	103.7	223.5

	1962	6.9	38.6	5.7	11.4	29.2	96.8	60.3	155.9
	1963	6.8	38.9	5.4	11.4	28.5	95.1	72.1	164.4
	1964	7.0	41.8	5.8	12.4	31.4	103.2	84.0	187.2
	1965	7.1	43.9	5.8	12.5	32.4	109.9	84.3	192.3
6. Vegetable Oil Mills									
	1949	24.0	N.A.	19.5	49.5	N.A.	216.4	990.6	1207.1
S.I.C.	1950	23.9	68.4	19.7	49.2	50.9	251.8	990.9	2142.7
2091,2092,	1951	21.8	67.0	17.5	43.6	48.2	228.5	1154.1	1382.6
2093	1952	21.9	71.2	17.5	45.4	52.1	182.8	1216.3	1399.1
	1962	17.4	86.1	13.2	30.3	56.9	258.8	2609.0	2166.1
	1963	16.8	89.6	12.6	29.8	59.8	295.7	2550.5	2262.7
	1964	16.2	92.1	12.3	29.5	61.0	286.0	2092.1	2367.3
	1965	16.7	92.4	12.6	29.6	61.7	301.9	2238.4	2527.7
7. Cotton and Jute Bags									
	1949	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
S.I.C.	1950	16.5	41.1	14.1	28.3	29.9	81.1	277.9	359.1
2393	1951	17.1	46.9	14.5	28.4	32.8	101.4	328.4	429.8
	1952	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
	1962	9.1	34.8	7.9	14.8	24.5	70.3	161.7	229.2
	1963	7.2	28.3	6.1	11.9	20.7	51.5	143.9	200.4
	1964	7.0	27.0	5.9	11.8	19.7	56.0	130.6	183.4
	1965	6.6	26.6	5.6	11.3	18.8	45.8	140.6	191.2
8. Cement Mfg.									
	1949	35.6	N.A.	30.3	64.0	N.A.	302.6	212.0	514.6
S.I.C.	1950	38.2	127.4	32.7	68.7	100.2	391.2	225.4	616.6
3241	1951	39.7	142.0	33.7	70.5	111.8	427.3	265.0	692.3
	1952	39.4	152.2	33.4	70.5	119.7	445.8	273.1	718.9
	1962	35.5	220.9	29.7	59.1	171.1	759.7	360.4	1118.9
	1963	34.9	227.4	28.7	57.6	173.9	785.7	378.9	1176.9
	1964	34.7	233.6	28.0	57.0	176.9	805.0	397.4	1198.9
	1965	34.3	242.3	27.8	55.5	180.5	836.7	403.5	1244.1
9. Animal oils & fats									
	1949	13.4	N.A.	10.1	23.1	N.A.	90.3	146.6	234.9
S.I.C.	1950	14.1	47.6	10.9	25.7	33.8	107.8	177.3	283.0
2094	1951	13.6	51.2	10.6	24.4	36.3	124.9	223.3	346.1
	1952	12.7	51.6	9.8	22.8	36.5	94.6	128.3	220.9
	1962	13.3	74.2	9.8	21.2	50.0	168.2	232.0	400.6
	1963	14.3	78.3	10.3	22.7	51.3	193.3	289.7	474.0
	1964	14.2	84.6	10.4	23.9	54.7	210.7	347.3	550.4
	1965	13.9	87.4	10.2	23.6	57.6	247.0	414.7	656.8

	1962	11.9	68.1	9.5	20.7	51.9	242.2	165.0	406.4
	1963	11.5	70.3	9.2	20.8	54.5	259.7	174.3	425.1
	1964	12.0	76.0	9.5	21.6	58.1	270.5	183.6	453.9
	1965	11.9	75.5	9.2	20.5	57.0	235.5	185.8	424.6
4. Broom, Brush and Mops									
	1949	18.0	N.A.	15.0	28.9	N.A.	91.6	101.0	189.6
S.I.C.	1950	17.4	50.3	14.3	27.2	33.4	95.9	103.6	199.4
3981	1951	18.2	59.0	14.7	28.6	37.9	110.0	110.4	220.4
	1952	17.9	58.2	14.3	27.2	15.2	138.5	106.8	209.6
	1962	16.3	74.4	13.5	25.7	49.4	166.6	144.8	306.9
	1963	16.6	73.6	13.4	25.8	49.5	167.9	157.2	N.A.
	1964	17.2	81.7	13.7	26.9	51.9	181.7	169.5	N.A.
	1965	17.2	83.5	14.1	27.3	53.8	193.3	180.8	N.A.
5. Knitting Mills									
	1949	236.6	N.A.	214.4	402.3	N.A.	851.9	367.4	1219.3
S.I.C.	1950	245.4	591.0	224.1	425.5	499.9	986.2	622.8	1607.0
225	1951	242.2	615.5	220.6	409.5	512.6	970.1	1179.0	2149.0
	1952	236.8	622.1	213.5	408.3	514.7	1005.1	1251.9	2257.0
	1962	220.9	767.1	197.3	374.2	606.6	1325.5	1782.6	3084.7
	1963	220.5	787.5	198.0	373.3	628.8	1396.0	1947.7	3326.1
	1964	224.8	838.9	200.7	388.9	663.6	1489.9	2112.7	3584.6
	1965	231.1	595.8	206.6	398.0	711.5	1643.7	2329.6	3915.8
6. Leather Gloves & Mittens									
	1949	8.7	19.1	7.7	13.1	15.6	24.5	26.7	51.1
S.I.C.	1950	8.0	N.A.	7.2	12.2	N.A.	25.1	N.A.	N.A.
3151	1951	7.2	17.2	6.7	11.3	14.2	23.1	N.A.	N.A.
	1952	6.4	16.6	5.6	10.3	13.2	26.7	N.A.	N.A.
	1962	6.2	18.5	5.4	9.9	14.6	25.5	31.2	56.4
	1963	7.7	24.4	6.9	12.2	19.5	32.2	38.6	80.6
	1964	6.9	23.4	6.2	11.2	18.7	38.0	46.0	83.8
	1965	7.3	24.1	6.5	11.2	19.0	37.4	47.6	81.2
7. Sugar Refineries									
	1949	32.3	106.3	28.2	61.2	84.6	199.5	N.A.	952.2
S.I.C.	1950	34.6	106.8	29.3	63.8	85.6	210.1	N.A.	1058.0
206	1951	33.1	105.8	28.5	58.7	83.6	237.4	N.A.	1086.2
	1952	31.5	110.9	26.8	57.5	88.0	261.7	N.A.	1172.8
	1962	30.6	175.5	24.9	54.7	135.7	478.0	1362.1	1828.7
	1963	32.0	189.2	25.9	56.7	145.8	590.8	1623.2	2214.0
	1964	32.6	197.6	26.3	58.2	152.6	502.2	1540.7	2051.0
	1965	31.5	195.2	25.8	54.5	151.2	586.4	1450.1	5010.2

APPENDIX TABLE B (continued)

8. Medicine & Pharmacy									
	1949	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
S.I.C.	1950	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
203	1951	93.6	366.8	60.5	122.7	199.6	1276.9	675.0	1944.1
	1952	96.6	406.7	60.5	122.1	207.4	1273.0	650.6	1915.8
	1962	106.2	684.2	58.3	113.7	291.5	2636.0	928.7	3540.9
	1963	99.0	673.8	54.9	110.0	296.3	2807.3	957.0	3715.9
	1964	101.6	718.1	56.4	113.5	312.9	2943.3	985.3	3921.4
	1965	104.2	771.9	57.2	113.8	332.8	3352.0	1064.5	4386.3
9. Furniture Industry									
	1949	285.8	N.A.	249.8	512.1	N.A.	1293.8	863.4	2157.1
S.I.C.	1950	314.8	943.8	273.3	571.9	720.0	1525.8	1418.6	2881.3
25-2591	1951	314.5	1014.8	272.6	553.0	775.2	1697.0	1519.4	3132.1
	1952	310.1	1062.0	267.2	553.7	810.6	1796.9	1493.4	3175.3
	1962	356.3	1588.4	299.3	615.5	1173.6	2743.0	2617.7	5336.4
	1963	365.9	1677.1	306.8	623.9	1257.5	2974.0	2803.5	5684.5
	1964	376.5	1788.2	315.5	645.6	1338.5	3115.4	2989.3	6082.5
	1965	388.0	1960.3	335.0	680.7	1457.5	3509.0	3187.4	6677.6
10. Silverware & Jewellery	1949	55.6	N.A.	44.4	87.4	N.A.	271.9	266.6	538.6
	1950	55.7	188.3	44.3	91.1	135.3	284.2	300.9	585.0
S.I.C.	1951	54.2	189.4	44.3	87.6	136.4	290.8	337.8	628.6
391	1952	48.4	182.4	39.4	78.8	131.1	280.7	278.5	559.2
	1962	43.5	219.8	33.9	70.1	151.5	397.3	398.3	788.9
	1963	43.2	225.7	33.5	67.7	154.1	415.7	445.3	857.9
	1964	44.8	243.5	34.6	70.7	165.6	426.9	492.3	922.5
	1965	48.1	259.1	37.5	89.1	177.0	520.2	537.0	1038.8
11. Motor Vehicle & Parts									
	1949	648.3	N.A.	552.4	1103.2	N.A.	4583.4	8707.3	13291.0
S.I.C.	1950	720.8	2829.4	625.5	1281.8	2355.5	5919.9	11248.0	18168.0
3717	1951	721.3	2962.6	619.4	1217.3	2427.0	5623.4	10683.6	16307.0
	1952	656.9	3006.2	551.9	1338.0	2418.2	5735.4	10896.6	16632.0
	1962	621.6	4431.8	511.3	1097.4	3455.7	11185.5	21530.9	32705.0
	1963	679.9	4947.3	535.8	1192.6	3890.0	12345.6	23079.2	36181.0
	1964	681.7	5306.8	562.3	1226.4	4165.2	13071.3	24627.6	37462.7
	1965	770.8	6297.9	643.0	1414.3	5014.4	15961.7	30404.0	46167.1

Source: Bureau of the Census: Annual survey of Manufactures, Various Years, Census of Manufactures, 1963.

N.A. = Not Available.

APPENDIX TABLE C

SAMPLE INDUSTRIES OF CANADA: 1949-52 AND 1962-65:
CURRENT U.S. DOLLARS

Industries		All Employees: Total No. (000)	All Employees: Total Earnings $ Mill.	Production Workers: Total No. (000)	Production Workers: Man-Hours Mill.	Production Workers: Wages $ Mill.	Value Added $ Mill.	Cost of Fuel, Electricity and Material $ Mill.	Selling Value of factory shipments $ Mill.
EXPORT INDUSTRIES									
1. Flour Mills									
	1949	5.0	11.6	3.7	8.5	8.0	27.5	210.4	237.8
S.I.C.	1950	4.9	10.8	3.6	8.4	7.5	28.9	195.7	224.6
124	1951	4.9	12.9	3.6	8.4	9.0	35.2	231.6	266.8
	1952	5.0	15.0	3.6	8.2	10.4	37.2	243.1	280.2
	1962	4.3	17.1	2.6	5.4	9.6	40.8	176.4	217.3
	1963	4.4	18.0	2.5	5.4	9.8	38.9	179.7	217.9
	1964	4.5	20.0	2.6	5.8	11.2	51.0	223.6	274.7
	1965	4.3	18.9	2.5	5.2	11.1	44.8	181.1	225.7
2. Agricultural Implements									
	1949	16.6	42.9	13.9	30.2	33.7	76.8	94.8	171.6
S.I.C.	1950	16.2	39.4	13.2	26.9	30.8	62.1	73.8	135.9
311	1951	17.2	49.6	14.0	28.2	39.4	69.1	93.5	162.6
	1952	18.0	63.8	14.8	31.1	50.8	95.8	114.5	210.3
	1962	10.0	45.4	7.3	15.2	32.4	60.0	72.8	130.6
	1963	11.2	54.1	8.6	18.4	40.8	80.7	92.1	169.1
	1964	12.5	63.8	9.6	20.5	47.9	106.2	128.2	227.2
	1965	13.7	69.9	10.6	22.3	51.9	117.0	152.6	263.2
3. Air Craft and Parts									
	1949	10.7	26.6	7.5	16.8	17.4	34.6	24.6	59.2
S.I.C.	1950	10.5	27.4	7.0	16.3	17.0	32.6	17.6	50.2
321	1951	19.2	56.6	13.7	30.9	38.1	75.4	35.9	111.3
	1952	33.4	111.1	23.6	50.1	75.8	130.1	119.9	250.0
	1962	27.7	128.0	17.9	38.4	77.1	175.9	174.3	353.6
	1963	24.4	129.4	16.5	35.4	73.5	172.4	164.9	333.6
	1964	28.7	148.2	18.0	38.3	84.2	195.4	182.8	376.0
	1965	27.8	147.3	17.2	36.2	81.9	198.1	172.8	364.1
4. Pulp and Paper									
	1949	52.1	152.9	43.8	109.6	121.1	410.5	400.3	810.8
S.I.C.	1950	52.3	153.9	43.8	112.2	121.4	464.7	402.7	867.4
271	1951	57.3	202.5	47.9	121.6	160.6	645.3	530.7	1176.0
	1952	57.8	230.3	48.3	117.4	181.1	597.0	586.4	1183.4

	1962	64.6	328.6	53.7	117.8	261.5	816.6	777.9	1592.1
	1963	65.0	337.2	54.0	118.7	268.4	845.8	810.7	1658.9
	1964	67.7	367.0	56.4	125.3	294.2	933.7	917.0	1847.4
	1965	69.9	391.3	58.1	128.0	317.4	954.3	993.2	1943.1
5. Veneer and Plywood									
	1949	5.8	11.8	5.3	N.A.	10.2	22.2	19.6	41.8
S.I.C.	1950	6.5	12.9	6.0	N.A.	11.1	27.1	22.4	50.0
252	1951	7.2	17.3	6.6	N.A.	15.0	38.7	30.2	68.9
	1952	7.8	21.0	7.1	N.A.	18.3	39.3	35.5	74.7
	1962	12.1	43.8	10.8	--	37.3	68.8	86.7	154.0
	1963	13.0	48.4	11.7	--	41.5	78.9	100.3	176.6
	1964	13.8	54.1	12.4	--	46.5	87.1	107.9	192.3
	1965	14.3	59.7	12.8	--	51.1	93.4	114.6	205.4
6. Saw and Planning Mills									
	1949	74.8	130.5	60.0	90.8	108.3	240.1	290.2	530.3
S.I.C	1950	79.5	138.0	64.2	123.7	113.6	279.5	331.4	601.9
2513	1951	83.5	167.7	67.5	127.4	139.2	328.1	418.7	746.8
	1952	91.9	187.1	65.1	156.3	153.3	345.9	442.3	788.7
	1962	50.0	170.1	40.3	85.7	135.9	281.5	368.7	648.6
	1963	51.7	186.1	41.5	88.4	147.3	316.7	443.1	724.0
	1964	52.5	199.0	43.6	93.8	161.7	345.3	466.2	796.4
	1965	52.7	210.4	44.5	95.5	173.9	355.0	481.7	827.6
7. Distilleries									
	1949	4.0	9.6	3.1	6.1	6.4	45.5	29.0	74.5
S.I.C.	1950	4.1	9.6	3.2	6.4	6.5	51.3	29.1	80.4
143	1951	4.6	12.3	3.7	7.3	8.5	64.7	43.3	108.0
	1952	4.8	14.4	3.8	7.0	10.2	72.3	46.2	118.5
	1962	4.7	22.6	2.9	6.0	12.3	107.8	54.1	160.2
	1963	4.6	22.9	2.7	5.7	12.1	119.7	58.1	173.2
	1964	4.7	24.6	2.7	5.8	13.0	135.1	63.5	193.4
	1965	5.0	27.9	2.9	6.3	14.8	145.5	69.3	210.9
8. Plastic and Synthetic Resins									
	1949	1.3	3.4	0.8	N.A.	2.0	9.3	11.0	20.4
S.I.C.	1950	1.4	3.6	0.9	N.A.	2.2	14.7	13.3	27.9
373	1951	1.6	5.1	1.0	N.A.	3.0	17.2	20.2	37.4
	1952	1.9	6.6	1.2	N.A.	3.9	15.5	21.7	35.4
	1962	3.5	18.6	2.0	--	9.7	55.5	64.5	118.8
	1963	3.6	19.4	2.0	--	10.3	59.2	69.0	128.7
	1964	3.8	21.2	2.2	--	11.2	69.8	74.8	145.0
	1965	3.8	22.1	2.2	--	11.8	65.7	77.9	143.6

