SPECIAL STUDY No. 9

Effective Protection in the Canadian Economy

by

James R. Melvin
and
Bruce W. Wilkinson

prepared for the
Economic Council of Canada

EFFECTIVE PROTECTION IN THE CANADIAN ECONOMY

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FOREWORD

Certain major developments in the Canadian economy could greatly improve our productivity performance and help to narrow the large and persistent productivity gap between Canada and the United States. One of these is a general upgrading of the educational qualifications and skills of the labour force, including managers and the self-employed. Another is greater specialization and longer production runs in Canadian industry.

Analysis of these and other potential sources of productivity growth has been the continuing concern of the Economic Council of Canada since it was established as an independent advisory body five years ago. It has been the Council's policy to publish the results of such work as widely as possible, both through its Annual Reviews and through the more technical background papers and studies prepared for the Council by its own staff as well as by outside specialists.

Although this Special Study does not address itself directly to the productivity question, it may nevertheless be viewed as a further basic element in the Council's broad program of productivity analysis.

Readers familiar with the Council's previous work will recall the emphasis placed on the importance of scale and specialization in raising the productivity of Canadian manufacturing, an area in which the Canada-U. S. disparity in levels of output per employed person is considerably wider than for the economy as a whole. The Council concluded that one of the most striking factors tending to inhibit greater specialization and longer production runs in Canadian manufacturing -- a factor that at the same time increases costs and restrains productivity advances -- was the effect of the tariff. In the analysis of this situation,

attention was focused on the importance of distinguishing between the nominal tariff (the rate of duty on imports listed in the Canadian tariff schedule) and the effective tariff. The nominal tariff allows the manufacturer to price his finished product up to the price of a competing imported product, plus the tariff and exchange rate. The effective tariff, on the other hand, is a calculation of the total protection afforded by the nominal tariff on the finished product together with the cost effect of other tariffs on materials and equipment which the manufacturer purchases abroad or in Canada. In short, the effective tariff measures the over-all protection for an industry when it adds value to purchased inputs in processing its products.

This Study, prepared for the Council by Professors James R. Melvin of the University of Western Ontario and Bruce W. Wilkinson of the University of Alberta, estimates the degree of effective protection in Canadian manufacturing. It is the first full published study of its kind for Canada. Although the concept of effective protection was introduced to economic literature 13 years ago by a Canadian, Clarence Barber, in the Canadian Journal of Economics and Political Science, heretofore all estimates of effective tariffs have been computed for other countries.

Briefly, the Melvin-Wilkinson findings are as follows:

On average, effective rates are typically higher than the nominal rates, and in Canada this difference appears to be particularly large. The weighted mean of the 133 industries distinguished in this Study (based on 1963 data) was 13.1 per cent for the nominal rates but 21.0 and 24.4 per cent for the two alternative calculations of the effective tariff rates. In other words this comparison clearly demonstrates that, on average, the tariffs on final products are higher than those on ~~imports~~ inputs.

The industry-to-industry variation in degrees of protection is higher for the effective rates than for nominal rates.

There are a number of industries in which the level of effective rates is negative, implying that producers may be operating under some disadvantage which is not evident when only the nominal rate is considered.

This study was well under way when the results of the Kennedy Round tariff reductions were announced But the authors have attempted to calculate the impact on Canada's effective tariff rates of the full Kennedy Round reductions by Canada for 32 industries, about one-fourth of the full group. In almost all of these industries the nominal tariff rates were reduced (three were unchanged). But in only about a tenth of the industries calculated does the absolute reduction exceed 10 percentage points in the effective tariff rates. However, for about 40 per cent of the industries selected, the Kennedy Round changes have had very little influence on effective rates. For about one-third of the industries, the levels of effective rates have actually gone up. This results from larger reductions in rates on machinery, materials and components than in those on finished products. In short, the average level of effective rates may well have been reduced very little in Canada as a result of the Kennedy Round.

Assuming, as the authors do, that "domestic producers all price at world prices plus the tariff", the level of nominal tariff rates measures the extent to which prices of Canadian manufactured products can exceed international prices. The effective tariff rates derived in this Study suggest that cost and productivity effects of the tariff structure in Canada may be significantly larger than those indicated by the nominal rates.

In 1963, the volume of output per employed person in total manufacturing in Canada was about two-thirds of the U.S. level. The high effective tariff rates, to the

extent that they may have permitted a less efficient use of labour and capital in Canada, had a bearing on this productivity disparity. Also, such high effective rates may be reflected in higher returns to labour and capital than would otherwise have been possible, given this lower productivity.

The Study does not examine the extent to which Canadian manufacturing firms actually price up to the tariff or the extent to which average productivity differences for total manufacturing or individual industries reflect the protection provided by the tariff. The estimates and analysis are, however, strongly suggestive and indicate the need to take account of the full impact of effective tariff protection on the existing structure of costs and productivity in Canadian manufacturing. It should be noted that the full implications of the tariff structure are not yet completely understood. For example, the extent to which tariffs reduce productivity or alternatively make wages and profits higher in particular indistries than they would otherwise be is a subject worthy of more research by Canadians. The estimates and analysis done thus far indicate the need to clarify and consider all aspects of the tariff structure in the future formulation of Canadian commercial policy, with a view to enhancing the relative productive posture of Canadian manufacturing.

Arthur J. R. Smith, Chairman
Economic Council of Canada

TABLE OF CONTENTS

1. INTRODUCTION

This paper is a study of the effective rates of protection provided by the Canadian tariff structure for Canadian manufacturing. [1]

The computations have been completed in as fine a detail as possible, given the state of the theory and the ever-present data problems. The resulting rates, it is hoped, will allow the concept of effective tariffs to be taken more fully into account in Canadian policy questions, although as is stressed in Section 6, these rates must be interpreted with care. It is also felt that this work will provide a useful basis for further research on related problems.

During the time when the calculations were being done the results of the Kennedy Round of tariff negotiations became available, and some preliminary computations of the effects of the Kennedy Round on Canadian rates of effective protection were undertaken. Due to a time constraint, only a representative sample of industries could be considered.

The organization of this paper is as follows. Section 2 reviews the effective protection concept, attempts to make clear the distinction between nominal tariffs and effective tariffs by means of simple examples, and presents the formal model used in this study. In Section 3 the data limitations are discussed, and Section 4 presents the major results of the study. Section 5 is

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[1] The manufacturing sector employs about 25 per cent of the labour force, and manufacturing value added accounts for nearly 30 per cent of Gross National Product.

devoted to an examination of some of the changes in effective tariffs resulting from the Kennedy Round of tariff negotiations. The interpretation of effective protection and the difficulties of drawing firm policy proposals from a study of this type will form the core of Section 6. A brief concluding section completes the main body of the paper. The appendices present the results of several tests relating to methodology and some alternative calculations for several industries. A number of the concepts used frequently throughout this Study are here defined for purposes of future reference:

Manufacturing value added (or just value added) equals the value of production (i. e., 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. It consists, therefore, of the returns to labour, capital and land (primarily the first two) in manufacturing plus some payments for business expenses such as advertising and insurance which are not collected separately as part of the annual Census of Manufactures.

Primary factors are those factors -- labour, capital and land -- whose returns comprise the large majority of manufacturing value added.

Intermediate inputs are those entering into the value of final output other than manufacturing value added. That is, they are the materials, components, fuel and electricity consumed in production.

Nontraded inputs are intermediate inputs that are largely produced and consumed domestically. They have been interpreted in this Study as including fuel and electricity.

Nominal tariffs refer to the tariff rates listed in the Canadian Custom Tariff, or some average of such rates.

2. THE CONCEPT OF EFFECTIVE PROTECTION

The concept of effective protection was introduced into economic literature in 1955 by Clarence Barber. [1] But while the concept of effective protection was introduced by a Canadian in a Canadian journal, to this date no studies of effective protection in Canada have been published. The lack of information in this area is particularly disturbing when taken in conjunction with the relatively large size of the Canadian trade sector and the importance of this sector for the Canadian economy as a whole. [2] Elsewhere, estimates of effective tariffs have been made for other economies, [3] and a good deal

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[1] Clarence L. Barber, "Canadian Tariff Policy", The Canadian Journal of Economics and Political Science, XXI, November 1955. In particular see pp. 523-524.

[2] An indication of the lack of attention paid to the concept of effective protection by Canadian economists is given by the fact that the study for the Royal Commission on Canada's Economic Prospects by J. H. Young, Canadian Commercial Policy, Ottawa, Royal Commission on Canada's Economic Prospects, 1957, makes no attempt to calculate effective protection for Canada.

[3] Among the empirical works are Bela Balassa, "Tariff Protection in Industrial Countries: An Evaluation", Journal of Political Economy, 73, December 1965, pp. 573-594, and Giorgio Basevi, "The United States Tariff Structure: Estimates of Effective Rates of Protection of United States Industries and Industrial Labor", The Review of Economics and Statistics, XLVIII, May 1966, pp. 147-160. For a list of the literature on effective protection see the bibliography appended to this Study.

of work has recently been done on the theoretical aspects of the question.[1/] These studies have provided a valuable base upon which to construct this study of effective protection in Canada.

The basic argument of the effective protection concept is that nominal tariff rates give an inaccurate indication of the extent to which the tariff structure protects the value added in a given industry. A nominal tariff on the final output of the industry permits the producer to raise the price at which he sells his product domestically while still remaining competitive with imports. But if there are tariffs on his inputs of material and components as well, these tariffs in turn raise the cost of the inputs to him regardless of whether he imports them or buys them domestically. If he buys domestically, the supplier of them can charge up to the foreign price plus the tariff on imports. The net effect of the nominal tariff structure on the price the producer can charge for his output domestically relative to the prices he must pay for his intermediate inputs -- hence the effect upon his value added -- is called the "effective protection" that producer enjoys.

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.

1/ Two of the more important theoretical articles are Harry G. Johnson, "The Theory of Tariff Structure, with Special Reference to World Trade and Development", Trade and Development, Études et Travaux de l'Institut Universitaire de Hautes Études Internationales, Geneva, Librairie Droz, 1965, pp. 9-29, and W. M. Corden, "The Structure of a Tariff System and the Effective Protective Rate", Journal of Political Economy, LXXIV, June 1966, pp. 221-237.

Although the concept of effective protection has been developed at length in a number of other studies, for the convenience of the uninitiated who may be reading this paper, it may be worthwhile to pause long enough to outline its meaning in a little more detail. For purposes of illustration, assume that there are only two industries in an economy, one producing a final product, the unit value of which we shall let equal unity, and another producing an intermediate input used in the production of the first commodity. If the proportion which this intermediate good comprises of the total value of a unit of the final product equals "a", then

(1) $v = 1 - a$

where "v" equals the value added per unit of output which the manufacturer of the final product receives. In other words, if we think of value added as being the residual after the payment for the intermediate input, this equation determines the share of value added. If we reserve "v" to mean value added per unit of output before tariffs are imposed on either intermediate inputs or the final product, and let v' = value added per unit of output after tariffs are imposed, then the effective protection rate is

(2) $g = \frac{v' - v}{v}$.

Consider a few simple examples under a variety of tariff assumptions. Throughout these examples it will be supposed that all manufacturers of the final product, and of the intermediate input, price their product at foreign price plus the domestic tariff. It will also be assumed that prior to any tariffs being imposed, 60 per cent of the cost of a unit of output is attributable to the intermediate factor, i.e., that $a = .6$ and thus $v = .4$. Finally the physical amounts of intermediate input and labour used per unit of output will be assumed to remain the same after the imposition of tariffs as before their imposition.

