A paper prepared for the

Un document préparé pour le

Economic Council of Canada

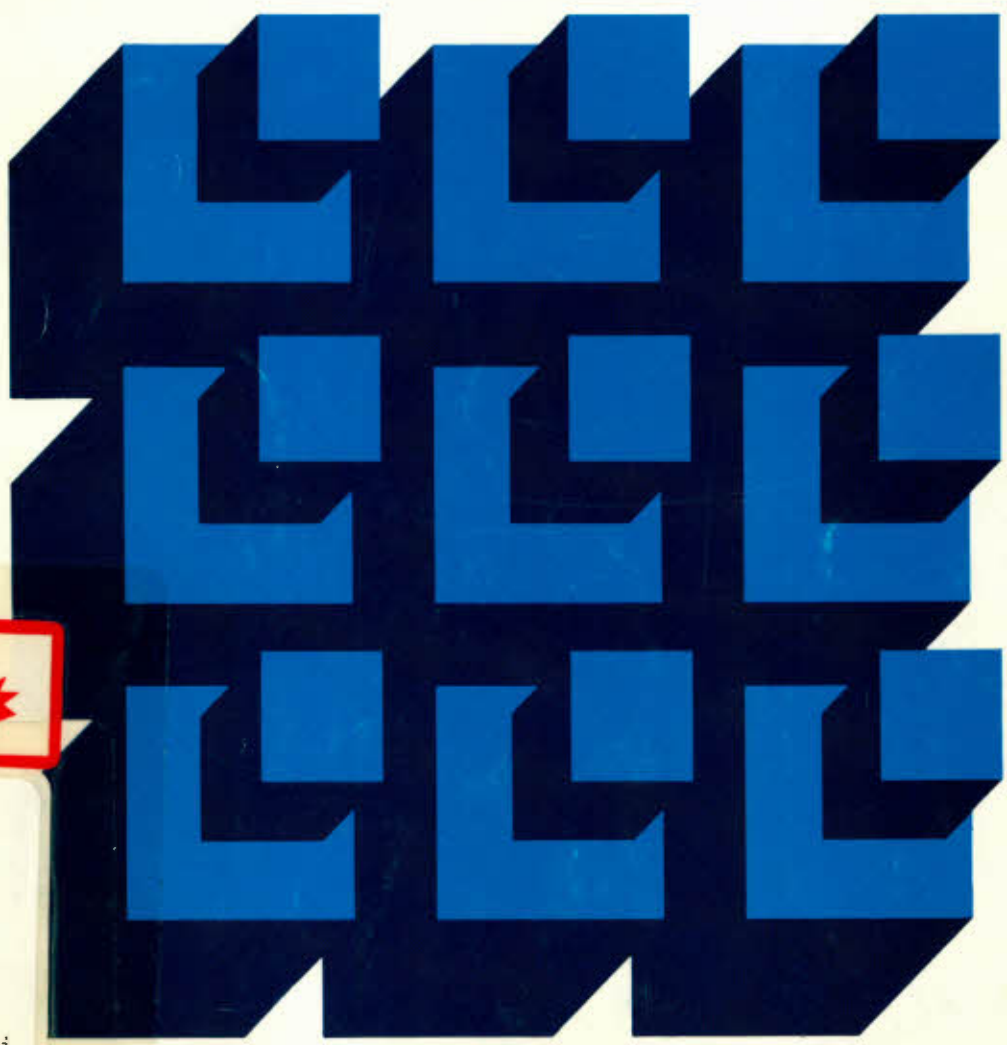
P.O. Box 527
Ottawa, Ontario
K1P 5V6

Conseil économique du Canada

C.P. 527
Ottawa (Ontario)
K1P 5V6

[redacted]





DISCUSSION PAPER NO. 280

# The Determinants of the Canadian Tariff Structure Before and After the Kennedy Round: 1966, 1970

by John R. Baldwin and
Paul K. Gorecki

*The findings of this Discussion Paper are the personal responsibility of the authors and, as such, have not been endorsed by members of the Economic Council of Canada.*

Discussion Papers are working documents made available by the Council, in limited number and in the language of preparation, to interested individuals for the benefit of their professional comments.



ISSN-0225-8013

April 1985

TABLE OF CONTENTS

## Résumé

Les différences de productivité entre le Canada et les États-Unis ont été attribuées aux trop petites échelles de production et à la trop grande diversité des produits au niveau de l'usine. Ces deux problèmes structurels se sont fait surtout sentir, au Canada, dans les industries de fabrication caractérisées par des tarifs élevés et une forte concentration. Dans des documents antérieurs, les auteurs ont examiné la mesure dans laquelle ces deux facteurs ont aggravé les déficiences structurelles et la façon dont la diminution des tarifs durant les années 70 a réduit les problèmes structurels.

Ces documents montraient que la réduction des tarifs a eu les effets bénéfiques prévus, mais qu'à cause de certaines anomalies, il a été jugé nécessaire de réexaminer la façon dont les tarifs avaient été établis. Dans le présent document, les auteurs s'appuient sur des travaux antérieurs dans le domaine de l'économie politique pour "expliquer" le processus de fixation des tarifs. La structure tarifaire, selon eux, émerge d'un processus politique où avantages et coûts des tarifs font l'objet d'un arbitrage. Le modèle s'inspire de la théorie selon laquelle les groupes de pression favorables aux tarifs sont des gens en quête de rentes qui comparent les avantages d'un tarif (lequel s'apparente fondamentalement à un désavantage de coût de leur

industrie) à ce qu'il en coûte pour obtenir l'appui politique requis pour la protection tarifaire. Les coûts sont fonction des coûts organisationnels ainsi que des considérations qui amènent le corps politique à protéger certains groupes.

À l'aide d'une importante base de données constituée par Statistique Canada aux fins de la présente étude et pour les autres documents du projet, les auteurs ont pu examiner les déterminants de la structure tarifaire, en 1966 et 1970, période pendant laquelle on a assisté à l'application des réductions tarifaires prévues dans le Kennedy Round.

Les auteurs de l'étude tentent également d'établir une distinction ente la question de l'élasticité de l'offre dont peuvent tirer avantage ceux qui favorisent les tarifs, et les considérations altruistes pouvant inciter un électorat à avantager certains groupes défavorisés. Leurs résultats démontrent qu'une fois pris en compte les effets de l'élasticité de l'offre, les considérations d'équité demeurent importantes puisque certaines industries peu adaptables et celles à salaires faibles ont été aidées.

Les auteurs se penchent enfin sur une question qui a déjà intéressé d'autres chercheurs : jusqu'à quel point importe-t-il que le suffrage en faveur d'une mesure tarifaire soit élevé ou non. Les résultats semblent démontrer qu'un

suffrage élevé est plus important qu'on ne le croyait. Mais ils appuient également l'opinion de ceux qui font valoir la complexité et le caractère imprévisible du processus politique. Les considérations d'ordre politique semblent avoir dicté que, lorsque les tarifs canadiens ont été abaissés lors du Kennedy Round, le suffrage élevé a été sacrifié en faveur de celui de circonscriptions d'une plus grande étendue géographique. Ainsi, à l'heure où les déterminants économiques fondamentaux de la structure tarifaire se sont montrés relativement stables, il en a été autrement des déterminants politiques.

## Abstract

Canadian productivity differences with the United States have been attributed to scale deficiencies and excessive product diversity at the plant level. Both structural problems have been particularly acute in those Canadian manufacturing industries characterized as having high tariffs and high concentration. Earlier papers by the authors have examined the extent to which it is these two factors together that have exacerbated structural deficiencies and the manner in which decreases in tariffs during the 1970's have reduced the structural problems.

These papers suggested decreases in tariffs had the expected beneficial effects but that there were some anomalies that required further examination of the manner in which tariffs have been set. In this paper, we build on earlier work in the field of political economy to "explain" the tariff-setting process. We treat the tariff structure as emerging from a political process in which the benefits of tariffs are traded off against the costs. The model relies upon the concept that groups lobbying for tariffs are rent-seekers who balance the benefits of a tariff (that basically relate to their industry's cost disadvantage) against the costs of obtaining political support required for tariff protection. The costs will be a function of organizational costs as well as political considerations that lead the body politic to protect certain groups.