APPENDIX TABLE C (continued)

DOMESTIC INDUSTRIES

1. Soft Drinks									
S.I.C. 141	1949	7.8	14.2	6.0	N.A.	9.6	50.1	32.9	83.1
	1950	7.7	14.2	5.8	N.A.	9.4	47.2	32.0	79.2
	1951	7.4	15.2	5.4	N.A.	9.7	52.4	33.6	86.0
	1952	7.6	18.8	5.4	N.A.	11.9	68.4	39.0	107.4
	1962	13.5	48.1	5.3	--	15.7	111.1	56.3	167.2
	1963	13.5	50.5	5.2	--	16.8	118.0	70.4	188.3
	1964	13.6	54.1	5.2	--	18.5	127.6	76.3	203.4
	1965	13.7	57.4	5.2	--	18.7	132.2	76.9	208.4
2. Bakeries									
S.I.C. 129	1949	31.8	55.8	26.9	60.2	45.6	91.8	105.7	203.7
	1950	31.1	54.6	26.4	60.0	44.7	89.5	105.6	195.1
	1951	32.3	63.8	27.4	60.7	52.4	110.5	122.5	233.0
	1952	33.0	75.9	28.2	62.5	62.6	132.6	133.3	265.9
	1962	34.4	113.2	17.0	37.8	51.8	180.8	172.0	352.9
	1963	33.9	114.6	16.9	36.9	53.3	181.4	183.9	364.9
	1964	34.5	122.9	17.4	38.2	58.1	197.7	200.6	398.2
	1965	35.2	130.7	17.7	38.9	61.4	208.6	201.7	410.0
3. Printing & Publishing									
S.I.C. 289	1949	30.9	68.3	14.6	31.3	34.6	130.9	65.9	196.8
	1950	31.4	69.0	14.8	29.8	33.4	132.6	63.2	196.4
	1951	31.9	80.1	15.2	32.0	40.5	148.7	74.2	222.9
	1952	32.4	95.9	15.5	31.6	48.2	178.4	87.2	265.7
	1962	33.5	147.8	15.5	31.1	71.9	265.9	92.0	357.9
	1963	32.4	151.0	15.4	30.7	72.4	267.8	92.6	360.5
	1964	32.1	153.7	15.0	30.2	73.8	283.8	95.7	378.7
	1965	33.5	167.1	15.4	30.9	78.7	310.3	101.9	410.8
4. Leather Tanneries									
S.I.C. 172	1949	4.6	10.0	4.0	N.A.	8.2	15.5	37.2	52.7
	1950	4.4	9.4	3.9	N.A.	7.6	15.5	38.2	53.7
	1951	4.1	9.8	3.5	N.A.	7.7	11.8	43.2	55.0
	1952	3.9	11.0	3.3	N.A.	8.7	17.9	29.7	47.6
	1962	3.5	13.2	3.2	--	10.8	18.2	36.6	56.0
	1963	3.4	13.0	3.0	--	10.7	21.4	29.6	53.4
	1964	3.5	13.9	3.1	--	11.4	22.7	33.3	55.2
	1965	3.4	13.7	3.0	--	11.3	20.9	34.5	55.6
5. Lime Manufacturers									
S.I.C. 343	1949	1.1	2.5	1.0	N.A.	2.2	8.0	3.5	11.6
	1950	1.2	2.6	1.0	N.A.	2.3	8.0	3.7	11.7
	1951	1.1	3.0	1.0	N.A.	2.6	9.9	4.1	13.9
	1952	1.0	3.2	0.9	N.A.	2.8	10.0	4.5	14.5

	1962	0.9	3.7	0.8	--	3.0	9.1	4.3	13.5
	1963	0.9	3.8	0.7	--	2.9	9.5	4.3	13.8
	1964	0.8	3.6	0.6	--	2.6	9.8	4.6	14.4
	1965	0.8	3.6	0.6	--	2.8	10.0	5.0	15.0
6. Vegetable oil Mills									
	1949	0.8	2.1	0.6	N.A.	1.3	8.9	40.8	49.7
S.I.C.	1950	0.8	2.0	0.5	N.A.	1.2	5.7	37.0	42.8
135	1951	0.8	2.2	0.5	N.A.	1.4	10.3	46.9	57.2
	1952	0.7	2.5	0.5	N.A.	1.5	7.0	46.1	53.1
	1962	0.6	2.6	0.4	--	1.5	7.8	56.4	64.3
	1963	0.6	2.7	0.4	--	1.6	9.6	65.2	74.4
	1964	0.6	2.7	0.4	--	1.6	9.4	68.7	77.7
	1965	0.6	2.9	0.4	--	1.8	9.8	78.1	87.7
7. Cotton & Jute Bags									
	1949	1.3	2.1	1.0	N.A.	1.4	4.3	22.6	26.9
S.I.C.	1950	1.3	2.1	1.1	N.A.	1.4	4.5	25.6	30.1
223	1951	1.3	2.4	1.1	N.A.	1.6	4.5	32.3	36.8
	1952	1.2	2.6	1.0	N.A.	1.8	3.2	27.7	30.9
	1962	1.1	3.4	0.8	--	2.1	6.9	21.6	28.3
	1963	1.0	3.3	0.9	--	2.1	6.5	21.7	28.2
	1964	1.1	3.5	0.9	--	2.3	6.9	22.0	28.7
	1965	1.1	3.7	0.9	--	2.4	7.0	21.6	28.8
8. Cement Manufacturing									
	1949	1.7	4.7	1.6	N.A.	4.3	20.4	13.6	34.0
S.I.C.	1950	1.8	4.8	1.7	N.A.	4.4	21.0	13.7	34.7
341	1951	1.9	6.0	1.8	N.A.	5.5	25.3	15.6	40.9
	1952	2.3	8.1	2.1	N.A.	7.4	33.4	18.8	52.2
	1962	3.7	19.1	2.6	--	12.7	77.6	31.5	108.3
	1963	3.6	19.0	2.5	--	12.5	81.2	31.6	113.0
	1964	3.6	19.8	2.5	--	13.0	88.8	33.5	124.1
	1965	3.8	22.6	2.6	--	14.9	96.1	39.0	133.7
9. Animal oils and Fats									
	1949	0.2	0.5	0.2	N.A.	0.4	0.8	1.0	1.8
S.I.C.	1950	0.3	0.7	0.2	N.A.	0.5	1.0	1.8	2.8
101	1951	0.3	1.0	0.3	N.A.	0.7	1.6	2.7	4.3
	1952	0.3	1.0	0.3	N.A.	0.7	1.5	2.0	3.5
	1962	0.5	1.9	0.4	--	1.2	4.7	4.8	9.4
	1963	0.5	2.1	0.3	--	1.2	6.3	6.0	12.0
	1964	0.6	2.7	0.4	--	1.5	8.3	8.3	16.4
	1965	0.6	3.1	0.4	--	1.8	9.1	10.1	19.3
10. Petroleum & Coal Products									
	1949	14.6	38.6	10.6	22.7	27.0	114.2	403.3	517.6
S.I.C.	1950	15.2	40.4	10.4	22.3	26.3	131.4	428.8	560.1
365,369	1951	15.6	49.3	10.5	21.9	31.8	170.9	503.2	674.1

	1952	16.9	65.0	11.3	23.4	41.4	230.8	566.8	797.6
	1962	11.1	62.0	7.5	16.2	40.4	262.8	941.2	1200.4
	1963	10.7	62.0	7.3	15.7	40.1	263.5	1009.7	1263.3
	1964	10.6	64.9	7.2	15.6	41.7	267.0	1049.0	1320.8
	1965	9.9	63.8	6.8	14.5	40.1	245.0	1078.4	1321.9
11. Fabricated Structural Metal									
	1949	7.1	18.0	5.6	N.A.	12.6	42.6	30.8	73.4
S.I.C.	1950	7.4	20.3	5.6	12.8	14.0	40.3	34.2	74.5
302	1951	8.6	26.9	6.6	15.1	19.2	56.9	47.3	104.2
	1952	10.8	38.2	8.6	17.9	27.8	78.0	64.8	142.8
	1962	14.8	71.9	10.8	22.1	49.3	111.7	124.8	236.6
	1963	14.2	71.8	10.2	21.1	48.2	110.3	116.4	226.8
	1964	14.6	76.5	10.7	21.7	52.8	122.2	136.9	258.9
	1965	18.1	97.9	13.2	27.7	68.7	173.0	170.8	343.8
PROTECTED INDUSTRIES									
1. Tobacco Products									
	1949	10.7	21.2	9.2	20.2	16.8	56.8	110.4	167.2
S.I.C.	1950	10.3	20.6	8.8	18.7	16.1	59.3	112.0	171.2
151,153	1951	9.8	23.2	8.4	17.1	18.1	56.1	114.1	170.2
	1952	9.3	26.0	7.9	16.0	20.3	72.3	148.3	220.7
	1962	11.4	44.2	8.4	17.0	29.6	116.7	198.1	321.4
	1963	11.0	44.5	8.6	16.8	31.3	123.8	205.7	326.3
	1964	10.9	46.2	8.2	16.0	31.9	126.5	202.2	324.8
	1965	10.3	46.9	7.9	15.6	32.6	146.2	203.6	350.7
2. Fur Goods Industries									
	1949	6.7	14.1	5.0	N.A.	9.5	22.8	36.3	59.1
S.I.C.	1950	6.3	13.3	4.7	N.A.	8.9	21.3	35.0	56.3
276	1951	6.1	13.7	4.5	N.A.	9.2	21.7	36.4	58.2
	1952	6.0	15.8	4.4	N.A.	10.6	24.6	43.1	67.7
	1962	3.6	13.0	2.6	--	8.6	20.0	33.9	53.9
	1963	3.3	12.8	2.3	--	8.3	20.1	35.7	55.4
	1964	3.3	13.5	2.4	--	8.9	22.1	37.1	58.2
	1965	3.1	13.3	2.2	--	8.8	22.3	38.3	59.7
3. Gypsum Products									
	1949	1.0	2.1	0.9	N.A.	1.8	7.4	7.9	15.2
S.I.C.	1950	1.1	2.6	0.9	N.A.	1.7	8.4	7.9	16.3
245	1951	1.1	3.1	0.9	N.A.	2.1	9.1	8.8	17.9
	1952	1.2	3.8	0.9	N.A.	2.5	10.0	9.1	18.8
	1962	1.5	6.0	1.2	--	4.3	19.2	13.7	33.2
	1963	1.5	6.1	1.1	--	4.4	20.4	14.7	34.8
	1964	1.4	6.6	1.1	--	5.0	21.7	14.9	37.5
	1965	1.4	6.8	1.1	--	5.3	22.9	15.8	38.6

APPENDIX TABLE C (continued)

4. Broom, Brush and Mops									
	1949	2.4	4.1	1.9	N.A.	2.8	8.1	6.2	14.4
S.I.C.	1950	2.4	4.1	1.8	N.A.	2.6	8.0	6.8	14.7
383	1951	2.3	4.5	1.8	N.A.	3.0	8.0	8.9	16.8
	1952	2.2	4.9	1.7	N.A.	3.3	8.8	8.3	17.0
	1962	2.4	8.7	1.6	--	3.8	12.8	11.3	23.7
	1963	2.5	9.5	1.7	--	4.2	14.7	12.2	26.5
	1964	2.6	10.7	1.7	--	4.7	16.2	13.3	28.7
	1965	2.9	11.4	1.7	--	4.7	16.7	13.9	30.8
5. Knitting Mills									
	1949	26.4	42.6	23.6	47.7	34.2	74.3	64.3	138.7
S.I.C.	1950	25.3	40.1	22.3	45.2	31.7	69.0	64.0	132.9
231,239	1951	25.2	46.6	22.3	45.7	37.3	79.3	81.9	161.2
	1952	23.2	50.0	20.4	41.7	39.6	82.4	84.0	167.4
	1962	22.6	57.7	19.2	40.6	44.0	95.6	123.8	216.6
	1963	22.3	60.0	19.5	41.4	46.1	101.9	135.2	235.5
	1964	22.7	65.6	19.8	42.7	50.9	114.3	148.9	258.2
	1965	23.8	70.8	20.9	44.6	55.1	124.5	163.1	285.2
6. Leather Gloves & Mittens									
	1949	2.1	2.7	1.8	N.A.	2.0	4.4	4.7	9.1
S.I.C.	1950	2.1	2.5	1.9	N.A.	2.0	3.6	4.9	8.6
175	1951	2.3	3.3	2.0	N.A.	2.6	5.2	7.0	12.2
	1952	2.2	3.5	1.9	N.A.	2.8	5.6	6.5	12.0
	1962	1.7	3.8	1.2	--	2.8	5.5	4.9	10.3
	1963	1.6	3.9	1.3	--	2.9	5.9	5.3	11.4
	1964	1.7	4.3	1.4	--	3.2	6.7	6.0	12.4
	1965	1.8	4.6	1.4	--	3.4	6.4	6.4	12.7
7. Sugar Refineries									
	1949	3.6	8.6	3.1	N.A.	6.7	23.0	90.2	113.2
S.I.C.	1950	3.9	8.7	3.4	N.A.	6.8	29.0	102.7	131.7
133	1951	3.6	9.8	3.0	N.A.	7.5	27.3	104.9	132.2
	1952	3.5	11.3	2.9	N.A.	8.7	33.8	98.1	131.9
	1962	3.1	14.1	2.4	--	9.8	46.0	87.0	131.0
	1963	3.2	14.0	2.5	--	10.2	55.6	171.3	215.3
	1964	3.2	15.7	2.5	--	10.6	43.6	159.7	212.5
	1965	3.2	15.9	2.4	--	10.4	48.0	90.9	141.1
8. Medicine & Pharmacy									
	1949	7.7	15.6	4.7	9.4	7.5	46.6	22.7	69.3
S.I.C.	1950	7.5	15.1	4.6	9.2	7.3	46.5	23.0	69.4
374	1951	7.5	18.0	4.5	9.5	8.7	57.1	27.7	84.8
	1952	7.5	20.9	4.4	8.8	9.6	61.2	28.7	90.0

APPENDIX TABLE C (continued)

	1962	10.1	45.4	4.2	9.1	13.2	114.2	49.0	162.6
	1963	10.4	48.8	4.2	9.1	13.9	128.9	51.5	179.2
	1964	10.7	52.3	4.2	8.7	14.7	136.1	59.1	192.8
	1965	11.2	57.4	4.4	9.1	16.0	149.9	72.8	219.5
9. Furniture Industry									
	1949	26.9	52.0	22.9	49.0	40.9	85.3	69.7	152.4
S.I.C.	1950	27.3	51.9	23.1	49.4	40.4	82.4	74.3	156.7
261,264,266	1951	27.2	58.4	22.7	48.7	44.9	93.6	87.8	181.4
	1952	27.2	67.3	22.5	47.8	51.3	108.4	100.4	208.8
	1962	34.6	117.2	26.7	58.5	81.6	177.8	171.7	346.0
	1963	36.0	124.9	27.8	60.9	87.3	191.5	186.8	376.0
	1964	38.1	138.7	29.5	64.6	97.9	214.1	212.8	422.6
	1965	40.5	152.3	31.7	68.8	108.6	239.3	234.3	469.2
10. Silverware & Jewellery									
	1949	6.2	12.8	5.1	N.A.	9.6	22.9	26.3	49.2
S.I.C.	1950	6.3	12.5	5.1	N.A.	9.3	20.7	27.8	48.5
382	1951	5.7	12.7	4.6	N.A.	9.2	19.7	28.2	47.9
	1952	5.5	13.8	4.4	N.A.	10.1	22.6	23.5	46.1
	1962	5.0	17.3	3.4	--	10.7	26.3	33.1	58.7
	1963	5.0	18.1	3.5	--	11.2	27.4	36.9	63.8
	1964	5.1	19.6	3.7	--	12.4	30.6	38.4	68.3
	1965	5.2	20.9	3.8	--	13.3	33.7	43.4	76.1
11. Motorvehicle & Parts									
	1949	44.9	118.6	41.2	75.6	92.4	255.3	333.7	637.4
S.I.C.	1950	49.1	136.8	40.5	90.6	107.1	351.2	469.2	820.4
323,325	1951	51.7	148.3	42.7	90.6	124.0	368.7	587.0	955.7
	1952	52.9	190.3	43.4	90.6	147.2	403.0	644.1	1067.1
	1962	49.2	263.1	35.5	80.3	178.1	528.3	977.4	1499.3
	1963	57.2	320.0	41.8	94.8	222.5	685.8	1254.3	1906.7
	1964	65.5	375.1	48.7	108.2	262.1	720.0	1466.1	2147.8
	1965	74.4	461.7	55.8	126.4	329.1	884.6	1792.8	2655.5

Source: D.B.S.: General Review of Manufacturing Industries of Canada, 31-201.