Case (i): The tariff on the final product is 20 per cent and there is no tariff on the intermediate input:

The domestic producer of the final product can then increase his price by 20 per cent. The return on what used to be a dollar's worth of output is now $1.20 and so in equation (1) we replace 1 with 1.2. Since the cost of the intermediate input has not changed we have

$$v' = 1.2 - a = 1.2 - .6 = .6 .$$

A 20 per cent tariff on the final product has permitted value added to increase from 40 to 60 per cent of the original value of the product, a gain of 50 per cent in value added. More formally:

$$\frac{v' - v}{v} = \frac{.6 - .4}{.4} = .5 \text{ or } 50 \text{ per cent.}$$

Thus, although the nominal tariff is only 20 per cent, the effective rate of protection on value added is 50 per cent.

Case (ii): The tariffs on the final product and the intermediate input are each 20 per cent:

With producers pricing up to the tariff, both the value of the final product and the intermediate input will rise by 20 per cent. Therefore equation (1) becomes

$$v' = 1.2 - a(1 + .2) = 1.2 - .72 = .48 .$$

The effective protection is

$$\frac{v' - v}{v} = \frac{.48 - .4}{.4} = .2 \text{ or } 20 \text{ per cent.}$$

The effective protection equals the nominal tariff on the final product.

Case (iii): The tariff on the final product is 20 per cent and the tariff on the intermediate input is 30 per cent.

Equation (1) becomes

$$v' = 1.2 - a(1 + .3) = 1.2 - .78 = .42$$

and the rate of effective protection is

$$\frac{v' - v}{v} = \frac{.42 - .4}{.4} = .05 \text{ or } 5 \text{ per cent.}$$

Here the effective protection is less than the nominal tariff.

Case (iv): No tariff exists on the final product but there is a 20 per cent tariff on the intermediate good.

Here there is no increase in receipts but only an increase in cost. We thus have

$$v' = 1 - a(1 + .2) = 1 - .72 = .28$$

and the effective tariff is

$$\frac{v' - v}{v} = \frac{.28 - .4}{.4} = -.3 \text{ or } -30 \text{ per cent.}$$

In this case the effective protection is negative, which means that if, as we have supposed, value added is the residual claimant, it must decrease by 30 per cent if the industry is to remain competitive, even though the price of the output has not been affected.

From the preceding examples the following conclusions may be drawn:

-- If the tariff on the output is higher than the tariff on the input, the effective protection will be higher than the nominal tariff.

-- If all tariffs are equal, then the effective protection is equal to the nominal tariff.

-- If the output tariff is lower than the tariff on the input, then the effective protection will be less than the nominal tariff.

-- Effective protection can be negative if the tariff on the input is sufficiently higher than the output tariff, or if there is no tariff on the output.

The Effective Protection Model Used in This Study -- As the foregoing discussion indicated, effective tariff computations require a knowledge of value added per unit of output both before and after tariffs are imposed. Herein lies the basic difficulty in calculating effective protection rates: the only data available on the sales value of output, the cost of intermediate inputs and value added are those recorded under the present tariff structure. Nothing precise is known about what these magnitudes would have been if no tariffs existed. Consequently, a number of simplifying assumptions must be made in order to estimate from the post-tariff numbers what their pre-tariff values may have been. These assumptions, now common in the literature on effective tariffs, are as follows:

(i) That the input-output coefficients or the ratios of each input to each output remain the same both before and after tariffs are imposed on both inputs and outputs. The coefficients we

use are derived from the Canadian Census of Manufacturers. [1/]

(ii) That domestic producers all price at world price plus the tariff; hence pre-tariff price is assumed to be the observed post-tariff price less the tariff.

(iii) That elasticities of foreign demand for our exports, foreign supply of our imports and domestic supply of nontraded inputs are infinite.

The discussion of these assumptions and some indication of the bias which they impart to our effective tariff computations will be delayed until after the detailed results have been presented.

Recall that the effective protection rate for any industry j may be expressed as:

$$(2a) \quad g_j = \frac{v_j' - v_j}{v_j} .$$

Based on this definition of effective protection the actual formula used in our computations was:

$$(3) \quad g_j = \frac{(1 - \sum_{i=1}^{n} a_{ij}) - [\frac{1}{1+t_j} - \sum_{i=1}^{n} (\frac{a_{ij}}{1+t_i})]}{\frac{1}{1+t_j} - \sum_{i=1}^{n} (\frac{a_{ij}}{1+t_i})}$$

[1/] Dominion Bureau of Statistics, Ottawa, Queen's Printer, 1963.

where

1 = the value of a unit of output in any industry under the existing tariff structure;[1/]

a_{ij} = the production coefficient or input-output coefficient for the i^{th} intermediate input in the j^{th} industry.

t_j = the nominal tariff rate for the j^{th} industry;

and

$\sum_{i=1}^{n} a_{ij}$ = the proportion of the sales value of a unit of final output of industry j under the existing tariff structure going to the intermediate inputs.

Thus:

$1 - \sum_{i=1}^{n} a_{ij}$ = value added per unit of output under the existing tariff structure; i.e., $= v_j'$;

$\frac{1}{1+t_j}$ = the estimated pre-tariff value of a unit of output in industry j;

$\frac{a_{ij}}{1+t_i}$ = the estimated pre-tariff value of the production coefficient for the i^{th} intermediate input into the j^{th} industry;

[1/] Notice that this assumption differs from our simple one-input model where we let the value of a unit of output before tariffs equal unity.

$\sum_{i=1}^{n} \left(\frac{a_{ij}}{1+t_i}\right)$ = the total pre-tariff value of the production coefficients for all intermediate inputs into the j^{th} industry;

and finally

$\frac{1}{1+t_j} - \sum_{i=1}^{n} \left(\frac{a_{ij}}{1+t_i}\right)$ = estimated pre-tariff value added per unit of output for any industry j; i.e., v_j.

This formula can be expressed in a number of alternate ways.[1/] For our method of calculation, however, the expression of equation (3) was found to be the most useful.

[1/] For example, see Johnson, op. cit., p. 12.

3. DETAILS OF THE COMPUTATIONS

A number of questions arose with respect to the individual computations. The first one was whether effective rates of protection were to be prepared on a commodity or industry basis. For detailed tariff negotiations it would be useful to have effective rates on a commodity basis. Unfortunately, no published information exists on inputs into commodities, so that it was necessary to be satisfied with calculations at the industry level.

A difficulty of working with the industry as a unit is that in most cases no such thing as a single tariff on an industry's output exists. Typically the various products of an industry have different tariffs, and so to get an industry tariff some kind of a weighted average must be constructed.

Various weighting methods have been suggested, among them weighting by domestic consumption or production, weighting by world trade, weighting all goods equally (taking simple averages), and weighting by imports.[1/] Ideally, since the nominal industry tariff is used in our calculations to show how much, on the average, the industry could raise prices due to the tariff, we would want to weight by domestic production or consumption. Unfortunately, output or consumption data at a detailed commodity level, in a form easily related to tariff rates, was simply not available. Weighting by world trade, while perhaps an acceptable approach when comparing the effective rates for a number of countries, has far less appeal when one is concerned

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1/ For a discussion of these various methods see Balassa, op. cit., pp. 574-575.

with the effective protection rates for the industries of a single country. Indeed, the very nature of trade would suggest that the world trade patterns would not accurately represent the production patterns of an individual nation. The fact that for the world such commodities as woodpulp, newsprint, wood products and semi-processed metals may not form a substantial proportion of total trade in the relevant industries certainly does not mean that such products should be given light weights with respect to Canadian industrial production. Furthermore, there was the empirical problem of obtaining world production on a detailed production basis. The arguments for constructing simple averages are either that with many commodities the differences in duties among products will tend to cancel each other out, or that if a sufficiently detailed industry classification is used, the tariffs for the products within each industry will tend to be quite similar. As we were working with three- and four-digit industries, each producing either a fairly wide range of products or only a few products that tended to have similar tariff rates, simple averages probably would not have done great injustice to the facts. The difficulty was essentially a practical one in that this approach would have necessitated classifying all tariffs in the Canadian Customs Tariff Manual into industries and converting all specific rates into ad valorem equivalents before the averaging could have been done. Weighting by imports suffers from the disadvantage that imports are at best only a rough approximation for domestic consumption or production. Furthermore, the tariffs themselves tend to distort the results, for goods with higher tariffs will be weighted less because of the restrictive effect of the tariff. This method does, however, have the advantage that data at the commodity level are available.

It was decided, therefore, to weight by imports. It is recognized that this may not be ideally the best method, but it was generally the best possible one. (In a few cases, the industries were so well defined that the

tariffs for their product could be taken directly from the tariff manual. Where this was feasible it has been noted in the results.) Duties collected as a per cent of total imports are available for each product recorded in published import data. Consequently, once imports have been categorized by industry, it is not difficult to determine average duty rates on the imports of each industry. This information has already been compiled for another recent study. 1/ We have borrowed from it. The problem that the highest tariffs are sometimes given much lower weights because of their restrictive effect on imports is not so serious when an industrial classification as fine as the one we have used is employed. There tends to be a rough similarity of rates for products within such industries.

Another question arising with respect to all industries was that of how to treat the catch-all group listed in the Canadian Census of Manufactures as "all other materials and components used". In general there was no way of knowing what this group consisted of and so the choice of a tariff to apply was quite arbitrary. In many cases this item made up a considerable proportion of the total value of inputs (sometimes over 40 per cent), and so to obtain an idea of how different rates could affect the result we did all the calculations for two assumed values: 11.3 per cent which was the weighted mean of the nominal industry tariffs on all manufactures, 2/ and

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1/ See B. W. Wilkinson, Canada's International Trade: Analysis of Recent Trends and Patterns, Montreal, Canadian Trade Committee of the Private Planning Association of Canada, 1968, Chapters 5 and 7, for details of how this data was obtained and on the limitations of it.

2/ Ibid. If total duties collected as a per cent of total imports had been used, the average tariff would have been 9.6 per cent.

5 per cent, an arbitrary smaller rate. It seemed to be of interest to show the difference when a smaller rate was used because of the tendency for input tariffs to be lower than output tariffs. Thus the average nominal rate on manufactured imports could well be an overestimate of the unspecified input tariffs and hence the effective tariff rates may be understated for this reason. The calculations for both these rates are presented in the tables. 1/

Two other input categories presented similar difficulties: "operating, maintenance and repair supplies used (excluding fuel)" and "containers and other packaging materials and supplies used". Since specific input tariffs could not be found for these groups, they were aggregated with "all other materials and components" and the 11.3 per cent and 5 per cent rates were applied.

A somewhat different treatment was given to two other nonspecific categories. For the category "amount paid to others for work done on materials owned by establishments" a zero tariff was assumed since this input is more in the nature of a service on which there are, in general, no tariffs. A zero tariff was also applied to "fuel and electricity" on the grounds that the major components of this item, coal and electricity, have zero or very low tariffs. The other main component, natural and other forms of gas, while having a high tariff rate, is a commodity whose domestic price is probably not much affected by the tariff. Furthermore, the whole category usually makes up only 1 per cent or

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1/ The procedure of assuming two different rates to apply to the unspecified inputs is used in other effective protection studies. For example, Basevi, op. cit., uses the two rates 5.1 per cent and 1 per cent for his 1954 computations and 7 per cent and 1 per cent for 1958.

2 per cent of total value of the inputs and consequently even fairly substantial deviations from zero rates could not substantially distort the results.