With the use of a large data base at Statistics Canada that

was assembled for this and the other papers in the project, the authors were able to examine the determinants of the tariff structure in 1966, and 1970 -- the period spanning the implementation of the Kennedy round tariff cuts.

The study also attempts to differentiate between supply elasticity considerations that affect the benefit tariff-seekers may obtain and altruistic considerations that might cause an electorate to favour certain disadvantaged groups. Our results show that once the effects of the elasticity of supply are accounted for, equity considerations are still important in that low wage industries and those industries with "low adaptability" have been aided.

The paper also looks at an issue that has interested earlier researchers -- the extent to which broad as opposed to narrow-based support is important. The results suggest that broad-based support are more important than has been previously recognized. But the results substantiate the view that the political process is complex and subject to change. Political considerations appear to have dictated that, as Canadian tariffs were lowered during the Kennedy Round, broad-based support related to size was sacrificed for support from constituencies that were more widely distributed geographically. Therefore, while the basic economic determinants of the tariff structure have been relatively stable, the political ones have not been.

## Acknowledgements

The support and active cooperation of Statistics Canada and the efforts of J. McVey and J. Crysdale were essential for the creation of the extensive data base used in this and accompanying papers. We also acknowledge the aid of R.E. Caves of Harvard University for part of the U.S. data that were used herein.

## I INTRODUCTION

Since World War II, a series of multilateral tariff cuts have significantly reduced average tariff levels. The most substantial cuts were negotiated during the Kennedy Round between 1964 and 1967 and the Tokyo Round between 1974 and 1979.[1] In an accompanying set of papers, we have examined how the Canadian manufacturing sector responded to these tariff changes.[2] Here we use the theory of rent-seeking behaviour to explain the tariff structure and changes therein.

In doing so, we extend existing Canadian work on the political economy of the tariff.[3] Previous work suffers from either a paucity of data or explanatory variables. Caves (1976) and Saunders (1980) use a relatively small number of industries -- no more than 45. Helleiner (1977) uses a larger data set of about 87 industries but does not have relative Canada/U.S. variables that are included in the Caves and Saunders study. As a result, Helleiner cannot include at least one variable that Caves and Saunders find to be of some significance -- Canada/U.S. productivity differences.

In this study, we develop a larger data base than has been previously used. We use input-output tables to give us effective rates of tariff protection for 122 Canadian manufacturing industries. We also develop a matched Canada/U.S. data base at essentially the Canadian 4-digit SIC industry level -- 167 industries -- that gives us a large number of explanatory variables that we can use to test several competing hypotheses. Our final sample, after the elimination of poor Canada/U.S. matches and other anomalies gives us 108

industries for study.

Previous studies also suffer from problems with model specification. Caves tries to distinguish three models -- what he calls the adding machine (broad-based support), the interest group (narrow-based support), and the national policy model. But there is no inherent reason why one must be accepted and the others rejected. Broad-based support can be important while in some instances special interest groups that are not broadly-based can have sufficient influence to obtain state-bestowed rights. In contrast to Caves, Helleiner chooses to emphasize certain international political influences on the Canadian tariff structure; but in doing so ignores some of the hypotheses inherent in the Caves and Saunders work. It is important to pull together the competing explanations to see how robust they are in the presence of others and that is what we do here. More importantly, both of the above approaches can be subsumed into a more general model, such as that recently proposed by R. Baldwin (1982). The more general model focuses on the specification of those forces that affect the demand for as opposed to the supply of political activity in the tariff area. This model is useful because of its generality. With a more comprehensive variable list than has been available previously, we use this framework to try and discriminate among competing hypotheses as to the determinants of Canadian tariff rates.

## II THE TARIFF STRUCTURE

Before a model of the tariff-setting process is developed, it is useful to consider briefly the changes that have occurred since the

Kennedy Round of negotiations. Table 1 presents average tariff rates for 167 4-digit Canadian manufacturing industries, aggregated to the 2-digit industry level, or major manufacturing group, for the years 1966, 1970, 1975, and 1978. Both nominal and effective tariffs are presented along with the percentage of imports not subject to any duty. Nominal tariff rates are calculated as duties paid divided by value of imports excluding duties. Effective tariff rates are calculated using these average nominal tariff rates without correction for exports, taxes and subsidies.[4] For most of the 20 major manufacturing groups, effective tariffs generally exceeded nominal tariffs throughout the 1966-1978 period.[5] The Canadian tariff structure then protected the manufacturing sector more than the nominal tariff rate would indicate.

Between 1966 and 1978, nominal and effective tariffs declined for the manufacturing sector as a whole. Average nominal rates fell somewhat more than average effective rates -- 34.5 per cent versus 28.7 per cent. The percentage of total imports not subject to tariffs increased from 35.4 per cent in 1970 to 45.8 per cent in 1979. This upward trend is characteristic of all industry groups, except rubber and plastics and primary metals. Thus tariff barriers, whether measured by effective tariffs, nominal tariffs, or by the amount of total trade that is free of import duties, have been reduced since the mid-sixties.[6]

## III MODELLING THE TARIFF-SETTING PROCESS

The outcome of the political process, where it involves the acquisition of certain state-bestowed rights, can be modelled in the

TABLE 1

Nominal and Effective Tariffs on Imports, and Proportion of Imports not Subject to Tariffs, by Major Manufacturing Industry Groups,[1] Canada, 1966, 1970, 1975, and 1978 or 1979

| | Nominal tariffs | | | | Effective tariffs[2] | | | | Imports not subject to tariffs | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | 1966 | 1970 | 1975 | 1978 | 1966 | 1970 | 1975 | 1978 | 1970 | 1975 | 1979 |
| | (Per cent) | | | | | | | | | | |
| Food and beverages | 21.1 | 21.2 | 11.2 | 9.9 | 27.8 | 20.4 | 15.7 | 10.1 | 23.5 | 22.7 | 41.1 |
| Tobacco products | 55.6 | 50.9 | 41.9 | 28.3 | 94.8 | 79.5 | 94.8 | 22.9 | - | -- | 1.0 |
| Rubber and plastics | 13.4 | 10.0 | 9.0 | 12.2 | 19.3 | 16.0 | 13.3 | 19.6 | 20.7 | 10.2 | 14.6 |
| Leather | 19.7 | 19.0 | 18.4 | 17.6 | 31.6 | 30.0 | 27.6 | 27.5 | 4.7 | 4.2 | 8.7 |
| Textiles | 16.3 | 14.2 | 14.2 | 12.5 | 22.9 | 17.9 | 20.3 | 18.7 | 9.9 | 7.4 | 13.3 |
| Knitting mills | 26.2 | 27.6 | 24.1 | 22.9 | 37.4 | 43.0 | 34.5 | 35.0 | -- | 0.1 | 8.0 |
| Clothing | 22.5 | 21.6 | 21.9 | 20.3 | 28.8 | 25.0 | 28.2 | 25.7 | 0.2 | 1.3 | 6.6 |
| Wood | 6.1 | 5.2 | 6.0 | 4.4 | 11.4 | 10.5 | 10.6 | 7.9 | 58.9 | 59.3 | 72.3 |
| Furniture and fixtures | 18.9 | 15.5 | 15.6 | 15.7 | 24.7 | 19.5 | 20.6 | 20.6 | 1.4 | 1.0 | 5.2 |
| Paper and allied products | 10.5 | 8.7 | 9.6 | 7.7 | 16.6 | 15.4 | 17.1 | 13.8 | 29.2 | 22.8 | 36.6 |
| Printing and publishing | 5.1 | 4.9 | 6.5 | 6.8 | 2.8 | 3.8 | 5.7 | 7.1 | 59.5 | 58.9 | 65.7 |
| Primary metals | 4.8 | 4.6 | 4.7 | 4.2 | 8.0 | 7.2 | 9.8 | 8.7 | 50.4 | 49.0 | 50.4 |
| Metal fabricating | 10.7 | 9.0 | 8.6 | 8.0 | 13.9 | 11.4 | 11.8 | 10.8 | 19.6 | 13.4 | 22.3 |
| Machinery | 8.3 | 6.9 | 5.9 | 5.9 | 8.0 | 6.1 | 5.6 | 6.0 | 48.8 | 59.2 | 61.6 |
| Transportation equipment | 4.1 | 2.7 | 3.2 | 2.5 | 1.9 | 1.0 | 1.7 | 0.6 | 77.5 | 78.4 | 84.0 |
| Electrical products | 14.1 | 10.9 | 10.3 | 9.5 | 18.1 | 14.0 | 12.9 | 12.3 | 21.3 | 19.9 | 29.6 |
| Nonmetallic mineral products | 6.9 | 6.2 | 5.5 | 5.7 | 9.8 | 8.8 | 7.5 | 8.1 | 30.5 | 31.6 | 37.4 |
| Petroleum and coal products | 5.4 | 6.3 | 1.5 | 3.1 | 35.7 | 44.1 | 7.9 | 59.7 | 23.4 | 92.8 | 88.7 |
| Chemicals and chemical products | 9.5 | 7.9 | 6.6 | 6.7 | 14.5 | 11.7 | 10.3 | 11.1 | 45.2 | 46.3 | 51.2 |
| Miscellaneous manufacturing | 12.6 | 11.6 | 10.3 | 9.1 | 17.4 | 15.9 | 14.4 | 13.2 | 29.0 | 28.2 | 32.6 |
| All industries | 11.9 | 10.7 | 8.8 | 7.8 | 16.4 | 13.8 | 12.8 | 11.7 | 35.4 | 36.2 | 45.8 |