D.B.S.: Manufacturing Industries of Canada, Summary for Canada, 31-203

D.B.S.: Annual Census of Manufactures, various Industries, 1962-65.

Appendix Table K.

APPENDIX TABLE D (a)

PRICE INDICES USED TO DEFLATE VALUE OF SHIPMENTS AND VALUE ADDED IN THE UNITED STATES: 1961 = 100

	1949	1950	1951	1952	1961	1962	1963	1964	1965
EXPORT INDUSTRIES									
1. Flour Mills	85.9	93.9	105.9	109.1	100.0	101.0	93.5	93.6	95.7
2. Agricultural Implements[1]	72.7	74.3	80.6	81.6	100.0	101.9	103.4	105.1	107.1
3. Pulp and Paper Mills[1]	76.1	78.0	92.4	90.0	100.0	101.2	100.4	100.2	101.1
4. Veneer and Plywood	101.2	113.3	122.5	111.7	100.0	96.5	97.7	96.4	96.4
5. Saw and Planning Mills[2]	82.8	92.4	102.3	99.8	100.0	100.9	103.2	106.4	106.6
6. Distilleries[3]	86.0	91.4	92.2	94.3	100.0	100.4	100.4	100.2	100.1
7. Synthetic Resins and Plastics	103.4	104.0	129.8	129.0	100.0	99.7	97.5	96.7	96.1
DOMESTIC INDUSTRIES									
8. Soft Drinks[4]	88.6	95.7	97.5	99.3	100.0	105.1	109.9	112.6	113.7
9. Bread and Bakeries[5]	78.3	79.8	86.2	86.2	100.0	102.4	102.1	102.6	103.7
10. Printing and Publishing	79.4	83.6	87.8	89.0	100.0	102.0	103.6	109.7	115.9
11. Leather Tanneries	89.9	103.0	120.1	86.1	100.0	102.6	96.5	97.3	102.3
12. Vegetable oil Mills	88.7	106.1	126.9	93.5	100.0	85.9	77.7	75.9	89.6
13. Cement	70.7	74.1	74.6	81.7	100.0	99.7	98.2	97.8	97.9
14. Petroleum & Coal Products[6]	83.8	87.6	94.4	93.2	100.0	98.8	97.8	93.2	96.6
15. Fabricated Structural Metal	76.2	78.7	88.8	87.0	100.0	99.2	99.2	100.3	102.2
PROTECTED INDUSTRIES									
16. Tobacco Products	79.9	81.5	83.9	84.5	100.0	100.1	102.4	103.9	104.1
17. Gypsum Products	75.3	77.1	86.5	86.7	100.0	101.1	101.1	104.2	100.2
18. Knitting Mills[7]	99.7	103.2	114.9	104.2	100.0	100.2	98.9	98.2	98.5
19. Leather Gloves[7]	93.2	93.8	107.2	96.2	100.0	101.0	100.8	99.0	102.8
20. Sugar Refineries[8]	116.1	117.1	108.8	143.7	100.0	97.2	82.3	84.7	78.9
21. Medicine and Pharmaciticals	101.8	100.6	104.0	100.6	100.0	97.6	96.7	96.6	96.0
22. Furniture	74.3	77.6	86.7	85.0	100.0	100.1	100.2	100.7	100.9
23. Motor Vehicle and Parts	76.8	76.4	80.4	85.1	100.0	100.0	99.2	99.7	99.9

Sources: B.L.S.: 1. Price Indexes: Hand Book of Labour Statistics, 1968
B.L.S.: 2. Price and Price Indexes, Various Years.
B.L.S.: 3. Monthly Labour Review, Various Numbers.

[1] Index of Pulp, Paper and Allied Products
[2] Index of Lumber and Mill Work.
[3] Index of Alchoholic Beverages.
[4] Index of Non-Alchoholic Beverages.
[5] Index of Cereal and Bakery Products
[6] Index of Petroleum Products
[7] Index of Leather and Related Products
[8] Index of Sugar.

APPENDIX TABLE D (b)

PRICE INDICES USED TO DEFLATE VALUE OF SHIPMENTS AND VALUE ADDED IN CANADA: 1961 = 100

	1949	1950	1951	1952	1961	1962	1963	1964	1965
EXPORT INDUSTRIES									
1. Flour Mills	70.4	78.7	80.4	79.4	100.0	110.7	109.8	113.8	112.4
2. Agricultural Implements	79.4	83.3	85.1	99.6	100.0	101.7	103.3	103.1	103.6
3. Pulp and Paper Mills	74.7	83.4	101.5	91.2	100.0	102.3	102.6	104.4	105.7
4. Veneer and Plywood	100.0	109.9	123.8	109.9	100.0	102.1	106.9	109.2	111.5
5. Saw and Planning Mills	142.9	160.1	170.3	154.6	100.0	100.9	106.0	108.6	111.3
6. Distilleries	81.2	90.7	91.0	93.2	100.0	100.9	101.1	105.8	106.5
7. Synthetic Resins and Plastics	52.5	80.4	79.3	61.8	100.0	98.2	96.2	93.6	92.8
DOMESTIC INDUSTRIES									
8. Soft Drinks	70.9	69.8	79.4	89.7	100.0	100.7	110.8	123.3	118.4
9. Bread and Bakeries	72.1	72.1	81.5	85.9	100.0	101.4	109.4	114.0	114.2
10. Printing and Publishing[1]	91.1	90.8	94.0	100.1	100.0	95.7	96.0	89.5	91.8
11. Leather Tanneries	89.4	93.4	85.0	117.6	100.0	105.9	99.7	97.2	103.1
12. Vegetable oil Mills	178.3	147.4	181.3	185.7	100.0	102.6	103.1	101.7	105.2
13. Cement	60.0	63.2	71.1	81.2	100.0	101.8	104.0	105.4	108.2
14. Petroleum and Coal Products	113.3	124.1	134.5	154.9	100.0	99.1	95.3	95.8	94.0
15. Fabricated Structural Metal	89.3	83.9	97.8	108.2	100.0	105.3	100.8	104.4	110.1
PROTECTED INDUSTRIES									
16. Tobacco Products	96.6	104.9	101.6	105.2	100.0	100.3	100.4	100.6	95.6
17. Gypsum Products	65.5	72.9	70.5	73.6	100.0	100.5	100.5	101.5	102.2
18. Knitting Mills	133.6	131.3	139.0	134.9	100.0	99.6	99.2	94.5	94.0
19. Leather Gloves	86.0	77.4	93.7	90.5	100.0	99.9	101.5	106.7	110.1
20. Sugar Refineries	71.8	87.2	91.4	97.7	100.0	102.3	187.7	152.0	96.8
21. Medicine and Pharmacy	79.9	85.9	93.5	95.4	100.0	98.7	98.8	98.0	98.1
22. Furniture	81.6	80.9	86.4	89.2	100.0	99.9	100.8	103.1	103.5
23. Motor Vehicle and Parts	86.1	97.1	91.1	90.0	100.0	101.9	103.1	103.1	102.6

Sources: For 1961-65: D.B.S. Industry Selling Price Index: 62-515, and Price and Price Indexes: 62-002.

For 1949-52: Industry Selling Price Projected backwards on the basis of data provided on Indexes of Net-Real Production published in Indexes of Real Domestic Product by Industry: D.B.S.: 61-506.

[1]For 1962-65 weighted Price Index of Paper and Printing Ink Industry.

APPENDIX TABLE E

SAMPLE INDUSTRIES OF THE UNITED STATES: 1949-52 AND 1962-65: CONSTANT (1961) U.S. DOLLARS

		All Employees		Production Workers					
		Total no. (000)	Total Earnings $ Mill.	Total no. (000)	Man-Hrs. Mill.	Wages $ Mill.	Value Added $ Mill.	Cost of Fuel, Electricity and Materials $ Mill.	Selling Value of Factory Shipments $ Mill.
EXPORT INDUSTRIES									
1. Flour Mills									
	1949	35.7	N.A.	27.4	61.0	N.A.	331.5	1667.8	2099.3
S.I.C.	1950	34.4	125.7	26.4	57.1	54.9	362.7	1630.0	1999.1
2041	1951	34.7	121.3	26.5	59.2	85.1	357.5	1695.0	2052.5
	1952	34.7	123.6	26.1	59.8	87.7	353.9	1689.3	2043.2
	1962	25.7	147.6	18.9	43.8	99.0	436.9	1910.3	2345.9
	1963	22.4	147.3	16.4	38.4	101.5	399.0	1989.7	2327.8
	1964	21.9	148.0	16.0	36.9	99.7	427.1	1913.7	2343.0
	1965	20.7	139.0	15.4	34.2	93.9	420.9	1820.9	2241.6
2. Agricultural Implements									
	1949	171.3	N.A.	136.9	268.1	N.A.	1391.3	1741.4	3132.7
S.I.C.	1950	166.3	759.6	131.6	252.8	560.2	1441.2	1703.8	2893.6
3522	1951	185.6	873.2	197.7	286.9	659.1	1577.6	1577.6	3628.2
	1952	177.3	884.9	137.0	266.9	642.0	1626.9	2040.9	3667.8
	1962	106.2	606.7	77.1	151.7	405.3	1183.4	1310.1	2435.7
	1963	112.6	666.4	84.6	168.9	461.1	1284.7	1489.5	2748.8
	1964	118.6	732.5	90.2	181.9	512.2	1452.0	1660.6	3048.6
	1965	123.2	763.6	93.9	188.5	534.4	1513.3	1763.7	3234.4
3. Pulp and Paper									
	1949	191.8	N.A.	165.6	360.8	N.A.	1810.9	2738.7	4549.6
S.I.C.	1950	197.2	926.4	170.9	385.8	756.9	2238.2	3163.3	5085.6
2611,2621,	1951	206.7	895.4	177.6	400.3	725.3	2298.2	3577.6	5875.8
2631	1952	203.9	945.0	174.1	385.5	763.4	2217.2	3415.9	5633.1
	1962	204.8	1319.9	166.9	366.5	1014.5	3059.0	3249.6	6270.1
	1963	208.4	1408.7	169.2	373.0	1085.7	3325.9	3440.7	6723.0
	1964	209.2	1478.6	170.2	377.9	1137.9	3509.7	3613.2	7139.6
	1965	210.9	1521.5	170.5	382.5	1167.7	3724.3	2803.7	7509.2
4. Veneer and Plywood									
	1949	35.7	N.A.	32.8	68.8	N.A.	212.3	166.0	420.5
S.I.C.	1950	44.9	125.1	41.6	90.4	109.0	223.9	218.4	442.3
2432	1951	49.4	136.2	46.0	96.9	118.9	235.6	224.5	453.8
	1952	47.9	151.3	44.4	93.0	131.6	221.2	252.2	475.4

	1962	68.0	323.0	60.6	126.2	276.2	509.9	807.8	1315.2
	1963	66.1	332.3	60.5	124.9	287.9	572.3	856.9	1371.2
	1964	68.8	379.4	62.8	131.9	327.7	641.2	928.3	1553.3
	1965	47.9	400.1	65.2	138.1	342.6	662.0	989.0	1647.8
5. Saw and Planning Mills									
	1949	378.4	N.A.	356.6	621.4	N.A.	1541.2	1453.8	2995.0
S.I.C.	1950	458.5	1041.2	431.0	751.0	931.5	1980.4	1831.0	3811.4
242	1951	424.0	973.9	398.2	693.3	860.1	1784.1	1706.0	3206.8
	1952	414.9	1054.8	389.9	687.7	936.1	1808.5	1794.1	3218.2
	1962	242.7	874.9	222.0	436.2	749.6	1471.5	1882.3	3292.5
	1963	242.7	906.7	218.6	428.3	780.8	1523.8	1931.1	3486.1
	1964	235.7	975.2	211.0	422.0	792.4	1630.2	1961.1	3584.1
	1965	238.8	949.7	215.0	427.5	795.9	1533.3	2023.7	3612.8
6. Distilleries									
	1949	22.7	N.A.	17.7	36.4	N.A.	469.4	517.7	987.0
S.I.C.	1950	23.8	89.5	19.2	38.8	66.2	496.2	556.9	1053.1
2085	1951	22.8	102.6	17.9	39.4	73.6	447.8	574.4	1017.7
	1952	19.0	85.7	14.5	31.4	59.7	372.7	438.6	800.7
	1962	18.7	112.9	14.5	30.6	80.1	449.4	481.4	928.9
	1963	18.0	109.8	14.3	28.1	79.9	62.13	477.1	1086.1
	1964	17.8	115.4	14.2	28.0	83.9	659.0	473.7	1131.5
	1965	19.0	126.0	14.9	29.6	91.5	722.6	576.5	1300.4
7. Plastic & Synthetic Resins									
	1949	29.2	N.A.	21.4	44.4	N.A.	258.4	314.2	572.6
S.I.C.	1950	30.0	110.2	22.3	46.1	73.6	371.0	390.4	761.4
2821	1951	37.3	120.2	27.5	56.3	79.4	364.1	468.3	869.8
	1952	37.6	131.9	27.0	57.3	85.4	369.5	467.9	881.3
	1962	57.7	402.7	39.5	82.2	245.7	1105.4	1283.0	2379.2
	1963	61.3	448.8	41.5	86.1	271.3	1233.2	1386.9	2637.4
	1964	62.6	477.3	42.0	88.9	287.7	1393.0	1473.9	2868.5
	1965	65.5	515.3	44.3	92.9	312.2	1534.4	1699.1	3221.8
DOMESTIC INDUSTRIES									
1. Soft Drinks									
	1949	93.3	N.A.	41.4	87.8	N.A.	537.4	440.9	978.3
S.I.C.	1950	95.2	269.0	42.8	98.4	94.4	513.9	418.1	932.0
2086	1951	84.9	298.8	36.8	71.0	80.9	521.6	377.9	899.5
	1952	83.9	268.0	36.3	71.9	84.2	544.9	395.8	940.7
	1962	105.4	490.3	41.4	92.9	150.6	1073.1	858.9	1932.2
	1963	106.9	489.3	40.9	86.6	149.9	1122.5	878.3	2011.8
	1964	111.1	517.4	40.9	89.2	153.5	1232.5	912.8	2139.3
	1965	113.4	537.6	41.8	89.6	164.9	1189.8	922.3	2177.9