A somewhat related class of inputs includes such things as advertising, insurance, consulting services and other business expenses such as payments to outside contractors for maintenance and repairs. These, however, are not distinguished in the Census of Manufactures and are included in the value-added estimates. Hence, they have had to be handled like the primary factors, land, labour and capital, and therefore the calculations of changes in value added include possible changes in these inputs.

To calculate the production coefficients (the a_{ij}'s), the cost of each intermediate input was taken as a percentage of total cost. After a few calculations of effective rates had been made, it became clear that many of the a_{ij}'s were so small that they had no appreciable effect on the calculations. Therefore, only those inputs accounting for at least 1 per cent of total cost were treated individually. Preliminary computations with six arbitrarily chosen industries revealed that using a finer level of disaggregation did not significantly alter the effective rate. The results of these tests are presented in Appendix A. The largest observed change which ensued after considering all inputs at the . 1 per cent level rather than at the 1 per cent level was one percentage point (i. e., one effective rate was reduced from 22. 3 per cent to 21. 3 per cent). Given the other approximations which were necessary in making the calculations, such a difference is not significant. Thus, all inputs contributing less than 1 per cent to total cost were grouped with the

unspecified category and the 11.3 per cent and 5 per cent rates discussed above applied to the whole group. [1]

An examination of the calculated effective protection rates which are summarized in Table 1 indicated that there were a number of industries where, because of the large number of inputs, each of which contribute only a small amount to output, the grouped inputs made up a large proportion of total cost. In order to be sure that the grouping was not distorting our results, we decided to consider all the industries where aggregated inputs made up more than 50 per cent of the total cost associated with intermediate inputs, and recalculate, aggregating at the .5 per cent level rather than at the 1 per cent level. The calculations for the seven industries which fell into this category are given in Appendix A. It can be seen that for two of the industries, there was no change, and that the greatest change was 2.5 percentage points for the trailer manufacturing industry. The changes are thus not significant, and the earlier conclusion that there is little to be gained by disaggregating beyond the 1 per cent level was confirmed.

Other kinds of data problems arose with respect to individual industries. The first of these was that for some of the industries no information was given on inputs in the Census of Manufactures. Consequently, there

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[1] The only exception to this rule was made in the pharmaceutical products industry where all the inputs listed in the Census each added less than 1 per cent to total cost. An examination of the tariff manual indicated that all the inputs in this industry enter free of duty. To take account of this, all specific inputs, even though adding less than 1 per cent to cost, were grouped and assigned a tariff of zero. The 11.3 per cent and 5 per cent rates were then applied only to the unspecified categories of inputs as discussed above.

was no way of calculating the production coefficients. Eighteen industries could not be considered for this reason. Three other industries were excluded because of their very nature. The leaf tobacco processing industry was omitted because the tariff items for tobacco inputs did not distinguish the stage of processing at which a particular tariff applied, and it was therefore impossible to distinguish this industry from the tobacco products industry. The tobacco products industry was, of course, considered. The ready-mix concrete industry was omitted because it is not, in general, an industry whose products enter trade, and consequently a calculation of effective protection did not seem appropriate. The third industry excluded was the textile dyeing and finishing industry. Here it is impossible to distinguish the proportion of the tariff which should be attributed to the dyeing and finishing process as opposed to the tariff on the cloth itself.

In some cases, difficulties arose in the determination of input tariffs. In the Census of Manufactures, inputs are given more or less on a commodity basis, and so the tariffs on these items must be obtained from the tariff manual. In all cases, GATT-Most Favoured Nation tariff rates were used. But the commodity listing in the Census generally does not coincide exactly with the tariff manual classification. Often the manual lists several tariff items for the same basic commodity, each with a different tariff. It was 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 proportions), and so decisions of a rather arbitrary nature sometimes had to be made. In some instances, the decision was based on an examination of the relative volume of imports of the various forms of the product, and in other cases the decision hinged on specific knowledge of the industry. Occasionally, it was necessary to compute a rough average of the various tariffs presented in the manual.

A number of industries seemed to deserve special attention, because either they possessed certain peculiarities or they seemed of special interest or importance. These special studies and the results of the studies are presented in Appendix B.

No attempt has been made to estimate the influence of import quotas. While it is clear that quotas will allow domestic producers to raise prices, the difficulty is that there is no way of knowing what magnitude of price increases to expect, and any decision on this matter would be completely arbitrary. It was felt that any calculations based on such guesses would have very little meaning.[1/]

Finally, the tariff items which receive drawbacks, listed in Schedule B of the tariff manual, were examined in detail to discover the possible effects of these drawbacks on the effective rate structure. It was found that none of the items listed have a bearing on the calculations for any of the industries treated in this Study. Many of the items refer to industries which were not considered in this Study. Others refer to inputs which were not treated specifically in the calculations; that is, inputs which did not add 1 per cent or more to the value of production. In some cases, the drawback items refer to inputs used to produce a particular product which is just one of many products of an industry. There is no way to distinguish the amount of the inputs that would enter the production of that particular product, and, therefore, no basis on which to reduce the input tariff and take the drawback into account.

1/ Note that Basevi, op. cit., pp. 154-155, has attempted to take account of quotas in his calculations.

4. THE RESULTS

After the elimination of 21 industries as described in the last section, 133 industries remained, and for each of these an effective protection rate was calculated. The results of the initial round of calculations are presented in Table 1. The industries are presented in the order in which they appear in the Census of Manufactures and are numbered from 1 to 133 for convenience of reference.

Table 2 gives the means, simple and weighted, and the standard deviations for the nominal and effective rates. For the weighted means, the nominal rates are weighted with industry production, and the effective rates are weighted by the value-added component of total production. In addition, the Spearman rank correlation coefficient is given for nominal rates versus effective rates for both sets of effective rates.

Some interesting conclusions can be drawn from an examination of Tables 1 and 2. First, in general, the effective rates tend to be considerably higher than the nominal rates. In fact, Table 2 indicates that, on the average, effective rates are from one and one-half to two times the nominal rates. These findings certainly support the widely held view that tariffs on final outputs tend to be higher than the tariffs on the inputs. (Recall that if the tariffs on the output and on all the inputs were the same, the nominal rates and the effective rates would be the same.)

Table 1

Nominal Tariffs and Effective Tariffs

for 133 Industries in the

Canadian Census of Manufactures, 1963

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) Calc. (1) using 11.3% for unspecified inputs	Effective Tariffs (g_j) Calc. (2) using 5% for unspecified inputs
1	Biscuit manufacturing	8.0	5.1	8.6
2	Bakeries	8.0	7.3	10.7
3	Breakfast cereals	13.5	17.5	19.9
4	Breweries	10.0	10.7	12.2
5	Distilleries	20.0	19.3	21.3
6	Wineries	25.2	41.2	45.2
7	Soft drinks	4.9	1.4	2.4
8	Dairy factories	7.1	- 15.6	- 13.8
9	Process cheese	6.6	.8	5.0
10	Confectionery	17.3	26.8	31.6
11	Feed manufacturing	7.2	8.9	17.3
12	Flour mills	8.8	31.9	38.1
13	Fish products	8.8	22.8	25.6
14	Fruit, vegetable canners and preservers	9.0	6.2	13.7
15	Macaroni	14.6	25.8	29.6
16	Animal oils and fats	4.7	1.9	3.0
17	Sausage and sausage casings	2.1	- 6.2	- 3.8
18	Slaughtering, meat packing	5.2	5.7	9.1

Table 1 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) Calc. (1) using 11.3% for unspecified inputs	Effective Tariffs (g_j) Calc. (2) using 5% for unspecified inputs
19	Sugar refineries[1/]	24.2	- 7.6	- 6.9
20	Vegetable oil mills	4.7	34.5	35.9
21	Miscellaneous food	5.1	1.2	4.8
22	Tobacco products	30.0	37.5	39.1
23	Poultry processors	12.7*	21.9	27.2
24	Leather tanneries	8.6	16.7	20.1
25	Shoe factories	21.7	28.3	30.3
26	Boot and shoe findings	21.3	33.2	37.2
27	Leather gloves	23.1	34.6	37.4
28	Miscellaneous leather products	23.1	36.2	39.5
29	Rubber industries	20.1	36.7	40.6
30	Canvas products	18.5	18.4	20.9
31	Cordage and twine	1.8	- 1.4	- .4
32	Cotton and jute bag	14.7	48.5	53.5
33	Cotton yarn and cloth	20.0	38.0	40.0
34	Narrow fabric mills	19.4	24.4	26.6
35	Synthetic textiles	30.3	58.2	64.0
36	Wool yarns	10.8	27.3	29.2
37	Wool cloth	19.3	40.4	42.6

Table 1 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) Calc. (1) using 11.3% for unspecified inputs	Effective Tariffs (g_j) Calc. (2) using 5% for unspecified inputs
38	Pressed and punched felt	24.2	70.8	84.4
39	Linoleum and coated fabric	24.9	43.2	46.4
40	Embroidery, pleating, etc.	20.2	23.1	24.0
41	Auto fabrics	30.3	82.8	90.9
42	Miscellaneous textiles	15.4	15.9	19.4
43	Foundation garments	28.4	34.8	36.4
44	Fur goods	25.0*	98.9	103.4
45	Knitting mills	31.1	64.9	77.1
46	Hosiery mills	25.2	37.0	40.1
47	Fabric gloves	26.5	36.0	37.1
48	Fibre preparing mills	20.0	61.1	67.6
49	Thread mills[2/]	.4	- 10.1	- 8.8
50	Carpet, mat and rug	28.2	59.7	66.8
51	Hardwood flooring	12.5*	25.4	26.1
52	Sawmills	2.2	2.2	3.7
53	Shingle mills	2.2	2.1	3.3
54	Sash, door and millwork	22.5	45.1	~~24.2~~ 48.7
55	Veneer and plywood	14.4	24.9	26.4
56	Miscellaneous wood industry	10.6	17.6	20.0
57	Wooden box	22.5*	38.4	40.2

Table 1 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) Calc. (1) using 11.3% for unspecified inputs	Effective Tariffs (g_j) Calc. (2) using 5% for unspecified inputs
58	Coffin and casket	22.5*	32.4	34.3
59	Household furniture	25.8	41.2	45.7
60	Office furniture	26.8	39.1	41.8
61	Miscellaneous furniture	25.8	40.1	43.8
62	Commercial printing	19.3	24.9	26.7
63	Platemaking, typesetting, etc.	19.3	~~77.0~~ 22.0	23.7
64	Publishing	1.3	1.5	1.7
65	Publishing and printing	1.3	.4	.8
66	Pulp and paper	13.0	~~74.9~~ 24.9	26.5
67	Asphalt roofing	25.0	49.1	54.7
68	Miscellaneous paper converters	22.2	32.8	37.0
69	Paper and plastic bag	20.7	32.4	36.6
70	Corrugated boxes	20.8	56.7	59.6
71	Folding cartons, etc.	20.8	27.9	31.4
72	Iron and steel mills	6.7	8.6	11.1
73	Aluminum rolling, casting, extruding[3/]	4.2	2.2	4.5
74	Fabricated structural metal	8.0	5.7	7.3