1 For each major group the relevant variable is the weighted average for the four-digit industries into which the group is divided. The weights used are the industries' total value-added in the year for which the variable was estimated (except for 1966 and 1978, when 1970 and 1979 weights were used, respectively). All 167 manufacturing industries were employed.

2 Simple effective tariff rates, calculated as the decline in value-added that may occur if tariff protection is removed.

SOURCE Special tabulations provided by Statistics Canada.

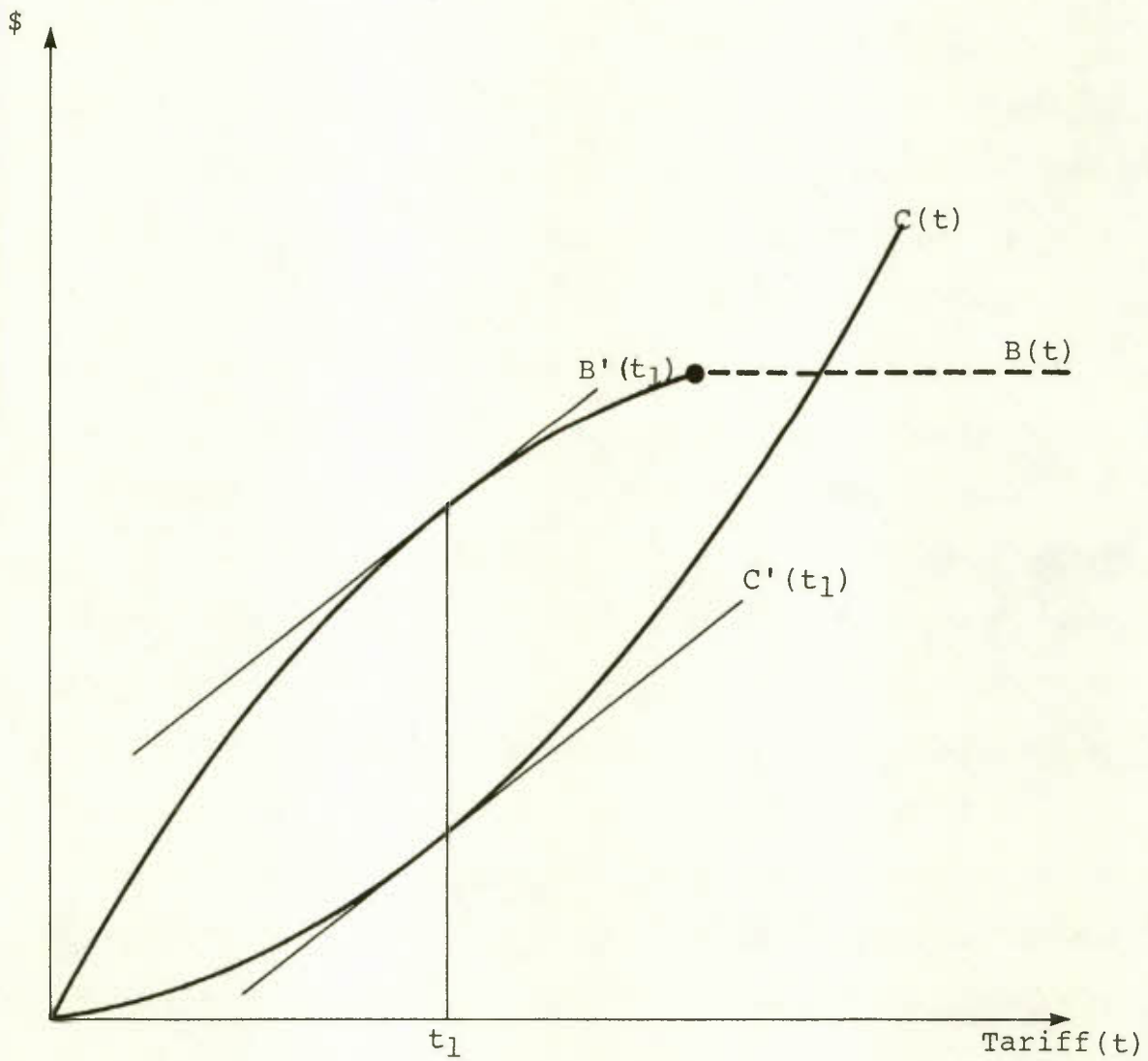
standard demand and supply framework used by economic analysis. In this context, producers or the factors of production are regarded as demanding certain rights. The governing political party is treated as the supplier of these rights.

This approach need not be interpreted as a cynical one that unduly emphasizes self-interest. It allows for more than one interpretation of the political process. First, public policy can be treated as if it results from the application of a Bergson-type welfare function. Irrespective of selfish demands by rent-seekers, the government may consider only those factors that emerge from its determination of an abstract welfare function. Second, public policy can be said to result from the governing political party's maximization of the present value of benefits it receives from holding office. This will be a function of the probability of re-election and the benefits received by the members of the party in power. The policy outcome in the latter case depends upon the voting system, information costs, and social values.

In the second case, the government is treated not just as weighing the social welfare of its citizens -- as in the case of a government employing a Bergson-type function -- but also as gauging their ability to deliver votes. The government's willingness to grant the privileges sought by rent-seeking groups depends not only on the political importance of these groups but also on the extent to which others can detect the costs imposed upon them by a particular program and the degree to which they, perhaps for altruistic reasons, are willing to bear these costs without withdrawing their support from the government.

This approach has been applied by Baldwin (1975), Peltzman (1976) and Jarrell (1978) to the area of regulation. It has also formed the basis for models of tariff protection.[7] The tariff level has been modelled as emerging from a process that maximizes the benefits received by the rent-seekers (B) minus their lobbying costs (C), where both B and C are functions of the tariff level.[8] In Figure 1, $t_1$ is the tariff level that maximizes net benefits, $N = B(t) - C(t)$ and is therefore presumed to be determined by those factors that influence the benefit and cost curves. Thus, $t_1$ is presumed to emerge from a profit-maximizing process of the industry concerned.