2. Bakeries									
	1949	246.0	N.A.	152.3	325.8	N.A.	1625.6	1648.3	3273.8
S.I.C.	1950	246.5	929.3	151.7	323.9	509.2	1645.9	1618.1	3263.9
2051	1951	258.0	1008.1	156.0	328.4	519.7	1687.4	1703.3	3390.7
	1952	264.5	1091.7	158.3	330.9	563.1	1824.0	1741.0	3565.0
	1962	254.2	1290.0	137.2	286.6	626.1	2278.8	2057.3	4342.1
	1963	237.0	1273.6	129.9	267.6	632.4	2354.3	2089.0	4413.1
	1964	234.4	1297.0	127.3	272.5	641.3	2429.0	2104.3	4501.2
	1965	234.5	1304.7	129.7	265.5	647.9	2420.0	2125.6	4540.7
3. Printing and Publishing									
	1949	384.5	N.A.	179.5	397.7	N.A.	3381.5	2608.6	7318.6
S.I.C.	1950	395.4	1792.1	190.7	404.5	844.5	3392.0	2540.4	7248.2
2711,2721,	1951	333.3	1517.1	166.2	339.5	729.8	2830.0	2389.0	6760.0
273,2741.	1952	335.7	1523.6	172.9	363.9	784.6	2746.5	2186.0	6433.5
	1962	485.3	2785.2	266.4	420.2	1230.1	5782.9	2991.9	8721.8
	1963	479.6	2771.2	223.6	418.4	1229.3	5943.9	3101.2	8928.7
	1964	496.9	2813.5	232.0	451.1	1242.7	6066.1	3075.5	9137.4
	1965	499.6	2755.0	229.9	439.0	1210.2	6077.9	2954.4	9014.9
4.. Leather Tanneries									
	1949	50.2	N.A.	44.6	88.8	N.A.	324.2	653.4	977.7
S.I.C.	1950	49.6	160.1	44.9	89.1	130.9	309.3	613.1	922.4
3111	1951	45.1	132.8	40.5	79.6	108.1	238.3	580.5	818.8
	1952	44.0	189.0	39.5	78.2	156.5	331.6	593.0	924.6
	1962	31.7	153.2	27.3	53.3	120.0	256.9	478.6	746.5
	1963	31.4	169.2	27.3	54.6	134.5	283.0	503.8	793.3
	1964	31.2	173.7	27.1	54.6	135.2	308.5	494.7	805.3
	1965	31.7	174.6	27.6	56.3	134.7	325.2	519.6	831.2
5. Vegetable oil Mills									
	1949	24.0	N.A.	19.5	49.5	N.A.	244.0	1116.8	1360.8
S.I.C.	1950	23.9	64.5	19.7	49.2	48.0	237.4	933.9	1171.3
2091,2092	1951	21.8	52.8	17.5	43.6	38.0	180.1	909.5	1089.5
2093	1952	21.9	76.2	17.5	45.4	55.7	195.5	1300.8	1496.3
	1962	17.4	100.2	13.2	30.2	66.2	301.2	2037.3	2521.2
	1963	16.8	115.3	12.6	29.8	77.0	380.5	2025.2	2912.2
	1964	16.2	121.3	12.3	29.5	80.4	376.8	2756.4	3129.0
	1965	16.7	103.1	12.6	29.6	68.9	336.9	2498.2	2821.1
6. Cement Manufacturers									
	1949	35.6	N.A.	30.3	64.0	N.A.	428.0	299.8	727.8
S.I.C.	1950	38.2	171.9	32.7	68.7	135.2	528.0	304.1	832.1
3241	1951	39.7	190.4	33.7	70.5	149.9	572.7	355.3	928.0
	1952	39.4	186.3	33.4	70.5	146.5	545.7	334.2	880.0

	1962	35.5	221.6	29.7	59.1	171.6	761.9	361.5	1122.3
	1963	34.9	231.6	28.7	57.6	177.1	800.1	385.8	1198.5
	1964	34.7	238.9	28.0	57.0	180.9	823.1	406.4	1225.8
	1965	34.3	247.5	27.8	55.0	184.4	854.7	412.7	1270.8
7. Petroleum & Coal Products									
	1949	208.4	N.A.	166.7	335.6	N.A.	2081.0	9088.0	11118.1
S.I.C.	1950	206.8	970.7	161.9	330.2	712.1	2441.3	10392.2	12731.4
29	1951	218.1	1027.7	169.9	347.0	754.3	2845.9	11500.0	14251.4
	1952	220.2	1111.3	170.3	338.4	805.9	2810.0	11968.3	14680.3
	1962	154.3	1109.1	110.0	221.3	732.3	3477.3	13939.8	17383.8
	1963	153.5	1159.3	109.4	216.7	761.9	3796.8	14497.3	18399.5
	1964	148.4	1208.0	105.4	213.6	796.6	4051.9	15616.5	19675.8
	1965	143.5	1145.9	102.3	203.0	755.7	4300.7	15449.6	19738.5
8. Fabricated Structural Metal									
	1949	212.9	N.A.	166.4	338.4	N.A.	1677.6	1664.5	3265.2
S.I.C.	1950	229.5	1071.0	179.3	370.2	739.3	1978.1	1851.9	3830.1
344	1951	244.9	1142.9	190.8	399.3	796.6	2042.8	2041.0	4083.8
	1952	259.9	1294.0	202.0	420.1	903.3	2260.1	2067.2	4327.3
	1962	320.7	1896.0	235.1	489.7	1227.5	3006.3	3776.8	6843.3
	1963	325.5	1938.2	242.4	490.8	1291.4	3245.8	3974.6	7127.0
	1964	330.9	2022.5	244.9	503.6	1341.9	3448.1	4126.6	7528.2
	1965	344.6	2126.7	255.6	532.5	1404.7	3890.6	4443.9	8165.7
PROTECTED INDUSTRIES									
1. Tobacco Products									
	1949	100.7	N.A.	92.8	173.9	N.A.	974.4	1365.0	2201.3
S.I.C.	1950	92.3	260.7	84.6	159.7	217.6	989.1	1359.9	2223.5
21	1951	93.8	274.4	85.8	161.8	229.2	1020.8	2663.7	3684.5
	1952	93.2	284.9	85.5	162.8	238.7	1026.7	2701.3	3728.3
	1962	77.3	334.9	67.3	134.0	265.3	1643.3	2891.4	4531.5
	1963	77.2	322.8	68.6	132.0	265.1	1641.2	2796.6	4414.0
	1964	78.8	339.7	70.2	138.2	279.8	1705.6	2726.7	4477.1
	1965	75.1	339.0	66.5	125.7	275.6	1715.9	2777.7	4474.6
2. Gypsum Products									
	1949	8.7	N.A.	7.4	16.8	N.A.	122.4	99.0	221.5
S.I.C.	1950	9.0	43.3	8.0	19.6	37.2	160.9	103.1	264.1
2375	1951	9.6	42.9	8.3	19.2	34.2	139.8	130.7	258.9
	1952	8.6	41.3	7.2	18.1	33.9	138.3	119.6	257.8
	1962	11.9	67.4	9.5	20.7	51.3	239.6	163.2	401.9
	1963	11.5	69.3	9.2	20.8	53.7	255.8	171.7	418.8
	1964	12.0	72.9	9.5	21.6	55.8	259.6	176.2	435.6
	1965	11.9	75.4	9.2	20.5	56.7	235.0	185.4	423.8

APPENDIX TABLE E (continued)

3. Knitting Mills	1949	236.6	N.A.	214.4	402.3	N.A.	854.5	368.6	1223.0
S.I.C.	1950	245.4	572.7	224.1	425.5	484.4	955.6	603.5	1559.1
225	1951	242.2	535.7	220.6	509.5	446.1	844.3	1026.1	1870.4
	1952	236.8	597.0	213.5	408.3	494.0	964.6	1201.5	2166.0
	1962	220.9	765.6	197.3	374.2	605.4	1322.9	1779.0	3078.6
	1963	220.5	796.3	198.0	373.3	635.8	1411.5	1969.3	3363.1
	1964	224.8	854.3	200.7	388.9	675.8	1517.2	2151.5	3650.4
	1965	231.1	909.4	206.6	398.0	722.3	1668.7	2365.0	3975.4
4. Leather Gloves	1949	8.7	20.5	7.7	13.1	16.7	26.3	28.7	54.8
S.I.C.	1950	8.0	N.A.	7.2	12.2	N.A.	26.8	N.A.	N.A.
3151	1951	7.3	16.0	6.7	11.3	13.3	21.6	N.A.	N.A.
	1952	6.4	17.3	5.6	10.3	13.7	27.8	N.A.	N.A.
	1962	6.2	18.3	5.4	9.9	14.5	25.2	30.9	55.9
	1963	7.7	24.2	6.9	12.2	19.4	31.9	38.3	80.0
	1964	6.9	23.4	6.2	11.2	18.7	38.0	46.1	83.9
	1965	7.3	23.4	6.5	11.2	18.5	36.4	46.3	79.0
5. Sugar Refineries	1949	32.3	91.6	28.2	61.2	72.9	171.8	N.A.	820.2
S.I.C.	1950	34.6	91.2	29.3	63.8	73.1	179.4	N.A.	903.5
206	1951	33.1	97.2	28.5	58.7	76.8	218.2	N.A.	998.3
	1952	31.5	77.7	26.8	57.5	61.2	182.1	N.A.	1172.8
	1962	30.6	180.6	24.9	54.7	139.6	491.8	1401.4	1881.3
	1963	32.0	229.9	25.9	56.7	177.2	717.9	1972.3	2690.2
	1964	32.6	233.3	26.3	58.2	130.2	592.9	1819.0	2421.5
	1965	31.5	247.4	25.8	54.5	191.6	743.3	1837.9	2547.8
6. Medicine & Pharmacy	1949	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
S.I.C.	1950	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
283	1951	93.6	352.7	60.5	122.7	191.9	1227.8	649.1	1869.4
	1952	96.6	404.3	60.5	122.1	206.2	1265.4	646.7	1904.3
	1962	106.2	701.0	58.3	113.7	298.7	2700.8	951.6	3628.0
	1963	99.0	696.8	54.9	110.0	306.4	2903.1	989.7	3842.7
	1964	101.6	743.4	56.4	113.5	323.9	3046.9	1020.0	4059.4
	1965	104.2	804.1	57.2	113.8	346.7	3491.7	1108.9	4569.0
7. Furniture	1949	258.9	N.A.	249.8	512.1	N.A.	1741.3	1162.0	2903.3
S.I.C.	1950	314.8	1216.2	273.3	571.9	927.8	1955.7	1818.7	3693.9
25-2591	1951	314.5	1170.5	272.6	553.0	894.1	2105.5	1885.1	3886.0
	1952	310.1	1249.4	267.2	553.7	953.7	2202.1	1830.2	3891.3

APPENDIX TABLE E (Continued)

	1962	356.3	1586.8	299.3	615.5	1172.4	2691.9	2568.9	5236.9
	1963	365.9	1673.8	306.8	623.9	1255.0	2876.2	2711.3	5497.6
	1964	376.5	1775.8	315.5	645.6	1329.2	2964.2	2844.3	5787.4
	1965	388.0	1942.8	335.0	680.7	1445.5	3276.4	2976.1	6234.9
8. Motor Vehicle & Parts									
	1949	678.3	N.A.	552.4	1103.2	N.A.	5967.9	11338.1	17306.0
S.I.C.	1950	720.8	5800.8	625.5	1281.8	3083.1	7748.6	14722.7	22471.2
3717	1951	721.3	3684.8	619.4	1217.3	3011.2	6994.3	13288.1	20282.3
	1952	656.9	3532.6	551.9	1338.0	2841.6	6739.6	12804.4	19544.1
	1962	621.6	4431.8	511.3	1097.4	3455.7	11185.4	21530.9	32705.7
	1963	649.9	4987.2	535.8	1192.6	3921.4	12445.2	23265.4	36290.0
	1964	681.7	5322.8	562.3	1226.4	4177.7	13110.6	24701.7	37575.4
	1965	770.8	6304.2	643.0	1414.3	5019.4	15977.7	30434.4	46213.3

Source: Bureau of the Census: Census of Manufactures, 1963. Annual Survey of Manufactures, Various Years. Appendix Table D (a)

APPENDIX TABLE F

SAMPLE INDUSTRIES OF CANADA: 1949-52 AND 1962-65:
CONSTANT (1961) U.S. DOLLARS

		All Employees		Production Workers					
		Total no. (000)	Total Earnings $ Mill.	Total no. (000)	Man-hrs. Mill.	Wages $ Mill.	Value Added $ Mill.	Cost of Fuel, Electricity and Material $ Mill.	Selling Value of Factory Shipments $ Mill.
EXPORT INDUSTRIES									
1. Flour Mills									
	1949	5.0	16.5	3.7	8.5	11.4	39.0	298.9	337.8
S.I.C.	1950	4.9	13.7	3.6	8.4	9.5	36.8	248.7	285.4
124	1951	4.9	16.0	3.6	8.4	11.2	43.8	288.1	331.9
	1952	5.0	18.9	3.6	8.2	12.9	46.8	306.2	352.9
	1962	4.3	15.4	2.6	5.4	8.7	36.8	159.3	196.3
	1963	4.4	16.4	2.6	5.4	8.9	35.5	163.6	198.5
	1964	4.5	17.6	2.6	5.8	9.8	44.8	196.5	241.4
	1965	4.3	16.8	2.5	5.2	9.9	39.9	161.1	200.8
2. Agrl. Implements									
	1949	16.6	54.0	13.9	30.2	42.4	96.7	119.4	216.1
S.I.C.	1950	16.2	47.3	13.2	26.9	37.0	74.6	88.6	163.2
311	1951	17.2	58.3	14.0	28.2	46.3	81.2	109.9	191.1
	1952	18.0	64.1	14.8	31.1	51.0	96.2	115.0	211.1
	1962	10.0	44.7	7.3	15.2	31.8	59.0	71.6	128.4
	1963	11.2	52.4	8.6	18.4	39.5	78.2	89.1	163.2
	1964	12.4	61.9	9.6	20.5	46.5	103.0	124.3	220.3
	1965	13.7	67.5	10.6	22.3	50.1	113.0	147.3	254.1
3. Pulp and Paper									
	1949	52.1	204.7	43.8	109.6	162.1	549.6	535.9	1085.4
S.I.C.	1950	52.3	184.5	43.8	112.2	145.6	557.2	482.9	1040.1
271	1951	57.3	199.5	47.9	121.6	158.2	635.7	522.9	1158.6
	1952	57.8	252.5	48.3	117.4	198.6	654.6	643.0	1297.5
	1962	64.6	321.2	53.7	177.8	255.6	798.2	760.4	1516.3
	1963	65.0	328.7	54.0	118.7	261.6	824.3	790.1	1616.8
	1964	67.7	351.5	56.4	125.3	281.8	894.3	878.4	1769.5
	1965	69.9	370.2	58.1	128.0	300.2	902.9	939.6	1838.4
4. Veneer and Plywood									
	1949	5.8	11.8	5.3	N.A.	10.2	22.1	19.6	41.8
S.I.C.	1950	6.5	11.7	6.0	N.A.	10.1	24.6	20.4	45.5
252	1951	7.2	14.0	6.6	N.A.	12.1	31.2	24.4	55.7
	1952	7.8	19.1	7.1	N.A.	16.7	35.7	32.3	68.0