Table 1 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) Calc. (1) using 11.3% for unspecified inputs	Effective Tariffs (g_j) Calc. (2) using 5% for unspecified inputs
75	Hardware, tool, cutlery	15.5	19.3	22.6
76	Metal rolling, casting, etc.	1.1	- 6.3	- 4.4
77	Wire and wire products	16.2	23.8	26.4
78	Steel tubes and pipes	10.0	14.6	18.0
79	Ornamental arch, metal	18.0	29.0	33.6
80	Boiler and plate works	9.7	6.2	10.4
81	Copper and alloy rolling, etc.	1.3	- 3.3	- 1.0
82	Heating equipment	15.6	20.7	26.7
83	Iron foundries	15.4	24.6	27.8
84	Metal stamping, etc.	21.6	35.3	40.8
85	Miscellaneous metal fabric	18.0	24.8	29.1
86	Agricultural implements[4/]	0.0	0.0	0.0
87	Boat building, repair	17.5	24.4	30.0
88	Shipbuilding, repair[1/]	17.5	24.9	27.9
89	Motor vehicle parts, accessories[1/]	10.2	8.3	14.4
90	Railroad rolling stock	16.6	24.3	33.4

Table 1 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) Calc. (1) using 11.3% for unspecified inputs	Effective Tariffs (g_j) Calc. (2) using 5% for unspecified inputs
91	Miscellaneous vehicle manufacturing	15.0	20.0	53.6
92	Miscellaneous machinery equipment	9.5	7.9	13.4
93	Commercial refrigeration, etc.	15.4	20.0	24.5
94	Office and store machinery	11.0	11.0	17.3
95	Trailers	20.7	41.5	57.6
96	Small electrical appliance	19.7	27.9	36.1
97	Major appliances	19.7	31.4	41.5
98	Household radio and TV	20.7	36.0	51.4
99	Communication equipment	14.8	17.4	22.3
100	Electrical industrial equipment	17.7	21.4	24.8
101	Battery manufacturing	17.4	25.4	30.6
102	Electrical wire and cable	20.3	41.3	45.6
103	Miscellaneous electrical products	14.1	17.4	23.7
104	Abrasives	20.5	44.1	48.1
105	Asbestos products	12.2	16.3	19.4

Table 1 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) Calc. (1) using 11.3% for unspecified inputs	Effective Tariffs (g_j) Calc. (2) using 5% for unspecified inputs
106	Cement	3.4	3.1	4.0
107	Concrete products	18.3	31.1	33.7
108	Glass and glass products	10.1	11.5	14.0
109	Other nonmetal mineral products	19.9	31.6	40.7
110	Mineral wool	24.1	34.5	44.7
111	Stone products	15.7	17.5	~~70.0~~ 20.0
112	Refractories manufacturing	4.3	1.3	5.2
113	Clay products	11.5	13.6	15.4
114	Gypsum products	25.0	37.0	39.0
115	Petroleum refineries	5.3	27.8	30.3
116	Lubricating oils and greases	14.0	17.3	20.6
117	Other petroleum and coal products	5.0	1.6	4.5
118	Pharmaceuticals, etc.	22.5	28.8	31.9
119	Paints and varnishes	16.7	23.1	29.1
120	Plastics and synthetics	8.2	7.1	12.3
121	Soap and cleaning compound	19.5	31.4	37.4
122	Toilet preparations	15.6	18.3	22.0
123	Other chemical industries	7.8	4.8	11.0

Table 1 (concluded)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) Calc. (1) using 11.3% for unspecified inputs	Effective Tariffs (g_j) Calc. (2) using 5% for unspecified inputs
124	Industrial chemicals	6.8	5.3	8.8
125	Mixed fertilizer	7.5*	~~5.3~~ 20.3	24.5
126	Broom, brush, mop	30.0*	56.0	61.1
127	Clock and watch	18.8	17.8	19.3
128	Opthalmic goods	14.6	12.3	13.5
129	Pen and pencil	23.5	31.3	33.6
130	Typewriter supplies	12.7	10.3	12.4
131	Plastics fabricators	19.1	31.3	35.3
132	Venetian blinds	11.6	15.1	18.1
133	Jewellery, silverware	22.5	42.4	46.9

* These nominal tariff rates have been taken directly from the Canadian Customs Tariff. In these industries, the product line was narrow and the tariff rate uniform for all products so that this approach became feasible.

1/ See Appendix B where alternate calculations are shown.

2/ If the highest individual ad valorem rate on imported yarns (i.e., 20 per cent) is used, the g_j's become 32.3 and 35.1 respectively.

3/ The t_j used, and hence the g_j's, seem low when one is cognizant of the 22.5 per cent tariff prevailing on some aluminum imports. This low t_j occurs because many aluminum imports for aircraft came in duty-free; also the British Preferential rate is zero on aluminum imports. If the higher 22.5 per cent is used for the t_j, the g_j's become 161.0 and 175.9 respectively.

4/ This industry is very much an exception. All components, materials, supplies and equipment of any sort used in any segment of the industry can be imported duty-free.

Table 2

Simple and Weighted Means, Standard Deviations and Rank Correlation Coefficients for the Nominal Tariffs and the Effective Tariffs for 133 Industries in the Canadian Census of Manufactures, 1963

	Simple Mean	Standard Deviation	Weighted Mean	Standard Deviation	Rank Correlation Coefficient with t_j
			(Per cent)		
Nominal Rates (t_j)	16.0	8.0	13.1	8.0	
Effective Rates (g_j) Calc. (1)	26.4	23.5	21.0	19.4	.86
Effective Rates (g_j) Calc. (2)	30.6	25.2	24.4	20.5	.83

Effective Protection

An examination of Table 1 also makes it clear, however, that in quite a number of individual cases effective rates are lower than nominal rates. Of the 133 industries, for the 11.3 per cent calculation, there are 33 cases, or 25 per cent, for which the nominal rates exceed the effective rates, and there are 7 industries, or 5.2 per cent, for which effective protection is actually negative. When the 5 per cent rate is applied to the unspecified inputs, there are 16 industries (or 12 per cent) with nominal rates higher than effective rates and 7 industries with negative effective rates.

It appears, then, that in total about 20-30 per cent of the industries face average duties on their inputs greater than the average duties on their outputs, and that for about 5 per cent of the industries, tariffs on inputs are so much higher than those on outputs that, certeris paribus, the entire tariff structure actually makes it more difficult for domestic producers to compete with imports than if no tariffs existed at all.

Comparisons with the nominal tariffs and effective rates of protection of other countries can be made using the results of two other recent studies by Basevi and Balassa respectively.[1/] Differences among the three studies in the technique and levels of aggregation used mean that the comparisons give us only rough orders of magnitude. But even these may be of some interest.

1/ Op. cit.; Grubel and Johnson have produced nominal and effective rates for the six Common Market countries, but they do not show weighted means or standard deviations, so that we have not attempted to introduce their findings into this discussion.

Using 1958 data, Basevi finds that the simple mean of nominal tariffs for the United States is 14.13 per cent as compared to the Canadian simple mean of 16.0 per cent. The weighted means, which are probably better measures to compare, are a little closer, with the U.S. figure being 11.36 per cent as compared to the Canadian rate of 13.1 per cent.[1/] Using 1962 data, Balassa calculated that the weighted nominal rate for the United States is 11.6 per cent, for Japan is 16.2 per cent, for the United Kingdom is 15.5 per cent, for the Common Market is 11.9 per cent, and for Sweden is 6.8 per cent.[2/]

Assigning tariffs of 7 per cent and 1 per cent to unallocated inputs, Basevi has calculated the rates of effective protection to be 16.85 per cent and 19.98 per cent as compared to our rates of 21.0 per cent and 24.9 per cent.[3/] Thus in the calculations by Basevi for the United States and ourselves for Canada, the rates of effective protection are from 1.5 to 2 times the nominal rates. Using the weighted average of nominal tariffs to weight the unallocated inputs, Balassa has calculated effective tariff rates of 20 per cent for the United States, 27.8 per cent for the United Kingdom, 18.6 per cent for the Common Market, 12.5 per cent for Sweden and 16.2 per cent for Japan.[4/] Using Balassa's calculations and the comparable data from this study for Canada, we find that the ratio of effective rates to nominal rates are:

1/ Basevi, op. cit., pp. 155-156. He actually has two sets of simple means and weighted means, for his sample size had to be changed when he changed the assumption about the level of the tariff on "unspecified inputs". We are using the rate he gets for the largest sample.

2/ Balassa, op. cit., p. 588.

3/ Basevi, op. cit., p. 156.

4/ Balassa, op. cit., p. 588.

for Sweden 1.85, for Japan 1.82, for the United Kingdom 1.79, for the United States 1.72, for Canada 1.65, and for the Common Market 1.56. For the United States, Basevi finds this ratio to be 1.48. Thus, compared to nominal rates, it would appear that Canada's effective protection is relatively low, the Common Market and possibly the United States being the only nations with a lower ratio. 1/

The standard deviations of the nominal and effective rates give us an idea about how the rates are dispersed about the means. From Table 2, the effective rates are dispersed much more than the nominal rates. To illustrate, in the weighted case the standard deviation for the nominal rates is 8 per cent as compared to 19.4 per cent and 20.5 per cent for the two weighted effective rates. The comparable figures from Basevi's study are 6.96 per cent for the weighted nominal rates and 13.93 per cent and 14.81 per cent for the two calculations of the weighted effective rates. The larger standard deviations for the Canadian data is an indication of the greater range of the effective rates in Canada. The standard deviations given by Balassa are much lower due, we might expect, to the greater degree of aggregation used by Balassa.

Finally, observe that the Spearman rank correlation coefficients are quite high, being .86 and .83 for the nominal rates versus the two sets of effective rates. Both are highly significant at the 1 per cent level, and indicate that there is quite a good deal of similarity in the rankings of nominal and effective rates; higher effective rates being associated with higher nominal rates and lower effective rates with lower nominal rates.

1/ The Canadian effective protection rates would have been higher had we used as low rates on the unspecified inputs as were used in the Basevi study.

5. THE KENNEDY ROUND

The Kennedy Round of tariff negotiations when fully implemented will result in some substantial changes in the Canadian tariff structure. For a selected group of industries, some preliminary estimates have been prepared to show how effective protection is affected by these changes.

Thirty-two industries were selected, with some from each of the major industrial classifications. Industries were selected which would be of general interest, yet would not be so large in terms of products and inputs that the number which could be examined in the available time would be seriously curtailed.

In order to get a clear picture of how the Kennedy Round would influence the rates of effective protection, it was vital that the two sets of numbers be comparable. This presented a number of difficulties. First, our original calculations of the nominal rates used imports as weights, and of course for Kennedy Round calculations no data on imports is available since the regulations of the Kennedy Round have not been in operation. We thus needed estimates of what trade patterns might be like after the Kennedy Round adjustments had been made. It was decided that the best estimates would be the latest import information obtainable, which turned out to be 1966 data. [1/]

1/ This was an unpublished list of values of imports and duties collected by tariff item and by country from the Dominion Bureau of Statistics. It proved to be invaluable, for the Kennedy Round calculations could not have been done without it.

Effective Protection

The nominal rates for the 32 industries chosen were computed in the same way as in the initial study. The products of a particular industry were classified by the use of the SITC, and a convertibility index then yielded the appropriate Import Commodity Classifications which in turn were converted into tariff items. The 1966 data for duties collected (D) and total value of imports (M) were used to compute an average tariff ($t_c = D/M$) for each item. The pre- and post-Kennedy-Round nominal rates for each item were taken from the tariff manual (t_m and t_m' respectively). A projection of post-Kennedy-Round duties collected (D') was computed by adjusting the average tariff for the Kennedy Round change and multiplying the adjusted rate by the total value of imports. Thus

$$D' = \frac{t_m' \; t_c \; M}{t_m} .$$

The new sets of nominal industry rates were then computed for both the pre- and post-Kennedy-Round situations (t_j and t_j' respectively) as follows:

$$t_j = \frac{\Sigma D_i}{\Sigma M_i}$$

and

$$t_j' = \frac{\Sigma D_i'}{\Sigma M_i}$$

where the summation is over the commodities assigned to the j^{th} industry.