The benefit curve (B[t]) in this model is assumed to depend, amongst other things, upon the producers' surplus generated by the tariff. In a world of certainty, rent-seekers can be regarded as choosing the level of the tariff they receive by picking the level of lobbying expenditures. In a world of uncertainty, rent-seekers can be treated as maximizing an expected net benefits function. Expected benefits depend both on the relationship between producers' surplus and the tariff level, as well as on the probability of achieving any given tariff rate. Rent-seeking expenditures affect the probability of attaining a given tariff level. Figure 1 is sufficiently general to embrace this latter approach if B(t) is interpreted as an expected benefits curve, t is a characteristic such as mean value of the density function on t, and C(t) is the expenditure required to obtain a certain expected tariff value.[9]




The Costs and Benefits of Tariff-Seeking Behaviour

Figure 1

The Benefits Curve

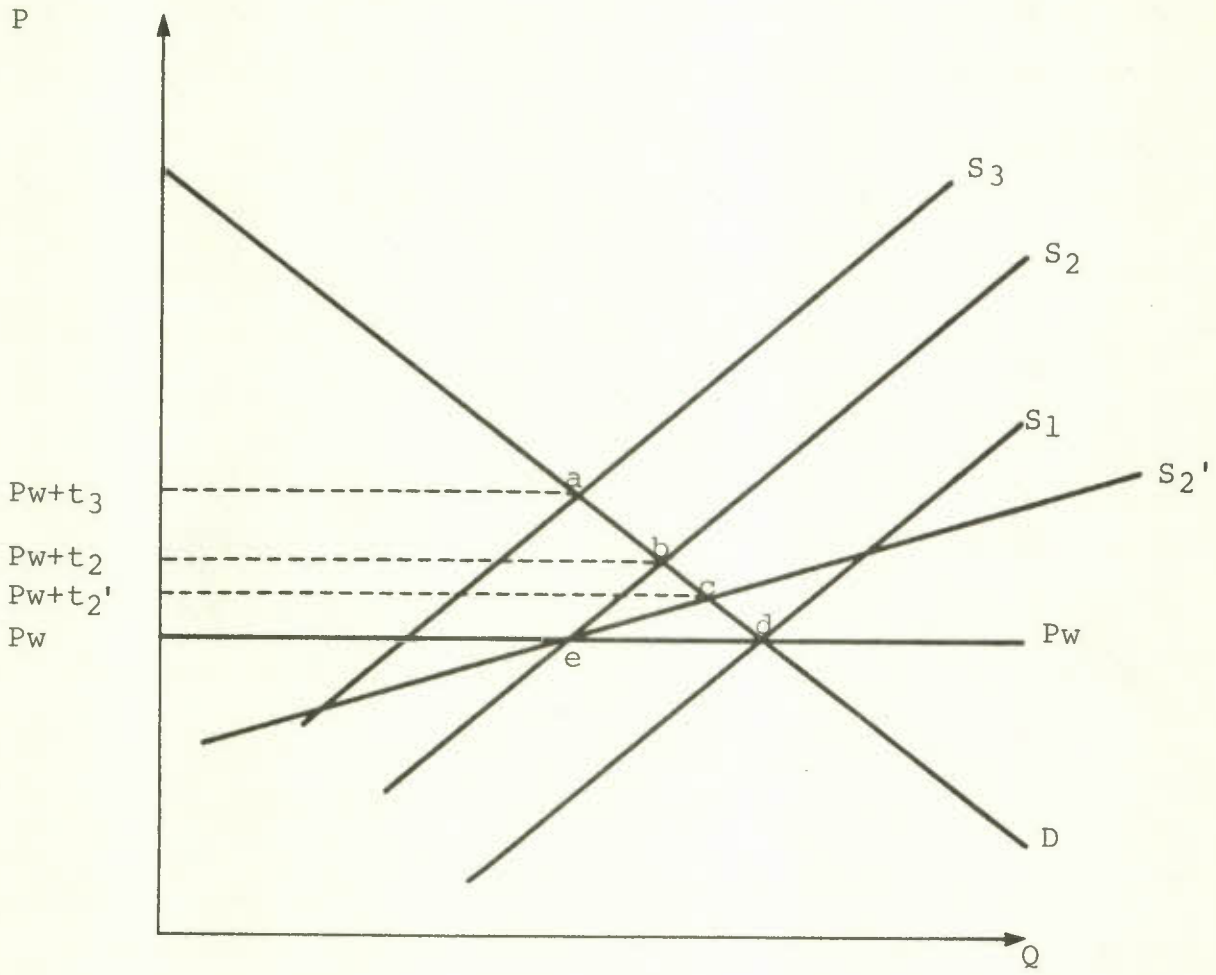
The benefits accruing to an industry are assumed to depend upon two characteristics of an industry's supply curve: its cost disadvantage and its elasticity of supply. The difference in producers' surplus when prohibitive tariff levels are levied is shown in Figure 2 for domestic supply curves $S_1$, $S_2$, $S_3$.[10] As the cost disadvantage increases (moving from $S_1$ to $S_2$) the maximum quasi-rents from a prohibitive tariff increase, though perhaps in a nonlinear fashion. While this suggests industries with a greater inherent competitive disadvantage will benefit more from the implementation of a prohibitive tariff, it does not imply the tariff that emerges from the process depicted in Figure 1 will actually be higher. In Figure 3, we draw the benefit curves corresponding to $S_2$ and $S_3$, $B_2$ and $B_3$ respectively. The slope of the benefit curve associated with $S_2$ is higher than $S_3$ but the latter has a higher maximum potential benefit. The tariff that maximizes net benefits is determined where the slope of the benefits curve equals that of the lobbying cost curve -- unless there is a corner solution at $t_2$ and $t_3$ respectively in figure 3. If $\delta c/\delta t\|_{t2} > \delta B_2/\delta t\|_{t2}$ but $\delta c/\delta t\|_0 < \delta B_2/\delta t\|_0$ and $\delta c/\delta t$ is monotonically increasing, then the optimal t for $S_2$ ($t_2$" in figure 3) is greater than that for $S_3$($t_3$"). Thus the prediction that greater competitive disadvantage should be associated with higher tariffs cannot a priori be derived from this framework -- unless the corner solutions of $t_2$ and $t_3$ are being implicitly invoked.

In a world of uncertainty, the expected benefits curve will depend upon the benefits associated with a given tariff level and on the probability distribution of obtaining different tariff levels. In

this world, both the height and the slope of the benefits curve will be positively related to the maximum benefit that can be derived from tariff protection. An increase in the expected tariff level associated with a shift in the probability density function to a higher mean may be associated with a greater increase in expected benefits for $S_3$ than $S_2$, even if the slope of the benefit curve for $S_3$ is less than for $S_2$, as was drawn in Figure 3; since the maximum benefit is reached sooner (for a lower tariff) in the case of $S_2$.[11] As such higher expected tariffs yield less of an increment in expected benefits for $S_2$ and the expected benefits curve for $S_2$ may have a lower slope than $S_3$. If this is the case, the higher maximum rent for $S_3$ will increase the tariff level chosen and competitive disadvantage should be positively related to tariffs.[12] But it is clear from this argument that the sign of the competitive disadvantage variables is not certain a priori for the truncation effect alluded to above may not be sufficiently great to produce a greater slope for $S_3$ compared to $S_2$.