APPENDIX TABLE F (continued)

	1962	12.1	42.9	10.8	23.0	36.5	67.4	84.9	150.9
	1963	13.0	45.3	11.7	24.7	38.8	73.8	93.8	165.2
	1964	13.8	49.5	12.4	26.1	42.6	79.7	98.8	176.1
	1965	14.3	53.6	12.8	27.5	45.8	83.8	102.8	184.2
5. Saw and Planning Mills									
	1949	72.8	91.3	60.0	90.8	75.6	168.0	203.1	371.1
S.I.C.	1950	79.5	86.2	64.2	123.7	11.0	174.6	207.0	375.9
2513	1951	83.5	98.5	67.5	127.4	81.7	192.7	245.9	438.5
	1952	91.9	121.0	65.1	156.3	99.2	223.7	286.1	501.2
	1962	50.0	164.5	40.3	85.7	131.4	272.3	361.4	627.2
	1963	51.7	175.5	40.5	88.4	139.0	298.7	426.1	683.0
	1964	52.5	183.3	43.6	93.8	148.9	318.9	436.9	733.3
	1965	52.7	189.1	44.5	95.5	156.3	319.0	440.3	743.5
6. Distilleries									
	1949	4.0	11.8	3.1	6.1	7.9	56.1	35.7	91.8
S.I.C.	1950	4.1	10.6	3.2	6.4	7.2	56.6	32.1	88.6
143	1951	4.6	13.5	3.7	7.3	9.3	71.1	47.6	118.7
	1952	4.8	15.5	3.8	7.0	10.9	77.6	49.6	127.2
	1962	4.7	22.4	2.9	6.0	12.2	106.8	53.6	158.8
	1963	4.6	22.7	2.7	5.7	12.0	118.4	57.4	171.3
	1964	4.7	23.2	2.7	5.8	12.3	127.7	60.0	182.8
	1965	5.0	26.2	2.9	6.3	13.9	136.6	65.0	198.0
7. Plastic and Synthetic Resins									
	1949	1.3	6.5	0.8	N.A.	3.8	17.8	21.0	38.8
S.I.C.	1950	1.4	4.5	0.9	N.A.	2.7	18.2	16.5	34.7
373	1951	1.6	6.4	1.0	N.A.	3.8	21.7	25.5	47.2
	1952	1.9	10.7	1.2	N.A.	6.3	25.0	35.1	57.3
	1962	3.5	19.0	2.0	4.4	9.9	56.5	65.7	121.0
	1963	3.6	20.2	2.0	4.5	10.7	61.6	71.7	133.7
	1964	3.8	22.6	2.2	4.9	12.0	74.6	79.9	154.9
	1965	3.8	23.8	2.2	5.1	12.7	70.8	83.9	154.7
DOMESTIC INDUSTRIES									
1. Soft Drinks									
	1949	7.8	20.0	6.0	N.A.	13.5	70.7	46.4	117.2
S.I.C.	1950	7.7	20.3	5.8	N.A.	13.5	67.7	45.9	113.5
141	1951	7.4	19.1	5.4	N.A.	12.2	66.0	42.3	108.3
	1952	7.6	21.0	5.4	N.A.	13.3	72.3	43.5	119.7
	1962	13.5	47.7	5.3	11.6	15.6	110.3	55.9	166.1
	1963	13.5	45.6	5.2	11.4	15.2	106.5	63.5	170.0
	1964	13.6	43.9	5.2	11.6	15.0	103.5	61.9	165.0
	1965	13.7	48.7	5.2	11.4	15.8	111.6	65.0	176.0

2. Bakeries									
	1949	31.8	77.4	26.9	60.2	63.3	127.4	146.6	282.6
S.I.C.	1950	31.1	75.7	26.4	60.0	62.0	124.1	146.5	270.6
129	1951	32.3	78.3	27.4	60.7	64.3	135.6	150.3	285.9
	1952	33.0	88.4	28.2	62.5	72.9	154.4	155.2	309.6
	1962	34.4	111.6	17.0	37.8	51.1	178.3	169.6	348.0
	1963	33.9	104.8	16.9	36.9	48.7	165.8	168.1	333.6
	1964	34.5	107.8	17.4	38.2	51.0	173.4	176.0	349.3
	1965	35.2	114.4	17.7	38.9	53.8	182.7	176.6	359.0
3. Printing and Publishing									
	1949	30.9	75.0	14.6	31.3	38.0	143.7	72.3	216.0
S.I.C.	1950	31.4	76.0	14.7	29.8	36.8	146.0	69.6	216.2
289	1951	31.9	85.2	15.2	32.0	43.1	158.2	78.9	227.1
	1952	32.4	95.8	15.5	31.6	48.1	178.3	87.1	265.5
	1962	32.5	154.4	15.5	31.1	75.1	277.8	96.2	374.0
	1963	32.4	157.3	15.4	30.7	75.4	279.0	96.5	375.6
	1964	32.1	171.8	15.0	30.2	82.5	317.0	107.0	423.1
	1965	33.5	182.1	15.4	30.9	85.7	338.0	111.0	447.5
4. Leather Tanneries									
	1949	4.6	11.2	4.0	N.A.	9.2	17.3	41.6	59.0
S.I.C.	1950	4.4	10.1	3.9	N.A.	8.1	16.6	40.9	57.5
172	1951	4.1	11.5	3.5	N.A.	9.1	13.9	50.8	64.7
	1952	3.9	9.4	3.3	N.A.	7.4	15.3	25.3	40.5
	1962	3.5	12.5	3.2	6.8	10.2	17.2	34.6	52.9
	1963	3.4	13.0	3.0	6.5	10.7	21.4	29.7	53.6
	1964	3.5	14.3	3.1	6.7	11.8	23.4	34.2	56.8
	1965	3.4	13.3	3.0	6.4	11.0	20.3	33.5	53.9
5. Vegetable oil Mills									
	1949	0.8	1.2	0.6	N.A.	0.7	5.0	22.9	27.9
S.I.C.	1950	0.8	1.4	0.5	N.A.	0.8	3.9	25.1	29.0
135	1951	0.8	1.2	0.5	N.A.	0.8	5.7	25.9	31.5
	1952	0.7	1.4	0.5	N.A.	0.8	3.8	24.8	28.6
	1962	0.6	2.5	0.4	0.8	1.5	7.6	55.0	62.7
	1963	0.6	2.7	0.4	0.9	1.6	9.3	63.2	72.2
	1964	0.6	2.7	0.4	0.9	1.6	9.3	67.6	76.4
	1965	0.6	2.7	0.4	0.9	1.7	9.3	74.2	83.4
6. Cement Manufacturers									
	1949	1.7	7.8	1.6	N.A.	7.2	34.0	22.7	56.7
S.I.C.	1950	1.8	7.6	1.7	N.A.	7.0	33.2	21.7	54.9
341	1951	1.9	8.4	1.8	N.A.	7.7	35.6	21.9	57.5
	1952	2.3	10.0	2.1	N.A.	9.1	41.1	23.2	62.2

APPENDIX TABLE F (continued)

	1962	3.7	18.8	2.6	5.8	12.5	76.2	30.9	106.3
	1963	3.6	18.3	2.5	5.5	12.0	78.1	30.4	108.7
	1964	3.6	18.8	2.5	5.5	12.3	84.3	31.8	117.8
	1965	3.8	20.8	2.6	6.0	13.8	88.7	36.0	123.4
7. Petroleum & Coal Products									
	1949	14.6	34.1	10.6	22.7	23.8	100.8	356.0	456.8
S.I.C.	1950	15.2	32.6	10.4	22.3	21.2	105.8	345.5	451.3
365,369	1951	15.6	36.7	10.5	21.9	23.6	127.0	374.1	501.2
	1952	16.9	42.0	11.3	23.4	26.7	149.0	365.9	514.9
	1962	11.1	63.4	7.5	16.2	40.8	265.2	949.8	1211.3
	1963	10.7	65.0	7.3	15.7	42.1	276.5	1059.5	1325.6
	1964	10.6	67.7	7.2	15.6	43.5	278.7	1095.0	1378.7
	1965	9.9	67.9	6.8	14.5	42.6	260.6	1147.2	1406.2
8. Fabricated Structural Metal									
	1949	7.1	20.2	5.6	12.0	14.1	47.7	34.5	82.2
S.I.C.	1950	7.4	24.2	5.6	12.8	16.7	48.1	40.8	88.9
302	1951	8.6	27.5	6.6	15.1	19.6	58.2	48.4	106.5
	1952	10.8	35.3	8.6	17.9	25.7	72.1	59.9	132.0
	1962	14.8	68.3	10.8	22.3	46.8	106.1	118.5	224.6
	1963	14.2	71.3	10.2	21.1	47.8	109.4	115.5	225.0
	1964	14.6	73.2	10.7	21.7	50.6	117.1	131.1	248.0
	1965	18.1	89.0	13.2	27.7	62.4	157.1	155.3	312.2
PROTECTED INDUSTRIES									
1. Tobacco Products									
	1949	10.7	22.0	9.2	20.2	17.4	58.8	114.3	173.1
S.I.C.	1950	10.3	19.6	8.8	18.7	15.4	56.5	106.8	163.2
151,153	1951	9.8	22.8	8.4	17.1	17.8	55.2	112.3	167.5
	1952	9.3	24.7	7.9	16.0	19.3	68.8	141.0	210.0
	1962	11.1	44.0	8.4	17.0	29.6	116.4	197.5	320.5
	1963	11.0	44.3	8.6	16.8	31.2	123.3	204.9	325.0
	1964	10.9	45.9	8.2	16.0	31.7	125.7	201.0	322.8
	1965	10.3	49.1	7.9	15.6	34.1	153.0	212.9	366.8
2. Gypsum Products									
	1949	1.0	3.2	0.9	N.A.	2.8	11.2	12.1	23.2
S.I.C.	1950	1.2	3.6	0.9	N.A.	2.3	11.5	10.8	22.3
245	1951	1.1	4.4	0.9	N.A.	3.0	12.9	12.5	25.4
	1952	1.2	5.2	0.9	N.A.	3.4	13.1	12.4	25.5
	1962	1.5	6.0	1.2	2.3	4.3	19.2	13.7	33.0
	1963	1.5	6.1	1.1	2.3	4.4	20.3	14.6	34.6
	1964	1.4	6.5	1.1	2.5	4.9	21.4	14.7	36.9
	1965	1.4	6.7	1.1	2.6	5.2	22.4	15.5	37.8

APPENDIX TABLE F (continued)

3. Knitting Mills									
	1949	16.3	21.9	12.6	47.7	25.6	55.7	48.1	103.8
S.I.C.	1950	25.3	30.5	22.3	45.2	24.1	52.5	48.7	101.2
231,239	1951	25.2	33.5	22.3	45.7	26.8	57.1	58.9	116.0
	1952	23.2	37.1	20.4	41.7	29.4	61.1	62.3	124.1
	1962	22.6	58.0	19.2	40.6	44.2	96.0	124.3	217.5
	1963	22.3	60.5	19.6	41.4	46.5	102.7	136.3	237.4
	1964	22.7	69.4	19.8	42.7	53.8	121.0	157.6	273.3
	1965	23.8	75.3	20.9	44.6	58.6	132.5	173.5	303.4
4. Leather Gloves									
	1949	2.1	3.1	1.8	N.A.	2.3	5.1	5.5	10.6
S.I.C.	1950	2.1	3.2	1.9	N.A.	2.6	4.7	6.3	11.1
175	1951	2.3	3.5	2.0	N.A.	2.8	6.1	7.5	13.0
	1952	2.2	3.9	1.9	N.A.	3.1	7.1	7.2	13.3
	1962	1.7	3.8	1.2	2.5	2.8	5.5	4.9	10.4
	1963	1.6	3.9	1.3	2.7	2.9	5.9	5.2	11.2
	1964	1.7	4.0	1.4	2.7	3.0	6.3	5.6	11.6
	1965	1.8	4.2	1.4	2.8	3.1	5.8	5.8	11.5
5. Sugar Refineries									
	1949	3.6	12.0	3.1	N.A.	9.3	32.0	125.6	157.7
S.I.C.	1950	3.9	10.0	3.4	N.A.	7.8	33.3	117.8	151.0
133	1951	3.6	10.7	3.0	N.A.	8.2	29.9	114.8	144.6
	1952	3.5	11.6	2.9	N.A.	8.9	34.6	100.4	135.0
	1962	3.1	13.8	2.4	5.4	9.6	44.9	85.1	128.1
	1963	3.2	8.1	2.5	5.5	5.5	29.6	91.3	114.7
	1964	3.2	10.3	2.5	5.5	6.9	28.7	105.1	139.8
	1965	3.2	16.4	2.4	5.4	10.7	49.6	93.9	145.7
6. Medicine and Pharmacy									
	1949	7.7	19.5	4.6	9.4	9.4	58.3	28.4	86.8
S.I.C.	1950	7.5	17.6	4.6	9.2	8.5	54.1	26.8	80.8
374	1951	7.5	19.3	4.5	9.5	9.3	61.1	29.6	90.7
	1952	7.5	21.9	4.4	8.8	10.1	64.2	30.1	94.3
	1962	10.1	46.0	4.2	9.1	13.4	115.7	49.6	164.7
	1963	10.4	49.4	4.2	9.1	14.0	130.4	52.1	181.4
	1964	10.7	53.4	4.2	8.7	15.0	138.9	60.3	196.7
	1965	11.2	58.5	4.4	9.1	16.3	152.8	74.2	223.8
7. Furniture									
	1949	26.9	63.7	22.9	49.0	50.1	104.5	85.4	194.9
S.I.C.	1950	27.3	64.2	23.1	49.4	49.9	101.8	91.8	193.7
261,264	1951	27.3	67.6	22.7	48.7	52.0	108.3	101.6	209.9
266	1952	27.2	75.5	22.5	47.8	57.5	121.5	112.6	234.0

	1962	34.6	117.3	26.7	58.5	81.7	178.0	171.9	346.3
	1963	36.0	123.9	27.8	60.9	86.6	190.0	185.3	373.1
	1964	38.1	134.5	29.5	64.6	94.9	207.7	206.4	409.9
	1965	40.5	147.1	31.7	68.8	104.9	231.2	226.4	453.3
8. Motor vehicle and Parts									
	1949	44.9	137.8	41.2	75.6	107.3	296.5	387.6	740.3
S.I.C.	1950	49.1	140.9	40.5	90.6	110.3	361.7	483.2	844.9
323,325	1951	51.7	173.8	42.7	90.6	136.1	404.8	644.4	1061.9
	1952	52.9	211.4	43.4	90.6	163.6	447.8	715.7	1185.7
	1962	49.2	258.2	35.5	80.3	174.7	518.4	959.2	1471.3
	1963	57.2	310.4	41.8	94.8	215.8	665.2	1216.2	1849.4
	1964	65.5	363.8	48.7	108.2	254.2	698.3	1422.0	2083.3
	1965	74.4	447.8	55.7	126.4	319.2	858.0	1738.9	2575.7

Sources: D.B.S.: General Review of Manufacturing Industries of Canada, 31-201.