An examination of the new set of pre-Kennedy-Round nominal tariffs revealed that there were discrepancies between them and the original set of nominal tariffs for the same industries computed with 1963 data. The prime

reason for these discrepancies is that the import classification system was completely revamped in 1964, and therefore, in some cases the 1963 and 1966 import classes are not directly comparable. For example, a given SITC number in 1963 may have contained many Canadian import items that the same number would not contain in 1966, simply because in 1963 the individual items could not be identified specifically. In fact, one of the reasons that a new import classification was deemed necessary was so that the thousands of new products which appear every year could be more accurately recorded rather than lumped into arbitrary categories. Conversely, an SITC number for 1966 may contain new import items which formerly had been grouped into some other SITC category simply because they could not be identified clearly. Where these changes are substantial and where the tariff rates on the individual items differ markedly, we might expect to observe different nominal industry tariffs even if the over-all tariff structure had not changed. In summary, then, because of the DBS classification change, our "industries" are not quite the same in 1966 as they were in 1963.

Another reason why the industry nominal tariffs might be different in 1966 than they were in 1963 is that the nominal tariffs are weighted averages that use the imports in the respective years as weights. Clearly, such a weighted average could not be expected to remain constant over time unless the value of imports of each commodity remains constant relative to the total value of imports for that industry, and this is clearly not to be expected. For example, changes in relative prices will most likely change the average unless there is an exactly compensating change in the quantities. And even if relative prices remain constant, there is no reason to expect that imports of the individual commodities will change exactly proportionately, and if they do not, then the weighted average will change unless the individual tariff rates are the same.

Effective Protection

A third way in which differences might arise is through changes in sources of imports. This could be of particular importance if the shift were between the United States and Great Britain, for many goods from the United Kingdom enjoy lower tariff rates due to Commonwealth Preference arrangements. Shifts between GATT and non-GATT sources could also result in changes in the rates, although this possibility is probably not of much importance.

Finally, during the first quarter of 1963, the surcharges (from the austerity program) still applied to a few imports and this could have marginally increased some of the nominal tariff rates for the 1963 calculations. This influence is also likely to be of only minor importance. 1/

While differences in pre-Kennedy-Round tariffs for the same industries may be observed by comparing the nominal rates from Tables 1 and 3, for the most part these differences are small and the tariffs are of the same order of magnitude. Nevertheless, to provide a sound basis for comparison with the post-Kennedy-Round effective tariff calculations, it was decided to recalculate pre-Kennedy-Round effective rates for the 32 industries using the nominal tariffs which had been calculated using the 1966 data. Because Census of Manufactures reports for 1966 were not available, it was impossible to use 1966 input data for calculating the production coefficients. We therefore did the new calculations of pre-Kennedy-Round nominal rates using the same production coefficients as were used in the original calculations. Of course the same input tariffs were also used. The resulting nominal rates are presented in Column 1 of Table 3 as the top number of the pair which appears for each industry. The bottom number of each pair is the nominal rate adjusted for the Kennedy Round changes.

1/ See B. W. Wilkinson, op. cit., pp. 55-58.

It was necessary to find new average tariffs to apply to the grouped and unspecified input category. Since the 11.3 per cent and 5 per cent figures used in the original calculations were based on an average for all manufacturing industries, it would be misleading to simply average the 32-industry nominal tariffs used in this Study. In order to derive an average comparable to the one used previously, we weighted the original nominal tariffs for the 32 industries by total value of production. The same weighting was then used to compute the weighted average of the 32 adjusted nominal tariffs. The adjusted weighted average was then taken as a percentage of the unadjusted weighted average and the result was multiplied by 11.3 and 5 to give the required figures for calculations (1) and (2) respectively. The new tariffs for calculations (1) and (2) were found to be 8 per cent and 3.5 per cent respectively.

The effective rates of protection were calculated in the same way as before, using equation (3). The two sets of calculations for the pre- and post-Kennedy-Round tariffs are given in Columns 2 and 3 of Table 3. For each industry, the top figure is the pre-Kennedy-Round effective rate and the bottom number is the post-Kennedy-Round effective rate. Columns 4 and 5 give the absolute change in the effective rate and Columns 6 and 7 express these changes as percentages.

An examination of Table 3 makes it clear that while all the nominal rates have been reduced, save for industries 9, 65 and 115 where there is no change, the effective rates have not all been reduced. In fact for calculation (1), for 13 of the 32 industries, or 40.6 per cent, the effective protection has increased while for calculation (2) there are 10 industries, or 31.3 per cent, for which the effective rate has increased. Of course in many of the industries the changes (both increases and decreases) have not been very large, and in fact for calculation (1) for 12 of the 32 industries the changes in effective protection

were less than 2 percentage points. But this by itself is an interesting result for it indicates that in nearly 40 per cent of the industries selected, the Kennedy Round changes have had very little influence on effective rates.

In 5 of the 6 industries where the rate of effective protection was greater than 40 per cent, the effective rates have been reduced by less than 5 per cent of their pre-Kennedy level. If this also turns out to be true for other high effective rate industries, then we would not expect the variance of the rates to be substantially reduced by the Kennedy Round negotiations. 1/

1/ In contrast, reduction in the variance of the rates was apparently one of the goals of the Canadian negotiators; see Foreign Trade (Ottawa, Department of Trade and Commerce, July 1967), p. 39.

Table 3

Pre- and Post-Kennedy Round Nominal and Effective Tariffs

for 32 Manufacturing Industries

No.	Industry		Nominal Tariffs (t_j)	Effective Tariffs (g_j) (1)	(2)	Absolute Change in Effective Rates Calc. (1)	Calc. (2)	Percentage Change in Effective Rates Calc. (1)	Calc. (2)
			(Per cent)	(Per cent)					
5	Distilleries	(a)	20.0	19.3	21.3	+ 2.9	+ 2.6	+ 15.0	+ 12.2
		(b)	20.0	22.2	23.9				
9	Process cheese	-	5.9	- .9	3.1	+ 3.4	+ 2.8	+377.8	+ 90.3
			5.9	2.5	5.9				
11	Feed manufacturers		3.7	- 7.3	- 1.2	- .5	- 2.1	- 6.8	-175.0
			2.6	- 7.8	- 3.3				
13	Fish products		7.1	16.5	19.0	- 8.1	- 8.8	- 49.1	- 46.3
			3.6	8.4	10.2				
22	Tobacco products		30.0	37.5	39.1	+ 3.3	+ 2.9	+ 8.8	+ 7.4
			25.0	40.8	42.0				

Table 3 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) (1)	Effective Tariffs (g_j) (2)	Absolute Change in Effective Rates Calc. (1)	Absolute Change in Effective Rates Calc. (2)	Percentage Change in Effective Rates Calc. (1)	Percentage Change in Effective Rates Calc. (2)
		(Per cent)	(Per cent)					
25	Shoe factories	25.6	37.3	39.6	- 1.1	- 1.9	- 2.9	- 4.8
		23.3	36.2	37.7				
37	Wool cloth	23.8	55.1	57.8	- 4.5	- 5.1	- 8.2	- 8.8
		21.6	50.6	52.7				
43	Foundation garments	25.9	30.2	31.7	- 1.7	- 2.1	- 5.6	- 6.6
		23.4	28.5	29.6				
44	Fur goods	24.5	95.4	99.7	- .4	- 1.5	- .4	- 1.5
		22.0	95.0	98.2				
45	Knitting mills	27.6	52.1	62.4	+ 1.6	- 4.6	+ 3.1	- 7.4
		24.1	53.7	57.8				
46	Hosiery mills	23.8	33.6	36.6	- 11.3	- 12.4	- 33.6	- 33.9
		14.6	22.3	24.2				

Table 3 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) (1)	Effective Tariffs (g_j) (2)	Absolute Change in Effective Rates Calc. (1)	Absolute Change in Effective Rates Calc. (2)	Percentage Change in Effective Rates Calc. (1)	Percentage Change in Effective Rates Calc. (2)
		(Per cent)	(Per cent)					
52	Sawmills	3.5	5.3	6.8	- 2.1	- 2.4	- 39.6	- 35.3
		2.3	3.2	4.4				
55	Veneer and plywood mills	16.1	29.6	31.2	- 5.5	- 6.4	- 18.6	- 20.5
		11.4	24.1	24.8				
57	Wooden box factories	20.0	32.6	34.2	- 5.2	- 5.5	- 16.0	- 16.1
		15.4	27.4	28.7				
60	Office furniture	22.0	29.5	31.8	- 6.6	- 7.3	- 22.4	- 23.0
		17.0	22.9	24.5				
65	Publishing and printing	1.4	.5	.9	+ .4	+ .3	+ 80.0	+ 33.3
		1.4	.9	1.2				
73	Aluminum rolling, casting, extruding 1/	3.0	- 2.4	- .4	+ .6	- .2	+ 25.0	- 50.0
		2.2	- 1.8	- .6				

Table 3 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) (1)	(2)	Absolute Change in Effective Rates Calc. (1)	Calc. (2)	Percentage Change in Effective Rates Calc. (1)	Calc. (2)
		(Per cent)	(Per cent)					
74	Fabricated structural metal	16.8 13.5	24.6 14.9	26.8 16.2	- 9.7	- 10.6	- 39.4	- 39.6
78	Steel tubes and pipes	17.7 14.2	46.3 32.7	51.9 35.5	- 13.6	- 16.4	- 29.4	- 31.6
88	Shipbuilding and repair[2/]	15.2 15.0	20.5 21.6	23.3 23.7	+ 1.1	+ .4	+ 5.4	+ 1.7
89	Motor vehicle parts and accessories	3.6 2.6	- 4.9 - 3.6	- .3 - .1	+ 1.3	+ .2	+ 26.5	+133.3
90	Railroad rolling stock	12.3 10.6	10.6 11.5	17.7 16.6	+ .9	- 1.1	+ 8.5	- 6.2
98	Household radio and TV	19.2 19.0	31.2 39.0	45.5 50.4	+ 7.8	+ 4.9	+ 25.0	+ 10.8

Table 3 (continued)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) (1)	(2)	Absolute Change in Effective Rates Calc. (1)	Calc. (2)	Percentage Change in Effective Rates Calc. (1)	Calc. (2)
		(Per cent)	(Per cent)					
99	Communication equipment	11.9 10.3	12.4 12.0	17.0 15.2	- .4	- 1.8	- 3.2	- 10.6
113	Clay products	9.5 7.8	10.4 8.4	12.1 9.7	- 2.0	- 2.4	- 19.2	- 19.8
115	Petroleum refineries	6.0 6.0	33.2 34.1	36.0 36.9	+ .9	+ .9	+ 2.7	+ 2.5
117	Other petroleum and coal products	9.1 4.6	10.0 2.8	13.3 5.0	- 7.2	- 8.3	- 72.0	- 62.4
125	Mixed fertilizers	.1 0.0	- 7.5 - 3.5	- 4.9 - 1.8	+ 4.0	+ 3.1	+ 53.3	+ 63.3
126	Broom, brush and mop	24.8 22.2	43.0 39.0	47.2 41.8	- 4.0	- 5.4	- 9.3	- 11.4

Table 3 (concluded)

No.	Industry	Nominal Tariffs (t_j)	Effective Tariffs (g_j) (1)	Effective Tariffs (g_j) (2)	Absolute Change in Effective Rates Calc. (1)	Absolute Change in Effective Rates Calc. (2)	Percentage Change in Effective Rates Calc. (1)	Percentage Change in Effective Rates Calc. (2)
		(Per cent)	(Per cent)					
127	Clock and watch	17.6 16.2	15.3 20.9	16.8 22.7	+ 5.6	+ 5.4	+ 36.6	+ 32.1
129	Pen and pencil	21.1 17.4	26.3 21.3	28.4 22.7	- 5.0	- 5.7	- 19.0	- 20.1
133	Jewellery and silverware	22.5 17.0	42.4 39.8	46.9 43.1	- 2.6	- 3.8	- 6.1	- 8.1

Notes: (a) Not adjusted for the Kennedy Round.
(b) Adjusted for the Kennedy Round.