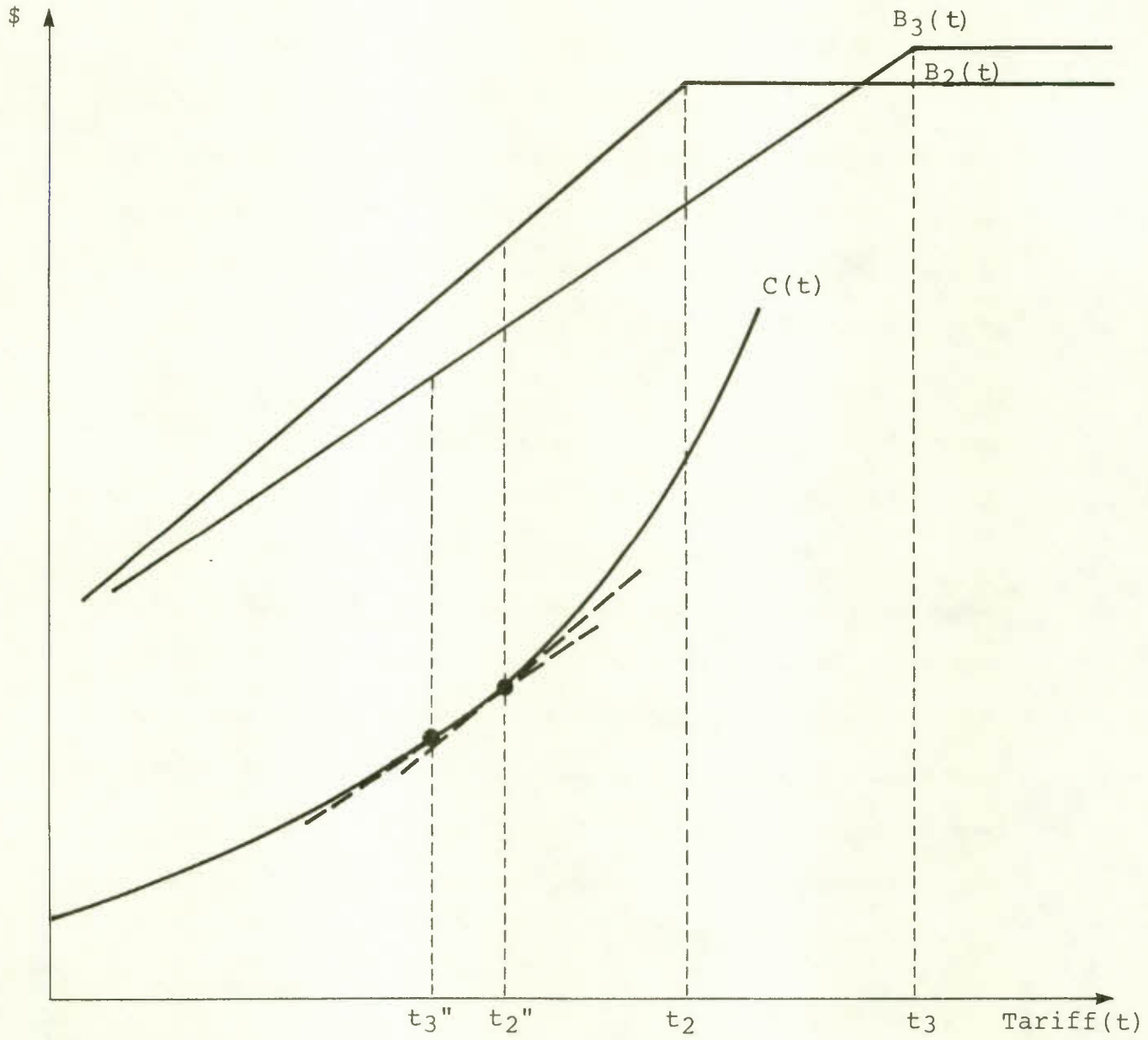
The elasticity of supply will also affect the benefits to be derived from tariff protection. In figure 2, $S_2$ and $S_2'$ are such that the same amount of domestic output is produced at world price pw but $S_2'$ has a higher elasticity. The effect of a higher supply elasticity also cannot be predicted a priori.

Consider first a world of certainty where the rent-seekers can determine the exact tariff level that will be granted. Moving from $S_2$ to $S_2'$ (an increase in supply elasticity) will both shift up the benefit curve (B) in Figure 1 and increase its slope. Providing that supply elasticity does not affect the cost curve (C), the tariff level




The Producer Surplus Associated with Tariff Protection

Figure 2




The Effect of an Industry's Cost Disadvantage on the Tariff Sought

Figure 3

should increase. However, the conditions that make society more willing to grant tariff protection may be inversely related to supply elasticity. Where adaptability of an industry to changed circumstances is difficult, voters may be more sympathetic to tariff protection. Thus the rent-seeking cost C(t) may be higher and more steeply sloped for industries with a higher supply elasticity. In addition, the deadweight loss from a tariff increase will be higher where domestic supply elasticity is higher (Ray, 1981), thereby suggesting governments should be less willing to allow high tariffs and the lobbying cost curve may be more steeply sloped in these industries. These effects may offset the first.

In a world of uncertainty, the effect of a higher elasticity cannot be evaluated without considering the maximum level of surplus available. Reasoning as before, if a higher supply elasticity is associated with a lower potential maximum benefit, then the higher supply elasticity may be associated with a lower slope of the expected benefits curve and, ceteris paribus, a lower tariff rate. The aforementioned effects of supply elasticity on the lobbying cost curve may reinforce this possibility.

The Cost Curve

Two factors are generally hypothesized to determine the position and slope of the cost curve (C): a government's willingness to grant protection and the efficacy with which rent-seekers can organize. The government's willingness to grant a certain tariff level and therefore lobbying costs have been posited to depend both upon economic conditions and altruistic values. Lobbying costs are

generally taken to be an increasing function of the tariff because government acquiescence is assumed to vary inversely with the level of the tariff being sought. The lobbying costs associated with rent-seeking have also been hypothesized to depend upon the ease with which industry members can organize and overcome the free rider problem associated with tariffs. A tariff has the characteristic that it benefits all firms in an industry, and therefore the organizational problems of rent-seeking groups that seek a public good benefit must be considered. The literature on public good creation stresses that smallness of numbers and homogeneity of interests are key determinants of group coalescence. (Olson [1965], Stigler [1974].)

## IV THE VARIABLES USED

The variables that will be used in this study can be divided into three groups: those that represent the benefits of tariffs to producers, those that reflect the costs of organizing lobbying activity, and those that attempt to catch the government's willingness to grant protection. The first set affects the benefit curve B; the latter two, the cost curve C.

### A] The Benefits Curve

The benefits accruing to producers are represented in this paper by a set of variables that relate either to the competitive position of the industry or to its supply elasticity.

1) Competitive Disadvantage

Variables used here to measure the competitive position of an industry fall into four separate categories: those that use factor intensities to capture the concept of comparative advantage -- variables such as raw material, labour, or capital intensity; those that proxy the industry's cost disadvantage with certain structural traits, such as the degree to which economies of scale are fully exploited; those that represent revealed trade flows -- the export, import, or intra-industry trade position; and those that measure cost or productivity differences with U.S. industry. Notwithstanding the earlier discussion about the expected signs of the comparative advantage variables, each of these variables is expected to affect the height of the cost disadvantage curve with a greater disadvantage being associated with the tendency to lobby for a higher tariff level because of the previous results of Caves (1976) and Saunders (1980).

Several variables are used to capture factor intensity, an indirect measure of comparative advantage.[13] RAW, a measure of resource intensity used by Helleiner (1977), is expected to be positively correlated with competitive advantage and have a negative coefficient. Two variables are used to capture labour intensity. The first is WKRS, the labour/capital ratio. The second is EVA, the ratio of industry employment to industry value added. WKRS was generally insignificant, while EVA was significant; therefore, only EVA was retained. In a world where Canada's chief trading partner is the capital rich United States, labour intensity should be positively

related to comparative advantage and have a negative sign. Finally, RD, research and development intensity, is included to capture the extent to which Canada is rich in skilled manpower. Wilkinson (1968) found that a variable measuring number of skilled workers, a proxy for RD, was positively related to export intensity in non-resource based manufacturing industries. Therefore, a negative sign is predicted.

Two structural traits that are hypothesized to be related to the disadvantage imposed upon Canadian industry from unexploited economies of scale are used. RELSIZ, the ratio of Canadian average plant size to U.S. MES (minimum efficient size plant), is meant to capture the extent to which economies of scale at the plant level are exploited. RELDIV, which is negatively related to plant specialization at the product level represents the extent to which product line economies may result in a cost disadvantage. RELSIZ should be negatively and RELDIV positively related to the tariff if they proxy structural traits that are associated with the competitive disadvantage faced by an industry.