D.B.S.: Manufacturing Industries of Canada, Summary for Canada, 31-203.

D.B.S.: Annual Census of Manufactures, various Industries, 1962-65.

Appendix Tables D (b) and K.

APPENDIX TABLE G

CANADIAN MANUFACTURING INDUSTRIES IN 1965:
CURRENT CANADIAN DOLLARS

S.I.C.			Total Employees: Total no. (000)	Total Employees: Total Earnings $ Mill.	Production Workers: Total no. (000)	Production Workers: Man-Hrs. Mill.	Production Workers: Wages $ Mill.	Value Added $ Mill.	Cost of Fuel, Electricity and Material $ Mill.	Value of Factory Factory Shipments $ Mill.
		EXPORT INDUSTRIES								
124	1.	Flour Mills	4.3	20.5	2.5	5.2	11.1	48.5	196.1	244.5
143	2.	Distilleries	5.0	30.2	2.9	6.3	16.0	157.6	75.0	228.4
213	3.	Cordage and Twine	1.1	4.9	0.9	1.8	3.6	8.2	15.9	26.3
2513	4.	Saw and Planning Mills	52.7	227.9	44.5	95.5	188.3	384.5	521.7	896.2
252	5.	Veneer and Plywood	14.3	64.7	12.8	27.5	55.3	101.2	124.1	222.4
271	6.	Pulp and Paper	69.9	423.3	58.1	128.0	339.4	1033.5	1007.6	2104.4
311	7.	Agricultural Implements	13.7	75.7	10.6	22.3	56.3	126.7	165.3	285.1
318	8.	Office and Store Machines	9.9	63.6	2.5	5.4	13.5	63.5	44.8	105.1
321	9.	Air craft and Parts	27.8	159.5	17.2	36.2	88.7	214.5	187.2	394.4
326	10.	Rail Road Rolling Stock	6.0	33.2	4.7	10.0	27.2	58.9	105.1	163.0
369	11.	Other Petroleum & Coal Products	0.5	3.2	0.3	0.7	1.5	7.7	8.0	15.7
373	12.	Plastic and Synthetic Resins	3.8	23.9	2.2	5.1	12.8	71.1	84.3	155.5
381	13.	Scientific and Professional Equip.	17.9	93.0	10.4	21.8	43.7	141.3	109.2	244.2
		DOMESTIC INDUSTRIES								
---	1.	Pen, Pencil & Typewriter Supplies	1.1	4.8	0.7	1.6	2.2	10.3	8.0	18.1
101	2.	Slaughtering & Meat Processing	30.5	164.3	21.8	46.1	111.7	292.6	1346.8	1632.8
103	3.	Poultry Processors	6.0	18.5	5.2	10.8	14.4	31.9	160.7	192.6
105	4.	Dairy Factories	32.3	139.6	13.6	29.9	53.5	250.6	741.4	990.2
112	5.	Fruit and Vegetable Canners	19.7	74.1	14.9	30.9	47.3	176.1	272.4	435.8
123	6.	Feed Manufacturers	8.9	37.6	4.7	10.4	18.2	79.1	314.0	392.8
376	7.	Soap and Cleaning Compounds	5.7	35.7	2.4	5.3	12.9	103.3	96.7	198.1
125	8.	Breakfast cereals	1.4	7.2	1.0	2.1	5.1	28.2	19.5	47.7
128	9.	Biscuits	6.6	26.1	4.8	9.7	16.1	54.6	48.1	102.7
129	10.	Bakeries	35.2	141.5	17.7	38.9	66.5	225.9	218.4	444.0
131	11.	Confectionary	10.9	41.0	8.4	17.2	27.1	91.6	96.9	187.6
135	12.	Vegetable oils	0.6	3.1	0.4	0.9	1.9	10.6	84.6	95.0
141	13.	Soft Drinks	13.7	62.1	5.2	11.4	20.2	143.2	83.3	225.7
172	14.	Leather Tanneries	3.4	14.9	3.0	6.5	12.3	22.6	37.3	60.2
179	15.	Luggage, Handbag, Leather Bag	5.7	18.6	4.8	9.8	13.6	28.8	27.1	55.6
193	16.	Wool Yarn Mills	2.1	6.8	1.7	3.6	5.0	10.8	16.9	28.3
221	17.	Canvas Products	2.1	7.1	1.5	3.0	4.2	11.0	13.4	24.2
223	18.	Cotton and Jute Bags	1.1	4.0	0.9	1.9	2.6	7.6	23.4	31.2
247	19.	Hat and Cap	3.2	11.4	2.6	5.0	7.9	15.3	11.4	26.7
289	20.	Printing and Publishing	33.5	181.0	15.4	30.9	85.3	336.0	110.4	446.9
292	21.	Steel, Pipe and Tube Mills	4.8	29.5	3.7	8.1	21.6	58.2	142.7	198.6
294	22.	Iron Foundaries	11.7	63.1	10.0	22.1	52.0	93.6	76.0	167.5
296	23.	Aluminum Rolling & Casting	4.7	25.8	3.4	7.3	17.2	43.9	113.0	154.7

306	24.	Hardware, Tool, Cutlery	13.7	66.9	10.4	22.5	45.8	123.7	81.3	202.2
315	25.	Misc. Machines & Equipment	44.0	242.7	28.4	62.5	147.1	419.7	421.0	797.2
327,328	26.	Ship Boat Building & Repairs	20.1	106.9	16.8	35.9	85.4	168.2	131.0	299.2
335	27.	Communication Equipment	33.5	172.3	21.7	46.0	94.8	275.7	176.5	430.5
336	28.	Electrical Industrial Equipment	21.7	121.2	14.0	30.1	71.0	220.6	158.8	375.5
337	29.	Battery Manufacturing	2.4	11.3	1.6	3.3	6.8	24.7	31.1	54.1
341	30.	Cement Manufacturing	3.8	24.4	2.6	6.0	16.2	104.0	42.3	144.8
343	31.	Lime Manufacturers	0.8	3.9	0.6	1.4	3.1	10.8	5.4	16.2
347	32.	Concrete Products	11.2	52.5	8.8	19.7	39.4	106.1	79.8	183.7
348	33.	Ready Mix Concrete	6.6	36.9	4.9	11.9	27.2	81.1	137.5	218.3
212	34.	Thread Mills	1.0	3.8	0.7	1.5	2.2	8.2	9.5	16.5
351	35.	Clay Products	3.5	16.3	2.9	6.5	12.5	31.1	12.2	42.8
353	36.	Stone Products	1.2	5.5	0.8	1.8	3.4	8.5	5.5	13.6
355	37.	Asbestos Products	2.8	16.4	2.0	4.3	10.8	30.3	29.9	59.9
356	38.	Glass and Glass Products	10.9	54.8	9.0	19.7	43.1	95.3	74.2	168.3
365	39.	Petroeum Refineries	9.4	65.7	6.5	13.8	41.9	257.6	1159.9	1414.9
357	40.	Paint and Varnish	7.8	42.2	3.2	7.0	14.9	94.0	100.7	193.6
377	41.	Toilet Preparations	4.4	20.6	2.3	4.5	7.1	69.7	35.1	103.8
393	42.	Sporting Goods	4.5	17.7	3.4	7.4	12.3	28.5	22.7	51.1
397	43.	Signs and Displays	5.0	24.8	3.4	7.3	14.9	32.9	20.6	52.9
---	44.	Button, Buckle & Fastners	1.6	6.5	1.2	2.7	4.2	11.2	7.7	19.0
---	45.	Toys and Games	3.6	11.6	3.0	6.2	8.2	21.6	23.4	43.9
---	46.	Venetian Blind Mfg.	0.2	0.7	0.1	0.2	0.3	1.0	1.1	2.1
101	47.	Animal oils and Fats	0.6	3.4	0.4	1.0	1.9	10.2	11.0	20.9
302	48.	Fabricated Structural Metal	18.1	106.1	13.2	27.7	74.4	187.4	185.0	372.3
175	49.	Breweries	9.5	60.1	5.0	10.9	29.3	213.4	85.2	298.4
286	50.	Commercial Printing	36.3	190.7	25.0	51.9	120.1	296.4	194.8	488.3
331,332	51.	Electrical Appliances	18.6	89.9	13.4	27.4	59.4	171.0	220.3	388.3
214	52.	Narrow Fabric Mills	2.7	9.5	2.3	5.1	7.3	17.2	17.7	34.5
197	53.	Wool Cloth Mills	7.1	27.3	6.1	14.0	21.3	47.9	56.0	103.2
		PROTECTED INDUSTRIES								
133	1.	Sugar Refineries	3.2	17.2	2.4	5.4	11.2	52.0	98.4	152.8
151-153	2.	Tobacco Products	10.3	50.8	7.9	15.6	35.3	158.4	220.4	379.8
174	3.	Shoe Factories	20.5	67.0	17.8	36.0	51.6	102.0	97.8	199.3
175	4.	Leather Gloves & Mittens	1.8	5.0	1.4	2.8	3.7	6.9	6.9	13.7
201	5.	Synthetic Textiles	20.2	87.0	15.9	34.3	62.2	172.3	210.7	373.8
216	6.	Carpet, Mat and Rug	3.3	13.5	2.7	5.9	10.0	33.5	48.5	79.9
231,239	7.	Knitting Mills	23.8	76.7	20.9	44.6	59.7	134.9	176.7	308.9
243,244,245	8.	Men, women, Children Clothing	74.1	246.0	63.1	125.5	180.8	377.3	487.0	857.1
246	9.	Fur goods	3.1	14.4	2.2	4.3	9.6	24.1	41.4	64.7
---	10.	Shash, Door, Plant Mills	13.2	53.8	9.7	21.6	36.4	84.0	106.0	189.1
256	11.	Wooden Box	3.1	11.6	2.6	5.8	8.8	19.2	16.0	35.1
261	12.	Household Furniture	23.9	93.7	18.8	41.0	68.0	143.8	140.1	281.9
264	13.	Office Furniture	4.3	19.1	3.2	6.9	13.0	33.4	24.7	56.8
266	14.	Other Furniture	12.4	52.2	9.7	20.8	36.6	81.9	89.0	169.4
334	15.	Household Radio, T.V.	7.0	31.1	4.5	9.6	16.5	59.8	101.9	155.1

APPENDIX TABLE G (continued)

375	16. Gypsum Products	1.4	7.4	1.1	2.6	5.7	24.8	17.1	41.8
357	17. Abrasive Manufacturers	3.0	18.7	2.2	4.8	12.8	31.0	34.7	65.0
374	18. Medicine & Pharmacy	11.2	62.2	4.4	9.1	17.3	162.3	78.9	237.8
383	19. Broom & Brush	2.9	12.4	1.7	3.6	5.1	18.1	19.1	33.6
324	20. Truckbody & Trailors	5.5	25.8	4.1	8.2	17.6	43.9	59.8	103.0
161,163,169	21. Rubber Industries	26.2	134.2	18.2	38.8	85.9	247.4	229.8	474.5
354	22. Mineral wool	1.1	5.5	0.8	1.7	4.1	17.1	10.2	27.2
323,325	23. Motor Vehicle & Parts	74.4	500.0	55.8	126.4	356.4	958.0	1941.7	2875.9
382	24. Jewellery and Silverware	5.2	22.7	3.8	8.2	14.4	36.5	47.0	82.5

Source: Annual Census of Manufactures, Various Industries, 1965.

APPENDIX TABLE H

CANADIAN MANUFACTURING INDUSTRIES IN 1965
CURRENT U.S. DOLLARS

		Total Employees		Production Workers					
S.I.C.		Total no. (000)	Total Earnings $ Mill.	Total no. (000)	Man Hrs. Mill.	Wages $ Mill.	Value Added $ Mill.	Cost of Fuel, Electricity and Material $ Mill.	Value of Factory Factory Shipments $ Mill.
	EXPORT INDUSTRIES								
124	1. Flour Mills	4.3	19.1	2.5	5.2	10.3	44.8	181.1	225.7
143	2. Distilleries	5.0	28.1	2.9	6.3	14.9	145.5	69.3	210.9
213	3. Cordage and Twine	1.1	4.6	0.9	1.8	3.3	7.5	14.7	24.3
2513	4. Saw and Planning Mills	52.7	212.0	44.5	95.5	175.2	355.0	481.7	827.6
252	5. Veneer and Plywood	14.3	60.2	12.8	27.5	51.4	93.4	114.6	205.4
271	6. Pulp and Paper Mills	69.9	393.8	58.1	128.0	315.7	954.3	993.2	1943.1
311	7. Agricultural Implements	13.7	70.4	10.6	22.3	52.4	117.0	152.6	263.2
318	8. Office and Store Machines	9.9	59.2	2.5	5.4	12.6	58.7	41.4	97.0
321	9. Aircraft and Parts	27.8	148.4	17.2	36.2	82.5	198.1	172.8	364.1
326	10. Railroad Rolling Stock	6.0	30.9	4.7	10.7	22.5	54.4	97.0	150.5
369	11. Other Petroleum & Coal Products	0.5	3.0	0.3	0.7	1.4	7.1	7.4	14.5
373	12. Plastic and Synthetic Resins	3.8	22.2	2.2	5.1	11.9	65.7	77.9	143.6
381	13. Scientific and Professional Equip.	17.9	86.5	10.4	21.8	40.7	130.5	100.9	225.5
	DOMESTIC INDUSTRIES								
---	1. Pen, Pencil & Typewriter Supplies	1.1	4.5	0.7	1.6	2.0	9.5	7.4	16.7
101	2. Slaughtering & Meat Processing	30.4	152.8	21.8	46.1	103.9	270.2	1243.6	1507.7
103	3. Poultry Processors	6.0	17.2	5.2	10.8	13.4	29.4	148.7	177.8
105	4. Dairy Processors	32.3	129.9	13.6	29.9	49.8	231.4	684.6	914.3
112	5. Fruit and Vegetable Canners	19.7	68.9	14.9	30.9	44.0	162.6	251.5	402.4
123	6. Feed Manufacturers	8.9	35.0	4.7	10.4	16.9	73.0	289.9	362.7
376	7. Soap and Cleaning Compounds	5.7	33.2	2.4	5.3	12.0	95.3	89.3	182.9
125	8. Breakfast Cereals	1.4	6.7	1.0	2.1	4.7	26.0	18.0	44.1
128	9. Biscuits	6.6	24.3	4.8	9.7	15.0	50.4	44.4	94.8
129	10. Bakeries	35.2	131.6	17.7	38.9	61.9	208.6	201.7	410.0
131	11. Confectionary	10.9	38.1	8.4	16.2	25.2	84.6	89.5	173.2
135	12. Vegetable oils	0.6	2.9	0.4	0.9	1.8	9.8	78.1	87.7
141	13. Soft Drinks	13.7	57.8	5.2	11.4	18.8	132.2	76.9	208.4
172	14. Leather Tanneries	3.4	13.9	3.0	6.5	11.4	20.9	34.5	55.6
179	15. Luggage, Handbag, Leather bag.	5.7	17.3	4.8	9.8	12.7	26.5	25.0	51.3
193	16. Wool, Yarn Mills	2.1	6.3	1.7	3.6	4.7	10.0	15.6	26.1
221	17. Canvas Products	2.1	6.6	1.5	3.0	3.9	10.1	12.4	22.3
223	18. Cotton and Jute Bags	1.1	3.7	0.9	1.9	2.4	7.0	21.6	28.8
247	19. Hat and Cap	3.2	10.6	2.6	5.0	7.3	14.2	10.6	24.7
289	20. Printing and Publishing	33.5	168.4	15.4	30.7	79.3	310.3	101.9	410.8
292	21. Steel, Pipe and Tube Mills	4.8	27.4	3.7	8.1	20.1	53.8	131.8	183.4
294	22. Iron Founderies	11.7	58.7	10.0	22.1	48.4	86.4	70.2	154.6
296	23. Aluminum Rolling & Casting	4.7	24.0	3.4	7.3	16.0	40.5	104.4	142.9