1/ Recall that the t_j's for this category are substantially lower than the existing rate on many aluminum imports. Hence the g_j's are also lower. See Table 1, footnote 3/.

2/ If the subsidy to shipbuilding were included, the t_j's and g_j's would be increased, as is indicated in Table 7.

6. INTERPRETATION OF EFFECTIVE TARIFF RATES

Considerable caution must be exercised in interpreting these effective tariff computations. The number of limiting assumptions necessary to arrive at any effective rates at all imply that the results must be qualified in the light of these assumptions.

The discussion of this section will be divided into three parts. First, the biases which our assumptions may have imparted to our calculations, that is, to our estimates of how value added per unit of output have been increased by the tariff structure, will be examined. Then the relations among effective rates, the efficiency of the Canadian economy and the returns to primary factors are analyzed. Finally, the impact of effective tariffs on resource allocation is briefly considered.

(a) Biases Resulting from the Assumptions

i) Returns to Primary Factors and the Assumption of Unchanged Input-Output Coefficients in Effective Tariff Computations -- For our effective tariff calculations, it was necessary to assume that the imposition of tariffs does not change the domestic ratios of inputs to output in any industry. But this may not be true. If, for example, the higher tariffs permitted domestic production to expand and increasing returns to scale were realized, then, assuming that producers continue to price up to foreign price plus the tariffs, value added per unit of output would have risen more than our computations suggest. The effective protection rate would, from this viewpoint, be understated. There is no way of knowing what actually occurred, however. Output may or may

not have expanded,[1] and increasing returns to scale may or may not be possible. Moreover, even if we knew that production increased and economies of scale were there to be realized, there is no assurance that they were realized. These issues will be elaborated upon somewhat in subsection (b) below. For now it is sufficient to observe that there may be some distortion in our results from this source, but it is impossible to know its direction or extent without much more detailed analysis of each industry.

A related point is that quite apart from efficiency changes there may also be some substitution among factors of production as their relative prices are altered by the tariff structure. J. Clark Leith, in a study involving data on 16 manufacturing industries in Taiwan,[2] has concluded that allowing for factor substitution in production results in lower rates of effective protection. This finding is consistent with Corden's theoretical analysis which suggests this possibility.[3] It implies that our estimates of effective protection rates, which of necessity ignored factor substitution, may be somewhat overstated.

Leith also observed that, depending upon the level of the assumed elasticity of substitution, the ranking of industries by their effective protection rates may alter.

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[1] Whether domestic output will necessarily expand when tariffs are imposed is discussed under subsection (c).

[2] J. C. Leith, "Effective Rates of Protection: Analysis and an Empirical Test", unpublished Ph. D. dissertation, Department of Economics, University of Wisconsin, 1967.

[3] Corden, op. cit., pp. 233-235.

When the elasticity was assumed to be 0.5, no change in the rankings of effective protection occurred and, at an assumed elasticity of 2.0, four industries changed their rank, although none by more than one position. Because of the obvious differences between Canada and Taiwan in such matters as industrial structure, relative factor prices, value added in relation to total output, and tariff structures, it is difficult to draw any strong conclusions about how allowance for factor substitution in Canada would affect the relative ranking of industries by effective rates of protection. At best one might cautiously suggest that the ranking would not be altered much, but this is little more than a hunch which could only be supported or refuted by empirical investigation.

ii) The Assumption of Perfectly Elastic Foreign Demand for Canadian Exports, Foreign Supply of Imports and Domestic Supply of Some Nontraded Inputs -- Consider first the assumption of perfectly elastic foreign supplies of imports. If Canada were a big enough buyer to influence the world price, then when restrictions on Canadian imports occur, foreign price may fall or rise depending on how the volume of imports changes and upon whether foreign producers are operating under conditions of increasing or decreasing costs respectively.[1/] If foreign price fell, for example, the possible increase in the Canadian producer's price (still assuming that he prices up to world price plus the tariff) would be less than if foreign price remained constant. Actual effective protection, and therefore the increase in returns to primary factors, would be less than what we have estimated.

1/ And upon whether these cost changes are reflected in their prices.

It is not probable, however, that this particular assumption is a major source of error in our computations. Over 75 per cent of Canadian imports of manufactured and semi-manufactured goods emanate from the United States, and Canada forms less than 10 per cent of the total U. S. market. Consequently, the marginal adjustments that have occurred in Canadian demand owing to tariff changes are likely to have had but a negligible impact upon U. S. export prices.

Perfectly elastic foreign demand for Canadian exports is less likely to be true, particularly for semi-processed goods, which form the bulk of Canadian manufactured exports. But as Corden has pointed out with regard to Australia, "The exportable content in protected import-competing production is fairly unimportant."[1/] Hence this assumption does not appear to be a major limitation of our computations.

The third set of items considered to be in perfectly elastic supply, and accordingly grouped with traded inputs in our estimates, were the intermediate factors of production, electricity and fuel. This assumption implies that none of the increase in domestic price that may be made possible by the tariff structure finds its way to these intermediate inputs, but rather goes entirely to the primary factors, that is, to value added. Clearly, to the extent that these nontraded inputs share in any price increases, the returns to the primary factors, and hence our effective rates of protection, are overstated. Leith,[2/] in his study on Taiwan, produced empirical evidence supporting this point. He also noted that of the 16 industries examined, 12 changed rank when the

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1/ Corden, op. cit., p. 236.

2/ Op. cit., pp. 95-102.

assumption of perfectly elastic supply of domestic nontraded inputs was relaxed. However, the Spearman rank correlation test still showed a very high correlation between the two sets of effective rates. Therefore, although our rates may be a little too high because of this particular assumption, their relationship to one another is probably quite realistic.

There is an additional complication, however, with regard to that set of nontraded domestic inputs whose returns are not distinguished in the Census of Manufactures but instead are included in the value added for each industry. This set consists of advertising, insurance, consulting services, and other business expenses such as payments to outside contractors for maintenance and repairs. To the extent that what has been reported as value added consists of payments for these inputs, both the estimated pre- and post-tariff value added numbers are overstated. It is impossible to tell, therefore, precisely what effect the inclusion of these payments in value added have had upon our effective tariff computations. Since the error will appear in both the numerator and denominator of our effective tariff estimates, our suspicion is that the distorting effect of this problem is not great. But only new, much more detailed data would provide a firm answer.

iii) Pricing Up to the World Price Plus the Canadian Tariff -- The assumption that producers price up to the world price plus the tariff is commonly used in estimates of effective tariff rates and has received considerable attention in Canadian discussions of industrial structure and efficiency. It is realized that this assumption is

not always true,[1] but owing to the lack of any better information, it has been a convenient simplification. To the degree that producers are not pricing up to the tariff, our estimates of the per cent increase in value added per unit of output resulting from the tariff are overstated.

Given these various limitations, it seems clear that our effective tariff computations offer only rough estimates of the extent to which the returns to the primary factors of production have been altered by the entire tariff structure. That is, they provide tariff negotiators, other government officials and industry personnel with but a first approximation to the possible impact that the Canadian tariff structure has had upon the returns to labour, capital, and land in the industries concerned.

(b) Effective Protection, the Efficiency of Canadian Industry, and Returns to the Primary Factors of Production

Very much at the centre of present Canadian thinking about trade, tariffs, and tariff changes are two questions: (1) the efficiency of Canadian manufacturing relative to the efficiency of our chief international competitors, particularly the United States; and (2) the returns to primary factors in manufacturing, especially labour, relative to the returns in the United States. It seems worthwhile, therefore, to devote some space to

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[1] For example, in the Wonnacotts' study, Chapter 14, in the two or three industries where detailed price information was available, the Canadian producers priced below the U. S. price plus the Canadian tariff. Perhaps this was necessary because of competition from imports of other countries. But it also could be simply that producers were not pricing up to the tariff.

discussing these issues in the light of our effective tariff computations -- even though our conclusions do little more than to re-emphasize that caution must be exercised in interpreting what the structure of effective rates actually implies.

It may well be that our effective rates of protection will be of help in identifying those industries which will have to face up to the largest adjustments in their value added -- or, as will be seen in a moment, in their efficiency -- if a move to a North Atlantic or some other alternate free-trade arrangement were taken. But they do not give us any indication of which industries will actually experience the greatest increases or decreases in value added per unit of output or of which industries will survive and prosper should free international trade obtain. What happens will largely depend upon how efficient the industries are relative to their foreign competitors -- and thus what scope there is for improvement in efficiency -- and how managements respond to the challenges and opportunities of free trade.[1/]

As a means of illustrating these statements, consider an industry which operates both domestically and in a foreign country, and assume that in the foreign country the industry is the one used in Section 2; hence

(1a) $v = 1 - a$

where $a = .6$ (there is only one intermediate input), and $v = .4$ (value added consists only of labour in this example). Assume initially that free trade prevails so that the prices of the output and the intermediate input are the same in both countries.

1/ This assumes away other complicating influences, such as transport costs, climatic considerations, and so on.

Suppose also that the domestic industry is 20 per cent less efficient than the foreign industry, or in other words that for the same inputs, domestic output is only 80 per cent of what it would be in the foreign country. The question now is, if the domestic industry is to sell at the same price as the foreign one, how much less must the primary factor, labour, be paid? For the domestic economy, equation (1a) will be replaced by

(4) $v^* = .8 - a$

where "a" still equals .6, and thus $v^* = .2$. The reduction in value added that the domestic industry must accept to be competitive is therefore

$$h = \frac{v - v^*}{v} = \frac{.2}{.4} = 50 \text{ per cent.}$$

In other words, if free trade prevails and if the industry is to survive domestically, labour must receive 50 per cent less than they receive in the foreign country, even though the domestic industry is only 20 per cent less efficient. We might call h the "effective inefficiency" of the domestic industry.

Suppose now that free trade in the intermediate input continues but that a tariff of 12 1/2 per cent is imposed on the final good. If industry prices up to the foreign tariff, and there is no change in domestic efficiency when the tariff is instituted, domestic value added will be increased to

$$v^{*\prime} = .8(1 + .125) - a = .9 - .6 = .3.$$

Consequently, the effective protection on this industry is 50 per cent.[1/] But in spite of this "high" rate of effective

[1/] I. e., $\frac{v^{*\prime} - v^*}{v^*} = \frac{.3 - .2}{.2} = .50.$

protection, domestic labour still receives 25 per cent less income per unit of output than does its foreign counterpart.[1/]

Although this is a highly oversimplified example, it serves to illustrate the basic issues regarding the relationships among Canadian and foreign tariffs, Canadian manufacturing efficiency, and the returns to labour.

It is generally agreed that Canadian manufacturing industries are less efficient on the whole than are their American counterparts. The evidence compiled on this argument is impressive.[2/] It is also well known that notwithstanding the increase in manufacturing value added that may have been made possible by the Canadian tariff

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1/ The tariff on the final good in this model would have to be 25 per cent, and accordingly the rate of effective protection would be 100 per cent, before the returns to domestic labour would equal the returns to labour in the foreign industry.