The competitive disadvantage of an industry is also measured directly by an industry's trade position. EXP, the ratio of exports to domestic production, should have a negative coefficient. Exports, rather than imports, was used because of possible simultaneity problems between imports and the tariff. In addition, non-tariff barriers may restrict imports. If so, even import intensity will not reflect the competitive disadvantage of an industry.[14] Therefore we included a binary variable (TARFD) which takes on a value of one for industries deemed to be protected by non-tariff barriers to trade. This variable may be negatively or positively signed since such

barriers may be a substitute or complement to tariffs. Earlier work by Ray (1981) suggests that tariffs and non-tariff barriers are complements. If TARFD captures omitted variables that determine the ability of an industry to garner protection, it will have a positive coefficient. The potential benefits that an industry can obtain from tariff protection will also depend upon the extent to which an industry receives natural protection from high transport costs. To capture this effect, a dummy variable REG is included. It measures the extent to which an industry is regional in nature. Its expected sign is negative.

Finally, two direct measures of competitive disadvantage are included. RELWAG measures the relative Canadian/U.S. wage rate. In a previous study, Helleiner (1977) used the Canadian wage rate to reflect relative cost disadvantage. The more direct measure RELWAG is used here to capture this effect. The second variable, RELPROD, measures relative Canada/U.S. labour productivity and was used by Saunders (1980). RELWAG is postulated to have a positive coefficient, RELPROD a negative coefficient.

2) Rent Potential Related to Supply Elasticity

The second set of variables that has been hypothesized to affect the benefit curve -- those relating to the certainty with which benefits can be captured -- can be divided into two classes: those which measure economic adversity and those which facilitate adaptability. In previous studies, economic adversity has been proxied by variables such as the lack of growth, fluctuations in economic well-being, a decline in the industry's trade position, and

the health, measured in per capita income, of those political jurisdictions in which the industry is located (Lavergne [1983]). The ease of adaptability or the degree to which resources are immobile has been represented by the extent to which an industry consists of one industry firms, which because of their lack of diversity are less able to shift resources effectively to other sectors (Caves [1976]), and by the extent to which factors may be relatively unskilled (low wage rates) and, perhaps therefore, unable to shift to other sectors (Lavergne [1983]).

Caves (1976) has argued that adversity influences the benefits curve because of a threshold perception effect. He argues that, while all groups in society may potentially be rent-seekers, when circumstances lead to unfulfilled expectations -- such as job loss or serious regional depression -- political activity of a self-seeking nature increases. Thus, adversity variables may influence the tariff process because of psychological threshold effects that are sometimes required to overcome the free-rider problems associated with public goods (Olson [1965]). But there is another reason this set of variables may be important. They may simply capture a code of ethics that is adopted by society to govern its granting of protection in order to reduce the costs of rent-seeking behaviour. In the latter case the variables probably should be taken to influence the costs of lobbying (C) rather than the benefits curve (B). In either case, greater adversity should result in higher tariff rates.

In contrast, R. Baldwin[15] notes that there is an externality problem always present in the rent-seeking process and that this externality problem may be used to predict that depressed economic

conditions and tariff-seeking behaviour are positively related. A producer's support for tariffs depends upon his ability to predict changes in surplus created by the tariff and on his ability to capture a share of the surplus created. Both are less predictable where the elasticity of supply is high, presumably because entry is likely to be greater in this case. A dying industry is more likely to have a low supply elasticity because, as Baldwin notes, tariff protection may still leave wage rates and capital return below those in other sectors and entry will be less important. In the latter case, the distribution of rents from protection is probably more closely related to the existing distribution of factor supplies and therefore more readily predicted. The expected benefits of tariffs for existing firms will therefore be higher and this should lead to a higher tariff level.

In this study, two variables are included to capture economic adversity: GR, the rate of industry growth and VAR, the variability in industry growth. The former is expected to have a negative coefficient, the latter a positive coefficient. Since variability never turned out to be significant, it was discarded. The first adaptability variable used in this study is the same as that used by Caves (1976) -- DIV, the percentage of industry sales accounted for by single industry firms. The coefficient attached to DIV should be positive. In addition, INTRA, a measure of intra-industry trade is included. High intra-industry trade suggests the industry may be able to adapt to increased imports by specializing in product lines and to compensate for lost domestic sales by increasing exports. In this case, INTRA should have a negative sign.

Economic adversity and immobility variables could also be regarded as affecting the voter cost curve because of equity or altruistic considerations adopted by the electorate. Since their effect on the benefit curve may arise because of their relationship to the elasticity of supply, inclusion of a direct measure of the latter should help us to discriminate between these alternate explanations. Therefore, CDR, the ratio of value added per worker of small over large plants is included. This is an inverse measure of the steepness of the cost curve that has met with considerable success elsewhere.[16] While it is not a direct measure of long-run elasticity,[17] measuring as it does the steepness of the cost curve of existing firms, it should provide a good estimate of the short run gains to be derived from resisting tariff decreases.[18] As was indicated in the discussion of the hypothesized effect of supply elasticity, the coefficient on CDR may take on a positive or negative value.

R. Baldwin (1982) notes that the EVA variable has also been posited to be related to the industry's adaptability. If labour is relatively more mobile than capital, the short-run elasticity of supply will be positively related to EVA and it should have a negative coefficient. However, to the extent CDR catches the elasticity effects more precisely, this postulated secondary effect of EVA should be relatively unimportant.

3) Other

The benefits of protection can be dissipated if foreign retaliation results. It can be argued that multinational firms are most likely to appreciate the benefits of free trade and to lobby

against tariff barriers. That 72 per cent of Canadian imports are made by subsidiaries of foreign firms[19] is indicative of the stake that foreigners have in the trade process. To the extent that foreign ownership is correlated with the foreign stake in imports, foreign ownership may be negatively related to tariff protection.

However, tariffs have also led to more foreign investment by multinationals than would otherwise have occurred (Caves [1974]). In the short run, adjustments to freer trade would be costly to these multinationals. If it is this group that is particularly powerful politically, then foreign ownership may be positively associated with tariff protection.

In order to separate these opposing influences, two variables were included. The first, PERFOR, is the percentage of imports from the U.S.A. made by foreign-controlled firms. It is meant to capture the interest of foreign firms in the trade process and thus the extent of countervailing power. It should have a negative sign if foreigners have superior bargaining power. The second, FO, is the percentage of domestic sales accounted for by foreign-owned firms. It will take on a positive sign if the foreign sector is powerful and acts in a myopic fashion. It will be negative if multinationals ignore their short-run sunk costs and lobby for freer trade.

Most discussions of the potential benefits from tariff protection focus only on the slope of the supply curve and ignore the elasticity of the demand curve. Yet the more elastic the demand curve, the lower will be the potential quasi-rents from tariff protection. The structure-conduct-performance literature has used AD, the advertising/sales ratio, to proxy the elasticity of the demand

curve and it is included here for the same purpose. If advertising creates brand loyalty, its sign in the tariff equation should be positive. On the other hand, if it is indicative of brand competition and high price elasticity, its effect should be negative.

Previous work on the causes of foreign investment suggests a second reason that AD may take on a negative value. Caves (1974) has shown that foreign investment is positively related to advertising intensity. This suggests that industries with high advertising intensity may, like industries with high transportation costs and regionalized markets, enjoy a high degree of natural protection. In this case, AD like REG will have a negative coefficient.

B] The Cost Curve

Variables that have been used here to measure influences determining the voter cost curve (C) attempt to capture the private costs of organizing as well as the importance attached by the political process to the lobbyist's position.

1) Organizational Costs

The ease with which a lobbying group can overcome its organizational costs is represented by four variables in this study. The first represents the small business lobby. WKOWN, the ratio of the number of working owners and proprietors to capital, should be directly proportional to the costs of organizing small business and therefore inversely related to the tariff. The second, UNION, measures the degree of unionization in an industry. A high degree of unionization is hypothesized to reduce lobbying costs because labour

in these industries has already overcome the free-rider problem. The third, MES, the ratio of an MES sized plant to industry sales, measures the extent of concentration due to plant economies and should be inversely related to organizational costs and positively related to the tariff level. Because of the inclusion of RELSIZ, this variable should measure organizational costs and not unexploited economies of scale and cost competitiveness as Lavergne (1983) has suggested in his criticism of those who previously used this variable.