306	24.	Hardware, Tool, Cutlery	13.7	62.2	10.4	22.5	42.6	114.2	75.1	186.7
315	25.	Misc. Machines & Equipment	44.0	225.8	28.4	62.5	136.8	387.6	388.7	736.1
327,328	26.	Ship, Boat Building & Repairs	20.7	99.4	16.8	35.9	79.4	155.3	120.9	276.3
335	27.	Communication Equipment	33.5	160.3	21.7	46.0	88.2	254.5	162.9	397.5
336	28.	Electrical Industrial Equipment	21.7	112.7	14.0	30.1	66.0	203.7	146.7	346.7
337	29.	Battery Manufacturing	2.4	10.5	1.6	3.3	6.3	22.8	28.7	50.0
341	30.	Cement Manufacturing	3.8	22.7	2.6	6.0	15.1	96.1	39.0	133.7
343	31.	Lime Manufacturers	0.8	3.6	0.6	1.4	2.9	10.0	5.0	14.9
347	32.	Concrete Products	11.2	48.8	8.8	19.7	36.7	98.0	73.7	169.6
348	33.	Ready Mix Concrete	6.6	34.3	4.9	11.9	25.3	74.9	127.0	201.6
212	34.	Thread Mills	1.0	3.5	0.7	1.5	2.0	7.5	8.7	15.2
351	35.	Clay Products	3.5	15.2	2.9	6.5	11.6	28.7	11.3	39.5
353	36.	Stone Products	1.2	5.1	0.8	1.8	3.2	7.9	5.1	12.6
355	37.	Asbestos Products	2.8	15.3	2.0	4.3	10.0	27.9	27.6	55.3
356	38.	Glass and Glass Products	10.9	51.0	9.0	19.7	40.1	88.0	68.5	155.4
365	39.	Petroleum Refineries	9.4	61.1	6.5	13.8	39.0	237.8	1071.0	1306.5
375	40.	Paint and Varnish	7.8	39.3	3.2	7.0	13.9	86.8	93.0	178.7
377	41.	Toilet Preparations	4.4	19.2	2.3	4.5	6.6	64.4	32.4	95.8
393	42.	Sporting Goods	4.5	16.5	3.4	7.4	11.4	26.3	21.0	47.2
397	43.	Signs and Displays	5.0	23.1	3.4	7.3	13.9	30.3	19.0	48.9
---	44.	Button, Buckles & Fastners	1.6	6.0	1.2	2.7	3.9	10.3	7.1	17.5
---	45.	Toys and Games	3.6	10.8	3.0	6.2	7.6	20.0	21.6	40.6
---	46.	Venetian Blind Mfg.	0.2	0.7	0.1	0.2	0.3	0.9	1.0	1.9
101	47.	Animal oils and fats	0.6	3.2	0.4	1.0	1.8	9.5	10.1	19.3
302	48.	Fabricated Structural Metal	18.0	98.7	13.2	27.7	69.2	173.0	170.8	343.8
145	49.	Breweries	9.5	55.9	5.0	10.9	27.3	197.0	78.7	275.6
286	50.	Commercial Printing	36.3	177.4	25.0	51.9	111.7	273.7	179.8	450.9
331,332	51.	Electrical Appliances	18.6	83.6	13.4	27.4	55.1	157.9	203.4	358.5
214	52.	Narrow Fabric Mills	2.7	8.8	2.3	5.1	6.8	15.9	16.3	31.9
197	53.	Wool Cloth Mills	7.1	25.4	6.1	14.0	19.8	44.2	51.7	95.3
		PROTECTED INDUSTRIES								
133	1.	Sugar Refineries	3.2	16.0	2.4	5.4	10.4	48.0	90.9	141.1
151-153	2.	Tobacco Products	10.2	47.3	7.7	15.6	32.8	136.1	203.5	305.6
174	3.	Shoe Factories	20.5	62.3	17.8	36.0	48.0	94.1	90.3	184.0
175	4.	Leather Gloves & Mittens	1.8	4.7	1.4	2.8	3.4	6.4	6.4	12.7
201	5.	Synthetic Textile Mills	20.2	80.9	15.9	34.3	57.9	159.1	194.6	345.2
216	6.	Carpet, Mat and Rug	3.3	12.6	2.7	5.8	9.3	30.9	44.7	73.8
231,239	7.	Knitting Mills	23.8	71.3	20.9	44.6	55.5	124.1	163.1	285.2
243.244,245	8.	Men, Women, Children clothing	90.9	228.8	67.2	133.7	168.2	378.1	470.3	841.7
246	9.	Fur Goods	3.1	13.4	2.2	4.3	8.9	22.3	38.3	59.7
---	10.	Sash, Door and Plant Mills	13.2	50.0	9.7	21.6	33.9	77.6	97.8	174.6
256	11.	Wooden Box	3.1	10.8	2.6	5.8	8.2	17.7	14.8	32.4
261	12.	Household Furniture	23.9	87.2	18.8	41.0	63.3	132.8	129.4	260.3
264	13.	Office Furniture	4.3	17.8	3.2	6.9	12.1	30.9	22.8	52.4
266	14.	Other Furniture	12.4	48.6	9.7	20.8	34.0	75.6	82.2	156.4
334	15.	Household Radio, I.V.	7.0	28.9	4.5	9.6	15.3	55.2	94.0	143.2

345	16.	Gypsum Products	1.4	6.9	1.1	2.6	5.3	22.9	15.8	38.6
357	17.	Abrasive Manufacturers	3.0	17.4	2.3	4.8	11.9	28.6	32.0	60.0
374	18.	Medicine and Pharmacy	11.2	57.9	4.4	9.1	16.1	149.9	72.8	219.5
383	19.	Broom and Brush	2.9	11.5	1.7	3.6	4.7	16.7	13.9	30.8
324	20.	Truck body & Trailors	5.5	24.0	4.1	8.2	16.4	40.5	55.2	95.1
161,163,169	21.	Rubber Industries	26.2	124.8	18.2	38.8	79.9	228.5	212.2	438.1
354	22.	Mineral Wool	1.0	5.1	0.8	1.7	3.8	15.8	9.4	25.1
323,325	23.	Motor vehicle & Parts	74.4	465.1	55.8	126.4	331.5	884.6	1792.8	2655.5
382	24.	Jewellery & Silverware	5.2	21.1	3.8	8.2	13.4	33.7	43.4	76.1

Source: D.B.S.: Annual census of Manufactures, Various Years, 1965.

Appendix Table K

APPENDIX TABLE I

AMERICAN MANUFACTURING INDUSTRIES IN 1965: CURRENT U.S. DOLLARS

S.I.C.			Total Employees: Total no. (000)	Total Employees: Total Earnings $ Mill.	Production Workers: Total no. (000)	Production Workers: Man hrs. Mill.	Production Workers: Wages $ Mill.	Value Added $ Mill.	Cost of Fuel, Electricity and Material $ Mill.	Value of Factory Factory Shipments $ Mill
		EXPORT INDUSTRIES								
2041	1.	Flour Mills	20.7	133.0	15.4	34.2	89.9	402.8	1742.5	2145.2
2085	2.	Distilleries	19.0	126.1	14.9	29.6	91.6	723.3	577.1	1301.7
2298	3.	Cordage and Twine	9.1	38.3	7.6	15.4	27.1	74.9	93.7	167.1
242	4.	Saw and Planning Mills	238.8	1012.4	215.0	427.5	848.4	1634.5	2157.3	3851.2
2432	5.	Veneer and Plywood	71.7	385.7	65.2	138.0	330.3	638.1	953.4	1588.4
2611,2621,2631	6.	Pulp and Paper Mills	210.9	1538.2	170.5	382.5	1180.6	3768.0	3849.4	7599.3
3522	7.	Agricultural Implements	123.2	817.8	93.9	188.5	572.3	1620.7	1888.9	3464.1
357	8.	Office and Store Machines	163.0	1213.8	101.6	206.5	630.9	2808.4	1772.5	4310.1
372	9.	Aircraft and Parts	642.3	5241.0	374.9	781.8	2595.4	8492.7	6261.4	14527.9
374	10.	Railroad Rolling Stock	57.7	416.7	46.3	92.5	315.9	815.8	1266.3	2209.5
299	11.	Other Petroleum & Coal Prod.	8.9	63.3	4.9	10.0	28.5	235.8	328.2	561.6
2821	12.	Plastic & Synthetic Resins	65.5	495.2	44.3	92.9	300.0	1474.5	1632.8	3096.2
38	13.	Scientific & Professional E.	327.7	2206.1	225.4	455.9	1258.5	5046.3	2742.0	7624.2
		DOMESTIC INDUSTRIES								
395	1.	Pen, Pencil & Typewriter S.	33.4	175.4	24.7	49.0	103.9	378.4	281.6	659.5
2011,2031	2.	Slaughtering & Meat Proc.	227.8	1501.6	192.0	347.9	1084.2	2559.6	13405.0	16091.5
2015	3.	Poultry Processors	71.9	230.9	65.5	126.6	190.9	470.6	2008.6	2474.1
202	4.	Dairy Factories	246.0	1416.4	109.9	238.6	579.7	3309.9	8244.9	11573.5
2033	5.	Fruit & Vegetable Canners	99.7	403.9	87.2	164.8	315.4	1173.9	1809.7	2974.9
2042	6.	Feed Manufacturers	51.4	282.7	32.2	72.0	158.9	977.4	2983.7	3956.0
2841	7.	Soap & Cleaning Compounds	30.1	219.2	19.8	39.9	128.1	1216.6	1063.7	2280.8
2043	8.	Breakfast cereals	11.9	84.2	10.0	19.8	65.8	415.9	293.8	707.1
2052	9.	Biscuits	42.4	219.9	33.9	66.8	158.4	673.1	563.3	1234.8
2051	10.	Bakeries	234.5	1353.0	1353.0	129.7	265.5	671.9	2509.5	4714.9
2071	11.	Confectionary	65.2	295.1	54.6	106.2	212.5	723.5	865.9	1582.5
2091,2092,2093	12.	Vegetable oils	16.7	92.4	12.6	29.6	61.7	301.9	2238.4	2527.7
2086	13.	Soft Drinks	113.4	611.2	41.8	89.6	181.5	1352.8	1128.5	2476.2
2111	14.	Leather Tanneries	31.7	178.6	27.6	56.3	137.8	332.7	531.5	850.3
317	15.	Luggage, Handbag, Leather Bag	36.9	139.9	31.7	60.8	105.0	233.1	211.6	443.6
2283	16.	Wool, Yarn Mills	15.6	64.3	14.1	29.3	53.1	124.5	284.9	405.2
2394	17.	Canvas Products	12.7	50.1	9.9	19.0	34.4	82.7	101.2	183.9
2393	18.	Cotton and Jute Bags	6.6	26.6	5.6	11.3	18.8	45.8	140.6	191.2
2352	19.	Hat and Cap	13.6	56.0	12.0	22.7	43.2	72.4	78.5	152.7
2711,2721,273,2741	20.	Printing and Publishing	962.8	6168.0	583.2	1141.3	3507.7	11877.6	6452.8	18273.0
3317	21.	Steel, Pipe and Tube Mills	24.9	175.1	19.8	41.3	129.1	411.5	613.4	975.3
3321,3322	22.	Iron Foundaries	159.0	1094.2	137.5	297.3	899.9	1824.8	1190.1	3037.5
3352,3361	23.	Aluminum Rolling & Casting	97.4	695.7	79.0	167.9	529.6	1141.1	2296.2	3409.1
342	24.	Hardware tool, cutlery	152.5	962.3	121.2	249.4	692.8	2084.6	1344.4	3391.8
353,354,355,356	25.	Misc. Machinery & Equipment	999.9	7293.9	719.4	1375.8	4784.5	13652.4	9764.1	23037.0
373	26.	Ship,Boat Building & Repairs	157.7	1075.8	132.5	269.1	840.0	1414.9	1080.9	2509.1

366,367	27.	Communication Equipment	771.0	512.7	498.3	1010.8	2739.8	9081.4	5354.2	14168.5
361,362	28.	Electrical Industrial Equip.	326.9	2174.2	233.6	481.0	1359.3	4237.5	2874.7	7034.6
3691,3692	29.	Battery Manufacturing	27.4	169.9	21.4	44.3	123.4	425.6	427.0	838.5
3241	30.	Cement	34.3	242.3	27.8	55.5	180.5	836.7	403.5	1244.1
3274	31.	Lime Manufacturers	7.1	43.9	5.8	12.5	32.4	109.9	84.3	192.3
3271	32.	Concrete Products	80.8	437.2	61.2	127.8	296.4	897.2	730.6	1621.3
3273	33.	Ready Mix Concrete	73.9	448.6	48.9	97.4	--	1034.2	1402.5	2439.4
2284	34.	Thread Mills	10.5	45.2	8.8	18.8	35.2	84.5	139.9	225.2
325	35.	Clay Products	66.8	350.3	56.3	115.0	267.9	627.5	344.2	967.8
3281	36.	Stone Products	17.6	90.3	14.5	28.9	69.2	132.8	85.3	218.3
3292	37.	Asbestos Products	21.0	131.7	16.7	34.6	99.9	302.4	267.5	568.0
3211,322,3231	38.	Glass and Glass Products	155.6	957.5	134.4	269.8	786.4	2078.2	1213.8	3273.1
2911	39.	Petroleum Refineries	109.8	888.5	78.9	154.1	592.7	3519.8	13952.8	17462.7
2851	40.	Paint and Varnish	64.6	449.7	35.5	72.6	205.9	1200.6	1574.3	2765.9
2844	41.	Toilet Preparations	38.6	217.4	24.4	47.2	107.1	1512.9	712.1	2208.1
3949,3943	42.	Sporting Goods	46.2	216.1	36.6	71.6	153.0	438.5	446.9	871.3
3993	43.	Signs and Displays	45.2	272.6	38.3	72.6	183.2	433.9	292.9	730.9
3963,3964	44.	Buttons, Buckles & Fastners	26.8	124.4	22.2	43.0	88.3	270.5	199.4	464.2
3941,3942	45.	Toys and Games	73.5	309.8	65.0	113.3	210.7	649.3	598.9	1225.0
2591	46.	Venetian Blind Mfg.	11.7	56.3	8.3	17.4	36.1	111.5	121.0	226.8
2094	47.	Animal oils and Fats	139.2	87.4	10.2	23.6	57.6	247.0	414.7	656.8
344	48.	Fabricated Structural Metal	344.6	2173.5	225.6	532.5	1435.6	3976.2	4541.6	8345.4
2082	49.	Breweries	60.4	488.1	40.6	78.7	310.4	1361.6	1139.1	2497.2
275	50.	Commercial Printing	321.1	2087.0	246.1	488.8	1496.6	3303.6	2282.1	5553.3
363	51.	Electrical Appliances	185.8	999.7	126.4	255.7	714.6	2394.4	2474.2	4840.4
2241	52.	Narrow Fabric Mills	23.7	104.5	21.0	42.6	81.2	193.2	201.6	385.0
2231	53.	Wool Cloth Mills	44.0	210.8	36.6	80.9	164.1	409.0	692.1	1095.9
		PROTECTED INDUSTRIES								
206	1.	Sugar Refiniers	11.2	85.0	8.5	17.9	62.5	275.9	914.1	1181.6
2121,2131	2.	Tobacco Products	61.3	295.9	55.0	102.7	248.2	1662.2	1605.9	3266.2
314	3.	Shoe Factories	217.2	827.8	196.8	365.3	674.3	1420.5	1192.3	2603.0
3151	4.	Leather gloves & Mittens	7.2	24.1	6.5	11.2	19.0	37.4	47.6	81.2
2221	5.	Synthetic Textile Mills	94.4	443.5	85.2	188.7	370.8	826.9	1284.2	2115.9
227	6.	Carpet, Mat and Rug	40.2	189.7	33.7	74.8	142.0	508.9	1011.4	1496.6
225	7.	Knitting Mills	231.2	895.8	206.6	398.0	711.5	1643.7	2329.6	3915.8
2231,232,233,234,236	8.	Men, Women, Children Clothing	1054.7	3821.9	938.8	1714.8	3000.8	6542.9	7698.5	14229.5
2371	9.	Fur Goods	8.9	57.6	7.7	14.0	45.0	113.1	234.5	344.1
2431,2433	10.	Shash, Door and Plant Mills	88.5	432.4	65.0	130.7	306.0	725.9	1098.6	1825.3
244	11.	Wooden Box	32.3	125.2	29.3	58.6	102.2	205.7	267.5	471.9
251	12.	Household Furniture	291.8	1346.1	253.0	511.6	1021.4	2399.5	2300.3	4696.5
252	13.	Office Furniture	29.7	176.0	23.6	49.7	125.3	365.9	260.4	625.3
2531,254,2543	14.	Other Furniture	74.5	438.1	58.5	119.4	310.9	743.5	626.7	1355.8
365	15.	Household Radio, T.V.	112.2	592.3	93.4	187.6	433.7	1350.3	2063.9	3393.8
3275	16.	Gypsum Products	11.9	75.5	9.2	20.5	57.0	235.5	185.8	424.6
3291	17.	Abrasive Manufacturers	31.8	216.9	21.0	42.9	133.3	555.7	370.6	896.6
283	18.	Medicine and Pharmacy	104.2	771.8	57.2	113.8	332.8	3352.0	1644.5	4386.3