2/ E. g., see D. H. Fullerton and H. A. Hampson, Canadian Secondary Manufacturing Industry, a study prepared for the Royal Commission on Canada's Economic Prospects, Ottawa, Queen's Printer, 1957; H. E. English, Industrial Structure in Canada's International Competitive Position, Montreal, Private Planning Association of Canada, 1964; R. J. and Paul Wonnacott, Free Trade Between the United States and Canada: The Potential Economic Effects, Cambridge, Massachusetts, Harvard University Press, 1967; H. C. Eastman and S. Stykolt, The Tariff and Competition in Canada, Toronto, Macmillan, 1967; D. J. Daly and D. Walters, "Factors in Canada-United States Real Income Differences", mimeographed, Economic Council of Canada, 1967.

structure, Canadian labour receives something in the neighbourhood of 25 per cent less than does American labour in comparable industries.[1] In other words, Canadian effective tariffs, as high as they may appear at first glance, have not been sufficient to offset the lower Canadian efficiency as well as any increase in returns to labour in the United States that have been permitted there by reason of the American tariff structure.[2]

The reason generally offered for the lower Canadian returns is that Canadian manufacturers have not achieved the economies of scale in production that have been attained in the United States. It is believed that on the one hand foreign tariffs, particularly those of the United States, have limited the extent to which Canadian producers can achieve these economies of scale through exporting. On the other hand, the Canadian tariff, by providing a protected market, offers no incentive for producers to rationalize their production (e. g., via larger plants or fewer lines and longer runs in existing plants) and acquire even those scale economies theoretically attainable within the Canadian market. It is argued that if domestic firms do price at something close to the world price plus the Canadian tariff, then if one of them in an industry attempts to obtain economies of scale by reducing its price, it may precipitate an expensive price war lasting until one or more firms are forced out of business. The firm initiating the price-cutting could not be assured that it would be one of those

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[1] Wonnacott and Wonnacott, op. cit.

[2] For a discussion of the approaches that might be taken in assessing the joint impact of domestic and foreign tariffs on effective protection in any one country, see Corden, op. cit., pp. 230-231.

surviving.[1] Hence inefficiency -- and lower returns to labour -- may be perpetuated.

But the argument too often has stopped there. Frequently ignored is the fact that the lack of aggressiveness by Canadian management may also be a very important consideration. The term aggressiveness is used here to summarize a host of factors relevant to successful international competition -- the foresight to see the potential of new markets, the willingness to undertake risks, the initiative to undertake new or adaptive types of research and development, and to use the latest technology in inventory and other cost control, production scheduling, inspection. and so on.

Only very recently has this concept been given any attention,[2] but we believe that it is very worthy of

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[1] Ibid. ; also H. E. English, op. cit. ; and B. W. Wilkinson, op. cit. , Chapters 6 and 7.

[2] See B. W. Wilkinson, ibid. , pp. 152-155 and Chapter 8; see also B. Anthony Lawless, The Thorne Group Ltd. , Management Consultants, Toronto, Wake up Canadian Industry, an Address to the Guelph Chamber of Commerce, February 22, 1968; also of interest is the recent study by the Financial Post (April 6, 1968, p. 1), on Canadian-American productivity which indicates inter alia that when sales increase, Canadian manufacturers "add -- relatively -- far more employees than U. S. manufacturers do. This severely limits productivity gains. It suggests that longer production runs in Canada do not, as thought, always lead to lower costs per unit of production." This particular finding, although far from conclusive, is at least consistent with the view that management's performance deserves attention.

mention. Its significance is that, in the above example, whether domestic returns to labour can be increased to equality with returns to labour in the foreign country should free trade be instituted, will depend upon the degree to which the domestic industry can improve its efficiency -- which will in turn depend upon the response of management, and of course the co-operation of labour. If efficiency rises to the level of efficiency abroad, value added per unit of output could rise until comparable to that abroad, even though effective protection is reduced to zero. If domestic productivity improved until the industry was only 10 per cent less efficient than the foreign industry, then value added per unit of output would remain the same as at present, even though effective protection is eliminated. And finally, if there were no improvement in efficiency, value added per unit of output would have to decrease until it is 50 per cent lower than abroad.[1/] The alternative would be for the industry to cease operations entirely.

Viewed in the context of the foregoing discussion, our results on the Kennedy Round tariff reductions take on additional meaning. It was observed that, of the sample of industries for which the change in effective protection was computed, about one-third of them actually will enjoy increased effective rates. Over one-third of the industries will experience less than two percentage points change (either increase or decrease). The new stimulus to manufacturers to improve their efficiency that might have resulted from less Canadian protection is therefore lacking -- even though there now may be greater opportunities for exporting as a consequence of lower foreign tariffs. In other words, negotiations which result in little or no reduction in Canadian tariffs, while possibly a victory for the negotiators, do little to spur on Canadian manufacturing to improved performance.

1/ The exchange rate is ignored throughout this discussion.

Perhaps this lack of stimulus to rationalization through reduced tariff protection may be compensated for, in part, by the more strenuous efforts that have been made in recent years by the Department of Trade and Commerce to develop export consciousness and aggressiveness among producers and by the Department of Industry to encourage modernization and rationalization. But there can be little denying that lower domestic protection would also complement these other measures.

(c) Effective Tariffs and Resource Allocation

It has been suggested that the main purpose of computing effective protection rates is to discover the resource-allocation effects of a tariff structure.[1/] The belief seems to be that the higher the effective tariff, 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.

While this is not the appropriate place to embark on a major theoretical analysis of effective protection and resource allocation, a number of important qualifications to the simple argument sketched above must nevertheless be highlighted. These will at least indicate that the effective rates computed are of only very limited usefulness in explaining how resources have shifted in response to the tariff structure.

First, effective protection exists only if domestic producers raise their prices by the total or some proportion of the percentage permitted by the tariff. But this price rise will normally imply a drop in the total quantity

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1/ Corden, op. cit., p. 222.

demanded of the product involved. This follows because there are many industries that do not enjoy effective protection (e. g., the service, communication, and transportation industries) and whose employees would therefore not obtain higher incomes from the tariff structure.[1/] The quantities of the protected goods that they would demand would normally decrease when prices rise.[2/]

Consequently, for output in a protected industry to expand, domestic producers would have to seize a larger share of the domestic market -- large enough to offset the reduction in the size of this market resulting from the price increases. For a determinate answer as to how this might occur, there must be either an upward sloping domestic supply curve or some sort of product differentiation between domestic and foreign goods (due perhaps to advertising) that permits domestic suppliers to expand their share of the market.

1/ Substitution effects assumed aside. Even if substitution effects were allowed, it is most unlikely that they would result in incomes in these other sectors rising by even the average amount that effective protection permits incomes in manufacturing to increase.

2/ This conclusion ignores the optimum tariff argument which is that real income may be raised via tariffs if they improve the terms of trade. We do not think that this argument is of much significance for Canada because it is highly questionable that Canada has much monopoly power in international markets. See also, Ronald I. McKinnon, "Intermediate Products and Differential Tariffs: A Generalization of Lerner's Symmetry Theorem", Quarterly Journal of Economics, 80, November 1966, p. 586, n. 5.

To the extent that these influences affect the various industries differently, outputs may not expand and therefore resources may not shift in accord with the sequence suggested by the ranking of industries according to their effective tariffs.[1/] An obvious corollary of this statement is that the restrictive effect of tariffs on imports will not be a simple monotonic function of the computed level of effective protection.

How primary factors move in response to effective protection will also depend upon the extent to which each factor participates in any rise in value added. If all primary factors do not gain equally in the sense of having their income increased by the same percentage, then it is quite conceivable that they may all gain more in an industry with lower effective protection than in one with higher effective protection. As an illustration, consider two industries A and B which employ two factors K and L and use intermediate inputs from other industries (and from each other perhaps). Suppose that initially (before the tariff) the price of factor K is $1,000 a unit in both industries and the price of factor L is $100 a unit. Further suppose that initially industry A uses one unit of K and 10 units of L and that B uses 10 units of K and one unit of L. Now suppose that after tariffs have been imposed industry A increases the payments to K by

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1/ Even if one ignores the preceding consumption effects of effective tariffs, there are still complications. Corden, op. cit., p. 224, has pointed out that when industries are ranked on a scale according to their effective rates, then the most one could say is that output in the industry with the highest effective rate would increase while output in the industry with the lowest effective rate would decrease. The in-between industries would tend to lose resources to those with higher effective rates and in turn attract resources from those with lower effective rates; the net effect on their output would be unpredictable.

10 per cent and the payments to L by 20 per cent and that industry B increases the payments to K by 12 per cent and the payments to L by 25 per cent. Now if there is any validity in the factor movements argument, we would expect a shift of both K and L from industry A to B, for the prices of both K and L have been increased by more in B.

But now let us see what effective protection rates this example implies. In industry A

$$v_a = 1.\,1000 + 10.\,100 = \$2{,}000,$$

$$v_a' = 1.\,1100 + 10.\,120 = \$2{,}300.$$

Then

$$g_a = \frac{v_a' - v_a}{v_a} = \frac{300}{2{,}000} = 15 \text{ per cent.}$$

In industry B

$$v_b = 10.\,1000 + 1.\,100 = 10{,}100,$$

$$v_b' = 10.\,1120 + 1.\,125 = 11{,}325.$$

Then

$$g_b = \frac{v_b' - v_b}{v_b} = \frac{1{,}225}{10{,}100} = 12.\,13 \text{ per cent.}$$

Industry A has the highest effective rate of protection. Yet the prices of both factors rose more in industry B and consequently, even if we accept the argument that factors do move to the industry where their prices have increased the most, they will move to industry B, the one with the lower effective rate.

The impact of the effective tariff structure on the balance of payments and hence upon the exchange rate

would also have to be determined carefully before firm statements could be made about the resource allocation consequences of the tariff structure.[1/] If the protective-rate structure had led to a balance-of-payments surplus and hence an appreciation of the Canadian dollar (that is, without the tariff structure the Canadian dollar would have to be devalued), then, it is as though there were a uniform ad valorem subsidy or negative tariff on imports and an equivalent tax on exportables. This ad valorem rate would have to be deducted from the computed effective rates for all tradeable goods to arrive at the net effective protection provided by the tariff structure and subsequently to assess the resource allocation effects of the tariff on tradeables relative to nontradeables.

Conversely, if the tariff structure had somewhat perversely led to a balance-of-payments deficit and necessitated a depreciation of the Canadian dollar, then the amount of the depreciation would have to be added to the computed effective rates of protection to obtain the net effective rate. This would be a questionable procedure, however, if the payments deficit and consequent depreciation did nothing more than permit inefficiency to develop in Canadian industry. Under such circumstances value added per dollar of output and hence the effective protection rate would not have been increased by the depreciation. Removal of the tariff structure might be a stimulus to improved efficiency (particularly if foreign tariffs were eliminated concurrently) and increased value added per unit of output.

Briefly, then, our effective rates of protection by themselves are of little guidance in indicating how resources will move in response to the tariff structure. Much more work is necessary on this issue before more positive statements can be made.

[1/] See Corden, espec. pp. 224-226.

7. CONCLUDING REMARKS

In conclusion, we suggest that the main use of effective protection rates would seem to be as crude indicators to government and industry of the advantages that have been conferred and the strains that have been imposed upon domestic industry by existing tariffs. But they are only one small building block in the construction of rational policies to promote industrial efficiency and consumer welfare. Much more intensive research on individual industry characteristics and problems will be necessary.[1/] It may even be worthwhile at some point to compute effective rates for individual products within industry -- providing industry opens its records so as to make this task possible.