Other studies (Caves [1976], Saunders [1980]) have also used a four-firm concentration ratio (CON4) to represent organizational costs. But the inclusion of this variable in addition to MES is essentially capturing a second effect besides concentration. If MES is held constant, varying CON4 is synonymous with changing concentration by varying the multiplant nature of the largest firms in an industry relative to the industry average. Thus CON4 is negatively related not just to organizational costs but probably also to the importance of a geographically widely distributed (multiplant) production process of the leading firms. Since it is this residual component of concentration that CON4 measures in the presence of MES, the variable included in this study is RCR, the difference between the four-firm concentration ratio and four times MES.

If broad-based voter support reduces lobbying costs, then tariffs should be higher in where the leading firms owe much of their concentration to their multiplant nature and organizational and voter support considerations will reinforce one another. However, Pincus (1975) argues that the costs of coordinating lobbying may be higher where an industry is dispersed geographically. Greater geographic

dispersion may imply greater heterogeneity and therefore less agreement on the optimal tariff level. In this case, RCR might be expected to have a negative coefficient.

2) Public Acceptance of the Tariff

i) Perception Costs

The costs of rent-seeking may depend upon the extent to which the electorate is cognizant of the costs of a tariff. If consumers are less informed than businesses of the effect of a tariff, the extent to which output goes to final demand should be inversely related to the costs of lobbying. To catch this effect, a dummy variable, PRODGOOD, the extent to which an industry's output is sold primarily to other industries rather than to final consumers, is included. Its coefficient is expected to be negative.

ii) Broad and Narrow-Based Voter Support

Categorizing the possible determinants of a government's willingness to grant tariff protection provides a potentially overwhelming array of testable hypotheses. Like previous authors (Caves [1976], Lavergne [1983]), we have chosen to reduce the task at hand by concentrating on whether it is broad or narrow-based political support that affects the tariff-making process.

One theory of the political process argues that governments will implement a tariff structure that garners broad-based political support since, ceteris paribus, the more constituencies they win, the greater is their chance of re-election. Several variables are used

here to capture the extent to which an industry may provide broad-based support: SIZE, the number of salary and wage earners in an industry; MPLNT, the importance of multiplant establishments; RCR, the importance of multiplant establishments of leading firms in concentrated industries; and REG, the extent to which an industry is geographically dispersed. They should have positive coefficients if broad-based support is important; and negative or zero coefficients if the opposite is true.

A second theory of the political process concentrates on the importance of the pressure group or narrow interest group model. It presumes that having narrow-based support may be more important to the government -- because of the existence of either swing ridings or a swing group located in several constituencies. Several variables are used in this study to capture the importance or unimportance of specific groups. Either WKRS, the labour/capital ratio, or EVA, the labour to value added ratio, could be used to test whether labour support is valued more highly than the owners of capital. As indicated earlier, EVA was finally adopted. Others (Breton [1964], Daly and Globerman [1976]) have stressed the connection between political decisions and benefits accruing to the middle class via white collar jobs. This influence can be captured with a nonproduction worker intensity variable, WHTCOL. However, it turned out to be so insignificant, it was discarded at an early stage. The scientific establishment has been a particularly vocal advocate of government support for jobs in their area and this force is represented by RD, the percentage of an industry's labour force that is accounted for by research and development personnel. Foreign

ownership (FO) may capture an aspect of the narrow-based political support model if domestic entrepreneurs are valued differently than their foreign counterparts. Unionization (UNION) will matter if the support of organized labour is particularly important to a government. The number of working proprietors (WKOWN) represents the importance of the number of entrepreneurs. Finally, the two concentration variables (MES and RCR) can be regarded not as capturing an identifiable interest group but as measuring the degree to which industry support is geographically concentrated. If swing votes are critical, geographical concentration may matter and MES should have a positive sign, RCR a negative sign. Geographical concentration may also be positively related to tariff protection for altruistic reasons. If an industry is geographically-concentrated, displacement costs may be particularly high.

iii) National Goals

Variables which directly measure professed government policy preferences can be used to test the importance of these goals in the tariff-setting process. When industry characteristics suggest tariff protection can achieve certain publicly stated goals, there may be a correlation between tariff protection and these characteristics. In this case, the use of such characteristics as explanatory variables is akin to the use of proxies for the underlying omitted voter support variables.

It has been Canadian policy since 1973 to restrict foreign investment through the Foreign Investment Review Agency. It is therefore possible that the foreign ownership variable FO would have a

negative effect on tariff protection for this reason -- even though we are examining pre 1973 tariff levels. Numerous other national policies are directed at helping workers in industries suffering from adversity and lack of mobility. Industries with low wages are those which a society might be posited to protect should equity considerations influence the tariff seeking process. Therefore WAGE -- the average wage -- is included. It will have a negative sign if the electorate chooses to help low wage industries. Because RELWAG is included separately, WAGE is less likely to capture comparative disadvantage effects. However, it may also be related to adaptability. Baldwin (1982) argues that skilled workers are more likely to remain unemployed for shorter periods. If this is so, and if adaptability is also considered by the electorate in granting tariff protection, WAGE will have a negative coefficient for this reason as well.

In addition, growth (GR), variability (VAR), and adaptability (DIV and INTRA) may affect the resistance offered by the government to tariff-seekers. If altruism is important, the effect of low growth, high variability and low adaptability should be to increase tariff levels -- the same directional impact they had when operating on the benefits curve.

Another variable that has been suggested as being related to an equity goal is the previously defined EVA. Where this is high, there may be relatively large amounts of low-skilled workers in comparison to capital and thus for policy reasons, these industries may receive favourable treatment in the tariff process. However, the inclusion of the WAGE variable should catch the 'equity' or

adaptability aspects of national policy and leave EVA to measure the factor proportions effect.

iv) Other Considerations

Two other variables are included to capture other national policy goals. If a country values industries that are relatively intensive in physical or human capital, the previously defined EVA will have a negative coefficient. Similarly, if governments value final processing, they may favour industries that have a relatively large slice of value added (Caves 1976). VAS, the ratio of value added to sales, is included to test for this preference.

The variable VAS, value added/sales, also serves to catch the "leverage" factor in the determination of effective tariffs.[20] Where share of value added is low, a small change in nominal tariffs will have a relatively large impact on effective tariffs. While bargaining may take place over surplus to be generated and effective tariffs are closely related to this surplus, nominal tariffs are the actual instruments to be negotiated. It is likely that the level of nominal tariffs also enters the determinants of the lobbying cost curve C(T) for effective tariffs. Ceteris paribus, the lobbying costs of attaining a given effective rate should be lower if it can be achieved with a lower nominal tariff rate. Since this occurs with a low VAS, the coefficient on VAS could be negative.[21]

There is still one other consideration that may affect the sign of the coefficient attached to VAS. Later stages in the production will have to lobby for nominal tariffs just to maintain a zero rate of protection if their inputs have tariff protection.

Ceteris paribus, if nominal tariffs are part of the bargaining process, the later stages of fabrication will face a higher and steeper lobbying cost curve for a given level of effective tariff protection. Forster's account (1979) of the bargaining process that led to the National Policy in 1879 indicates there was considerable conflict between successive stages of the manufacturing process. Thus, if VAS is negatively correlated with the stage of the production process, as it appears to be,[22] it will have a positive coefficient. Of course, the above-mentioned leverage effect that also operates would have the opposite effect.[23] Therefore, the sign of the coefficient attached to VAS is uncertain.

## V THE RELATIVE IMPORTANCE OF THE DETERMINANTS OF THE TARIFF PROCESS

In the preceding discussion, it has been noted that variables may have an effect on the rent-seeking process for more than one reason. When they are postulated to have the same directional impact, whether they operate through the benefit or the cost curve, it may therefore be difficult to discern which avenue is more important -- though an insignificant coefficient does allow the conclusion to be drawn that neither postulated effect is important. In the case where variables could have either a positive or negative effect, the sign of the coefficient that is significantly different from zero allows conclusions about the dominant influence. But an insignificant coefficient may mean the opposing effects just offset one another, or that neither matters.