APPENDIX TABLE I (continued)

3981	19.	Broom and Brush	17.2	83.5	14.1	27.3	53.8	193.3	180.8	370.7
3713,3715	20.	Truck body & Trailors	51.2	311.0	41.5	85.6	229.3	533.1	718.2	1247.6
3011,3021,3031,3069	21.	Rubber Industries	259.8	1726.9	202.1	409.3	1236.4	2468.4	3337.9	6749.3
3296	22.	Mineral Wool	15.3	98.7	12.1	25.9	77.3	228.8	201.0	428.3
3717	23.	Motor vehicle and Parts	770.8	6297.9	643.0	1414.3	5014.4	15961.7	30404.0	46167.1
391	24.	Jewellery and Silverware	48.1	259.1	37.5	89.1	176.7	520.2	537.0	1038.8

Source: Bureau of the Census: Annual Survey of Manufactures, 1965.

APPENDIX TABLE J

PRODUCTIVITY RATIOS FOR THE UNITED STATES AND CANADA FOR 100 INDUSTRIES IN 1965: CURRENT U.S. DOLLARS

			1965 Ratios for Canada			1965 Ratios for U.S.A.			1965 Canada as % of U.S.		
		Numerator	Value Added			Value Added			Value Added		
Canada S.I.C.	U.S.A. S.I.C.	Denominator	Production Workers ($ 000)	Employee ($ 000)	Man hrs. ($)	Production Workers ($ 000)	Employee ($ 000)	Man hrs. ($)	Production Workers ($ 000)	Employee ($000)	Man hrs ($)
		EXPORT INDUSTRIES									
124	2041	Flour Mills	18.2	10.4	8.6	26.2	19.5	11.8	69.5	53.3	72.9
143	2085	Distilleries	50.0	29.4	22.9	48.5	38.1	24.4	103.1	77.2	93.9
213	2298	Cordage and Twine	8.3	6.8	4.2	9.9	8.3	4.9	83.8	81.9	85.7
2513	242	Saw & Planning Mills	8.3	6.7	3.7	7.6	6.8	3.8	105.3	98.5	97.4
252	2432	Veneer and Plywood	7.3	6.5	3.4	9.8	8.9	4.6	74.5	73.0	73.9
271	2611,2621,2631	Pulp and Paper Mills	16.4	13.7	7.5	22.1	17.9	9.9	74.2	76.5	75.8
311	3522	Agricultural Implements	11.0	8.5	5.2	17.3	13.2	8.6	63.6	64.4	60.5
318	357	Office and Store Machines	23.9	5.9	10.8	27.6	17.2	13.6	86.6	34.3	79.4
321	372	Air Craft and Parts	11.5	7.1	5.5	22.7	13.2	10.9	50.7	53.8	50.5
326	374	Railroad Rolling Stock	11.5	9.1	5.4	17.6	14.1	8.8	65.3	64.5	61.4
369	299	Other Petroleum & Coal Products	22.6	13.4	10.2	47.9	26.6	23.6	47.2	50.4	43.2
373	2821	Plastic & Synthetic Resins	29.9	17.2	13.0	33.3	22.5	15.9	89.8	76.4	81.8
381	38	Scientific & Professional Equipment	12.5	7.3	6.0	19.8	15.4	11.1	63.1	47.4	54.1
		DOMESTIC INDUSTRIES									
---	395	Pen, Pencil, Typewritter Supplies	12.9	8.6	6.1	15.3	11.3	7.7	84.3	76.1	79.2
101	2011,2013	Slaughtering & Meat Processing	12.4	9.0	5.9	12.8	10.8	7.1	96.9	83.3	83.1
103	2015	Poultry Processors	5.7	4.9	2.7	7.2	6.5	3.7	79.2	75.4	73.0
105	202	Dairy Factories	17.0	7.2	7.7	30.1	13.5	13.9	56.5	53.3	55.4
112	2033	Fruit & Vegetable Canners	10.9	8.2	5.3	13.5	11.8	7.1	80.7	69.5	74.7
123	2042	Feed Manufacturers	15.5	8.2	7.0	30.3	19.0	13.6	51.2	43.2	51.5
376	2841	Soap and Cleaning Compounds	39.4	16.6	17.9	61.4	40.4	30.5	64.2	41.1	58.7
125	2043	Breakfast Cereals	25.4	19.0	12.1	42.1	34.9	21.0	60.3	54.4	57.6
128	2052	Biscuits	10.4	7.7	5.2	19.9	15.9	10.1	52.3	48.4	51.5
129	2051	Bakeries	11.8	5.9	5.4	19.4	10.7	9.5	60.8	55.1	56.8
131	2071	Confectionery	10.1	7.8	5.2	13.2	11.1	6.8	76.5	70.3	76.5
135	2091,2092,2093	Vegetable oils	22.4	15.7	10.5	24.0	18.1	10.2	93.3	86.7	102.9
141	2086	Soft Drinks	25.4	9.6	11.6	32.4	11.9	15.1	78.4	80.7	76.8
172	3111	Leather Tanneries	6.9	6.1	3.2	12.0	10.5	5.9	57.5	58.1	57.2
179	317	Luggage, Hand bag, Leather Bag	5.5	4.6	2.7	7.3	6.3	3.8	75.3	73.0	71.0
193	2283	Wool, Yarn Mills	5.7	4.8	2.8	8.8	8.0	4.2	64.8	60.0	66.7
197	2231	Wool Cloth Mills	7.2	6.2	3.1	10.6	9.3	5.0	67.9	66.7	62.0
221	2394	Canvas Products	6.9	4.9	3.4	8.4	6.5	4.4	82.1	75.4	77.3
223	2393	Cotton and Jute Bags	7.8	6.4	3.7	8.1	7.0	4.0	96.3	91.4	92.5
247	2352	Hat and Cap	5.4	4.4	2.8	6.1	5.3	3.2	88.5	83.0	87.5
289	2711,2721,273,2741	Printing and Publishing	20.2	9.3	10.1	20.4	12.3	10.4	99.0	75.6	97.1

292	3317	Steel Pipe & Tube Mills	14.5	11.0	6.6	20.8	14.5	10.0	69.7	77.2	66.0
294	3321,3322	Iron Foundries	8.6	7.4	3.9	13.3	11.5	6.1	64.7	64.4	63.9
296	3352,3361	Aluminum Rolling & Casting	12.1	8.7	5.6	14.4	11.7	6.8	84.0	74.4	82.4
306	342	Hardware tool, cutlery	11.0	8.3	5.1	17.2	13.7	8.4	64.0	60.6	60.7
315	353,354,355,356	Misc. Machines & Equipment	13.7	8.8	6.2	19.0	13.7	9.9	72.1	64.2	62.6
327,328	373	Ship, Boat, Building & Repairs	9.2	7.5	4.3	10.7	9.0	5.3	86.0	83.3	81.0
335	366,367	Communication Equipment	11.7	7.6	5.5	18.2	11.8	9.0	64.3	64.4	61.1
336	361,362	Electrical Industrial Equipment	14.6	9.4	6.8	18.1	13.0	8.8	80.7	72.3	77.3
337	3691,3692	Battery Manufacturing	14.6	9.7	6.9	19.9	15.6	9.6	73.4	62.2	71.9
341	3241	Cement	36.3	25.0	15.9	30.1	24.4	15.1	120.6	102.5	105.3
343	3274	Lime	15.5	12.5	6.9	18.9	15.5	8.8	82.0	80.7	78.4
347	3271	Concrete Products	11.2	8.7	5.0	14.7	11.1	7.0	76.2	78.4	71.4
348	3273	Ready Mix Concrete	15.2	11.4	6.3	21.1	14.0	10.6	72.0	81.4	59.4
212	2284	Thread Mills	11.0	7.7	5.1	9.6	8.1	4.5	114.6	95.1	113.3
351	325	Clay Products	9.9	8.1	4.4	11.1	9.4	5.5	89.2	86.2	80.0
353	3281	Stone Products	9.8	6.6	4.4	9.2	7.5	4.6	106.5	88.0	95.7
355	3292	Asbestos Products	13.9	9.9	6.6	18.1	14.4	8.7	76.8	68.8	75.9
356	3211,322,3231	Glass & Glass Products	9.8	8.1	4.5	15.5	13.4	7.7	63.2	60.5	58.4
365	2911	Petroleum Refineries	36.5	25.3	17.2	44.6	32.0	22.8	81.8	79.1	75.4
375	2851	Paint and Varnish	26.8	11.1	12.4	33.9	18.6	16.5	79.1	59.7	75.2
377	2844	Toilet Preparations	28.5	14.5	14.4	61.9	39.2	32.0	46.0	37.0	45.0
393	3949,3943	Sporting Goods	7.6	5.9	3.5	12.0	9.5	6.1	63.3	62.1	57.4
397	3993	Signs and Displays	8.8	6.0	4.1	11.3	9.6	6.0	77.9	62.5	68.3
---	3963,3964	Button Buckles, Fastners	8.5	6.5	3.9	12.2	10.1	6.3	69.7	64.4	67.9
---	3941,3942	Toys and Games	6.7	5.6	3.2	10.0	8.8	5.7	67.0	63.6	56.1
---	2591	Venetian Blind Mgf.	8.4	4.9	3.8	13.4	9.5	6.4	62.7	51.6	59.4
101(A part)	2094	Animal oils & fats	22.6	15.5	9.7	24.3	17.7	10.5	93.0	87.6	92.4
302	344	Fabricated Structural Metal	13.1	9.6	6.2	17.6	11.5	7.5	74.4	83.5	82.7
145	2082	Breweries	39.0	20.8	18.1	33.6	22.5	17.3	116.1	92.4	104.6
286	275	Commercial Printing	11.0	7.5	5.3	13.4	10.3	6.8	82.1	72.8	77.9
331,332	363	Electrical Appiances	11.8	8.5	5.8	18.9	12.9	9.4	62.4	65.9	61.7
214	2241	Narrow Fabric Mills	6.8	6.0	3.1	9.2	8.2	4.5	73.9	73.2	68.9
		PROTECTED INDUSTRIES									
133	206	Sugar Refineries	20.1	15.0	9.0	32.5	24.7	15.4	61.9	60.7	58.4
151-153	2121,2131	Tobacco Products	20.3	15.3	10.3	30.2	27.1	16.2	67.2	56.5	63.6
174	314	Shoe Factories	5.3	4.6	2.6	7.2	6.5	3.9	73.6	70.8	66.7
175	3151	Leather Gloves & Mittens	4.5	3.6	2.3	5.8	5.2	3.3	77.6	69.2	69.7
201	2221	Synthetic Textile Mills	10.0	7.9	4.6	9.7	8.8	4.4	103.1	89.8	104.6
216	227	Carpet, Mat and Rug	11.4	9.3	5.3	15.1	12.7	6.8	75.5	73.2	77.9
231,239	225	Knitting Mills	5.9	5.2	2.8	8.0	7.1	4.1	73.8	73.2	68.3
243,244,245	2231,232,233,234,236	Men, Women, Children Clothing	5.6	4.2	2.8	7.0	6.2	3.8	80.0	67.7	73.7
246	2371	Fur Goods	10.2	7.2	5.1	14.7	12.8	8.1	69.4	56.3	63.0
---	2431,2433	Shash, Door & Plant Mills	8.0	5.9	3.6	11.2	8.2	5.6	71.4	72.0	64.3
256	244	Wooden Box	6.7	5.6	3.0	7.0	6.4	3.5	95.7	87.5	85.7
261	251	Household Furniture	7.1	5.6	3.2	9.5	8.2	4.7	74.7	68.3	68.1
264	252	Office Furniture	9.7	7.3	4.5	15.5	12.3	7.4	62.6	59.4	60.8

APPENDIX TABLE J (continued)

266	2531,254,2543	Other Furniture	7.8	6.1	3.6	12.7	10.0	6.2	61.4	61.0	58.1
334	365	Household Radio, T.V.	12.3	7.9	5.8	14.5	12.0	7.2	84.8	65.8	80.6
345	3275	Gypsum Products	19.9	15.9	8.9	25.7	19.8	11.5	77.4	80.3	77.4
357	3291	Abrasive Manufacturers	12.7	9.4	5.9	25.6	16.8	12.5	49.6	56.0	47.2
374	283	Pharmacy & Medicine	34.2	13.4	16.4	58.6	32.2	29.5	58.4	41.6	55.6
383	3981	Broom and Brush	9.7	5.8	4.7	13.7	11.2	7.1	70.8	51.8	66.2
324	3713,3715	Truckbody & Trailers	9.9	7.4	4.9	12.8	10.4	6.2	77.3	71.2	79.0
161,163,169	3011,3021,3031,3069	Rubber Industries	12.6	8.7	5.9	17.2	13.3	8.5	73.3	65.4	69.4
354	3296	Mineral Wool	20.4	15.6	9.1	18.9	15.0	8.8	107.9	104.0	103.4
323,325	3717	Motor Vehicle & Parts	15.9	11.9	7.0	24.8	20.7	11.3	64.1	57.5	62.0
382	391	Jewellery & Silverware	8.8	6.4	4.1	13.9	10.8	5.8	63.3	59.3	70.7

Source: Appendix Tables H and I.

APPENDIX TABLE K

EXCHANGE RATE BETWEEN THE UNITED STATES AND CANADA

	U.S. Cents per unit of Canadian Currency	
1949	100.00 - Jan. to August 90.91 - Sept. to Dec.	weighted average 98.64
1950	90.91	
1951	95.00	
1952	102.20	
	Canadian Currency per U.S. Dollar	
1962	1.078	
1963	1.081	
1964	1.074	
1965	1.075	

Source: U.N. Statistical Year Book, Various Years.