Several other extensions of our effective tariff computations also may prove worthwhile. One of these would be to examine the impact of the Kennedy Round of tariff reductions on all industries. Another would be to investigate how the rates of effective protection for different countries are related, and how taking specific account of the fact that other countries also have a structure of tariffs will influence our domestic effective rates of protection.[2/]

As already indicated, the question of what, if anything, effective rates have to say about the allocation of resources has not been fully worked out and a good deal more work is required in this area. Satisfactory

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1/ See the industry studies forthcoming in the Private Planning Association of Canada Series, "Canada in the Atlantic Economy" to be published by the University of Toronto Press.

2/ See Corden, op. cit., pp. 230-231; also Wonnacott, op. cit.

approaches to these questions likely will have to take account of the possibility of substitution in production and of the fact that all elasticities are not infinite.[1] The question of how tariffs relate to the inefficiency of industries also needs further study.

There are also several interesting hypotheses about effective protection that could be tested. For example, is there a relation between the labour intensity of an industry and the height of the effective protection, or alternatively is there a relation between effective protection and the proportion of cost going to labour? Both questions may have relevance to the questions of what causes trade and how trade patterns are determined. These points relate to the more general question of the validity of the Heckscher-Ohlin model as an explanation of trade.

A question that has been raised by Basevi is whether effective protection should be considered as protection to all fixed factors or only to labour.[2] If capital is internationally mobile so that its "price" is determined internationally, then a case can be made for calculating the effective protection for labour alone. Quite a number of difficulties are involved here, however, not the least of which are how to determine the contribution of capital and the mobility of capital. There is the further empirical problem of obtaining information on capital stock at the detailed industry level. For Canada capital stock data exist only for 13 major manufacturing sectors.

1/ As suggested earlier, excellent exploratory work in these areas has been done by Leith, op. cit.

2/ Basevi, op. cit.

Effective Protection

One further point must be kept in mind. Tariffs are only one of the distortions in the economy and all other such distortions may also have influences larger than their "rates" would indicate. We have commented on the question of "effective inefficiency" and on the fact that domestic taxes can have exactly the same kinds of effects as tariffs. In order to get some idea of how the economy is behaving we must know something about all such forces, and a study of effective protection should be considered as just a part of a broader study of all the distortions that affect the economy.

APPENDIX A

THE EFFECT OF DISAGGREGATION ON THE RATES OF EFFECTIVE PROTECTION

Table 4 shows the changes, for an arbitrarily selected group of industries, that occurred in the effective protection rates when all inputs contributing more than .1 per cent to cost were treated separately, as compared to treating only those inputs contributing 1 per cent or more to cost. Column 1 gives the industry number and Columns 2 and 3 show the number of specific inputs treated at the 1 per cent and .1 per cent level of aggregation respectively. Column 4 gives the nominal tariff and Columns 5 to 8 give the effective rates of protection at both levels of aggregation for the two choices of rates to apply to the grouped inputs. Columns 9 and 10 give the absolute changes in the effective protection rates for the two sets of calculations and Columns 11 and 12 express these changes as percentages. The last four columns of Table 4 clearly indicate that at least for this set of industries, aggregating at the .1 per cent level rather than the 1 per cent level does not substantially affect the results.

The industries shown in Table 4 were arbitrarily chosen at the beginning of the Study and we had no reason to believe that they were the most appropriate ones to consider. At the end of our Study, to check on our earlier decision to aggregate at the 1 per cent level, we chose for further consideration all those industries where the grouped a_{ij} made up more than 50 per cent of Σa_{ij} (i.e., made up more than 50 per cent of the nonfactor inputs) and more than 45 per cent of the value of output, and redid the calculations aggregating at the .5 per cent level.

These were arbitrarily chosen initial limits and we planned to extend the range of industries to be considered if it was seen to be desirable.

Table 5 presents the results of these calculations. The table is set up in exactly the same way as Table 4 and the last four columns show the changes in the effective protection rates both absolutely and as percentages. The largest change was 2.5 percentage points (from an effective rate of 57.6 per cent to one of 55.1 per cent) and this is clearly not a significant change. It was concluded that no additional disaggregation was necessary.

Table 4

Industry	Specific Inputs Aggregating at		t_j	$g_j(1)$		$g_j(2)$		Absolute Change		Percentage Change	
	1 per cent	.1 per cent		1 per cent	.1 per cent	1 per cent	.1 per cent	$g_j(1)$	$g_j(2)$	$g_j(1)$	$g_j(2)$
4	1	8	35.9	50.4	50.6	53.2	52.8	.2	-.4	.4	-.8
62	8	20	26.8	39.1	38.8	41.8	40.4	-.3	-1.4	-.8	-3.3
65	0	3	19.3	22.0	21.7	23.7	23.4	-.3	-.3	-1.4	-1.3
80	2	6	10.0	14.6	15.0	18.0	18.0	.4	0.0	2.7	0.0
101	0	15	14.8	17.4	17.1	22.3	21.3	-.3	-1.0	-1.7	-4.5
130	7	9	18.8	17.8	17.3	19.3	18.8	-.5	-.5	-2.8	-2.6

Table 5

Industry	Specific Inputs Aggregating at		t_j	$g_j(1)$		$g_j(2)$		Absolute Change		Percentage Change	
	1 per cent	.5 per cent		1 per cent	.5 per cent	1 per cent	.5 per cent	$g_j(1)$	$g_j(2)$	$g_j(1)$	$g_j(2)$
14	6	19	9.0	6.2	5.3	13.7	11.4	-.9	-2.3	-14.5	-16.8
96	0	0	11.0	11.0	11.0	17.3	17.3	0.0	0.0	0.0	0.0
97	5	10	20.7	41.5	41.5	57.6	55.1	0.0	-2.5	0.0	- 4.3
99	2	5	19.7	31.4	30.6	41.5	40.6	-.8	- .9	- 2.5	- 2.2
100	2	2	20.7	36.0	36.0	51.4	51.4	0.0	0.0	0.0	0.0
111	1	2	19.9	31.6	31.7	40.7	40.4	.1	- .3	.3	- .7
126	3	12	7.8	4.8	5.2	11.0	10.4	-.4	- .6	8.3	- 5.5

APPENDIX B

SELECTED INDUSTRY STUDIES

There are many industries which enjoy special tariff concessions, receive subsidies or, in other ways, do not fit the standard pattern for which the basic formula for calculating effective tariffs is designed. We have selected several of these industries for closer examination with a view to taking account of some of these influences. The industries which we have selected for special treatment are, in our view, of special interest in the Canadian economy and therefore deserve more detailed consideration.

Motor Vehicle Parts and Accessories -- The automobile agreement between Canada and the United States would clearly be expected to have an effect on the effective tariff for the motor vehicle parts industry. Under the automobile agreement, all parts and accessories which are to be used as original equipment on motor vehicles enter free of duty. Replacement parts, when they are of a class or kind not made in Canada, also enter duty free. Replacement parts which are of a class or kind made in Canada must pay on the average of 17.5 per cent. In our original calculation for this industry we used an average nominal industry tariff of 10.2 per cent. In order to demonstrate the effects which the automobile agreement might be expected to have, we have made two additional calculations which are presented below. In the first, we assume that all parts and accessories are original equipment so that the relevant industry tariff is zero. In the second, the assumption is that all parts and accessories are for replacement purposes and of a class or kind made in Canada. The tariff used is therefore 17.5 per cent. As might be expected, the use of a zero tariff leads to a

negative effective rate of protection while the use of 17.5 per cent leads to quite high effective rates of 25.4 per cent and 33.6 per cent.

Table 6

The Effect of the Automobile Agreement on Effective Protection in the Motor Vehicle Parts and Accessories Industry

	t_j	$g_j(1)$	$g_j(2)$
		(Per cent)	
Original calculation	10.2	8.3	14.4
Parts used as original equipment	17.5	25.4	33.6
Parts used for replacement	0.0	-11.4	- 7.4

Shipbuilding and Repair -- The shipbuilding and repair industry receives a 25 per cent subsidy. A subsidy, by giving an advantage to the domestic producer relative to the foreign producer, acts in the same way as a tariff on imports, and thus the influence of the subsidy on the effective rate of protection can be assessed by treating it as a tariff. Accordingly, we have added 25 per cent to the nominal industry tariff of 17.5 per cent used in the original calculation. The resulting tariff of 42.5 per cent was then used in the calculation of the new set of effective rates which appear in Table 7. The effect on the rate is highly significant -- a change of

58.8 percentage points in calculation (1) and 62.5 percentage points in calculation (2). It should be noted that a tax on domestic production, where such might exist, could be treated in a similar manner by considering it as a negative tariff.

Table 7

The Effect of the Subsidy on the

Shipbuilding and Repair Industry

	t_j	$g_j(1)$	$g_j(2)$
		(Per cent)	
Original calculation	17.5	24.9	27.9
Addition of 25 per cent subsidy	42.5	83.7	90.4

Sugar Refineries -- The calculation in Table 1 for the sugar refining industry differs from the other calculations in that the tariffs are based on 1965 price and quantity data. The tariffs for both raw and refined sugar are given in the manual as \$1.28/cwt. for 96° raw and \$1.89/cwt. for 100° refined. In order to derive the percentage tariff it was necessary to obtain figures for the quantity and value of sugar imports, and compute the unit value. When this was done for the year 1963, we found that the price per unit for raw sugar was \$7.75/cwt. and \$9.10/cwt. for refined sugar. The same calculation for 1965 indicated that the price of raw sugar had fallen to \$2.98/cwt. and that of refined sugar to \$7.80/cwt. Since sugar prices in 1963 were affected by the Cuban

crisis, we felt that the 1963 tariff was not typical and we therefore reported the effective rate calculation based on the tariffs computed, using 1965 data.

A further examination of this industry revealed, as might be expected, that the majority of raw and refined sugar is imported from countries which receive British Preferential tariff treatment. In order to indicate the possible effects of the British Preferential (BP) rates, we calculated the effective rates for 1963 data using MFN-GATT rates, and then calculated the effective rates for 1963 using BP tariffs for both the inputs and the output. The results of these calculations are presented in Table 8. Although the effective rates are somewhat higher using BP tariffs, the difference is not very marked. The reason for this is that while the nominal industry rate is lower, so are the rates for inputs, and therefore the change in the effective rate is only moderate. It is of interest to observe the substantial difference in the effective rates between 1963 and 1965 which resulted from the large price change that occurred in this period and the fact that the tariff is a per-unit variety. Note that if the tariff were ad valorem, no such change would be observed. This example serves to point out the hardship that a per-unit tariff can impose on an industry in which the product price tends to fluctuate substantially.

Table 8

The Effect of British Preferential Rates on the Sugar Refineries Industry

	t_j	$g_j(1)$	$g_j(2)$
		(Per cent)	
1965 Data, MFN-GATT rates[1/]	24.2	- 7.6	- 6.9
1963 Data, MFN-GATT rates	20.8	38.5	40.1
1963 Data, BP rates	12.0	46.8	48.6

1/ Since Canadian refiners import mainly preferential raw sugar at a landed cost somewhat below the landed cost of raw sugar subject to MFN duty, and since the content and other provisions of the Canadian tariff tend to inhibit imports of refined sugar entitled to the preferential rate of duty, the calculated effective rates of protection may be too low.

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by James R. Melvin and Bruce W. Wilkinson

Economic Council of Canada