The existing empirical literature provides many examples of variables being used to represent more than one effect. For example,

wage rates have been used to proxy labour intensity (competitive disadvantage), displacement costs (low wage having less transferable skills), or the degree to which a benevolent state may wish to protect a certain group. In the first case, the variable affects the benefit curve; in the second and third, the cost of obtaining benefits. But the direction of the predicted impact is the same -- leading to a hypothesis of an inverse relationship between tariffs and the wage rate.

There are other instances where variables fill more than one role but are postulated to act in the same direction. Lavergne (1983) argues that concentration of production in one region may lead to higher tariffs either because of a narrow-interest based theory of voter support or because of a displacement-cost theory of voter acquiescence in tariffs. It may even affect the benefit curve if high displacement costs associated with geographic concentration are a proxy for supply elasticity. However, all effects operate in the same direction suggesting a positive coefficient for a concentration variable like MES that is directly related to geographic concentration.

Research and development intensity is one variable which may have an insignificant coefficient as the result of two offsetting effects. On the one hand, it proxies skilled labour intensity. Wilkinson (1968) indicates Canada exports skilled labour and thus this variable could be positively associated with comparative advantage and should have a negative sign. On the other hand, it also represents the importance of the science lobby and it therefore influences the voter support curve for a narrow-based pressure group model. If this

is so, it would have a positive sign. On the other hand, if broad-based considerations are important, it will have a negative coefficient and this may offset the factor intensity effect.

There are other variables that have opposing effects that may make it difficult to allow conclusions about the dominant influence. Foreign ownership is one such variable. Foreign ownership may have a negative effect when operating through the benefits curve if multinationals act in their long-run interests; but not if they take a short-run view based on investments they have made in response to the tariff structure. Foreign investment may have a positive or a negative coefficient depending upon the relative political influence of foreign as opposed to domestic entrepreneurs. It may have a negative effect if national goals involve a certain amount of xenophobia. The net effect, therefore, may reveal little information about whether either influence is significant.

Variables that are related to the degree of geographical dispersion -- the importance of economies of scale -- should be positively related to tariff protection if a narrow-based interest group model is correct; they should be negatively related to tariff protection if a broad-based voter support model determines the position of the voter cost curve. Therefore, the sign attached to these variables potentially provides a way of discriminating between alternate views of the political process.

This is the procedure followed by Caves when he uses the MES variable. Caves notes that, on the one hand, MES represents the degree to which there are few plants and thus it should be inversely related to the degree to which political support is dispersed across

political jurisdictions. As such, a negative coefficient will result if broad-based political support is important for the implementation of tariff protection. On the other hand, this variable is positively related to concentration, and to the extent that concentration eases the free rider problem and reduces organizational costs, it should have a positive coefficient. If the coefficient is positive, Caves suggests the forces that allow specific pressure groups to form are more important than broad-based support -- what he refers to as the adding-up model.

However, even in this case, conclusions must be drawn with care. Lavergne (1983) criticizes Cave's interpretation arguing that MES also catches the degree to which an industry suffers from an international competitive disadvantage. He argues that the variable should be negatively related to the cost disadvantage of an industry, because it may catch the degree to which economies of scale have been fully exploited. If so, it should have a negative sign if both the incentive to seek and the government's willingness to grant tariff protection are related to competitive disadvantage. It is important to note that there is a potential resolution to the problem in this and other similar cases. Once the cause of the potential confusion is identified, it can be reduced, if not eliminated, by including a variable that more directly measures the competing explanation. In our case, the variable RELSIZE has been included to represent directly the degree of unexploited economies of scale, and RELPROD is introduced to represent relative costs, hopefully purging MES of this problem.

The interpretative problems that have faced previous studies

cannot be eliminated; but they can be reduced by not relying exclusively on variables that serve more than one purpose. By including other variables that more directly measure one or other of the competing influences, this study attempts to reduce the burden previously borne by certain factor intensity and adaptability variables. International competitiveness is measured in four different ways, with only one set of variables relating to factor intensity. A measure of supply elasticity is included that does not rely upon proxies from the set of economic adversity and immobility variables which are also likely to affect the government's willingness to grant tariff protection and which therefore determine the lobbying cost curve. Thus, there is less likelihood that variables which are meant to capture aspects of organizational costs or voter preferences -- the determinants of the lobbying cost curve -- will be picking up residual effects from the benefit side.

Table 2 presents the variables that have been used and their expected signs. The first twelve measure competitive disadvantage either directly or indirectly. It is the indirect factor intensity variables #8 through #12 that may also represent aspects of the political process that favour certain specific groups. Variables #24 through #27 are adaptability and adversity variables that have been used previously to proxy supply elasticity and the benefits curve as well as governmental willingness to aid industries on equity grounds. The use of a direct measure of supply elasticity (CDR) should allow more weight to be given to the interpretation that these reflect society's willingness to grant protection on equity or adaptability grounds. Nevertheless, many of the variables can take on either a

TABLE 2

Expected Signs of Coefficients

| | | Benefit Curve | Org. Costs | Broad Support | Narrow Support | "National" Goals | Other |
|---|---|---|---|---|---|---|---|
| 1. | RELPROD | - | | | | | |
| 2. | RELWAG | + | | | | | |
| 3. | RELDIV | + | | | | | |
| 4. | RELSIZ | - | | | | | |
| 5. | EXP | - | | | | | |
| 6. | REG | - | - | + | - | | |
| 7. | COMP | - | | | | | |
| 8. | RAW | -[a] | | | | | |
| 9. | RD | -[a] | | | + | | |
| 10. | EVA | -[a] | | | +[c] | - | - |
| 11. | WKRS | -[a] | | | +[c] | | |
| 12. | WHTCOL | -[a] | | | + | | |
| 13. | AD | ? | | | | | |
| 14. | CDR | ? | | | | -[d] | |
| 15. | FO | ? | | | | - | |
| 16. | PERFOR | - | | | ? | | |
| 17. | MES | | + | - | + | + | |
| 18. | RCR | | ? | + | - | | |
| 19. | UNION | | + | | + | | |
| 20. | WKOWN | | - | | + | | |
| 21. | PRODGOOD | | | | | | - |
| 22. | MPLNT | | | + | | | |
| 23. | SIZE | | | + | | | |
| 24. | GR | -[b] | | | | - | |
| 25. | VAR | +[b] | | | | + | |
| 26. | INTRA | -[b] | | | | - | |
| 27. | DIV | +[b] | | | | + | |
| 28. | WAGE | | | | | - | |
| 29. | TARFD | | | | | | ? |
| 30. | VAS | | | | | | ? |

Notes: a) In the case of some of the factor-intensity variables, it might be better to conclude that their expected sign is uncertain given the state of the empirical literature on the relevance of the factor-proportions model.

b) The adaptability variables may have no effect on the benefit curve if supply elasticity is captured with CDR.

c) EVA, WKRS may have a negative sign for narrow-based support reasons if the support of labour is valued less than the support of capital.

d) If the adaptability variables (b) do not capture the voters willingness to grant protection to industries that are not easily able to shift resources, CDR may pick up some of this influence.

positive or negative sign and therefore the regression analysis must be treated as an inductive exercise rather than a definitive attempt to reject or accept one theory at the expense of others.

## VI THE REGRESSION ANALYSIS

### A] Choice of Tariff Rate

We have chosen to explain effective[24] (ERP) rather than nominal tariff rates. In a study of the U.S. tariff structure, Lavergne has argued that the high correlation between U.S. nominal and effective tariff rates (.92 to .94 at the 4-digit SIC level) makes the choice a matter of limited practical relevance.[25] This is not the case for Canada at the level of disaggregation used here. The correlation between Canadian nominal tariff and effective rates is .61 for 1966, and .63 for 1970.[26]

We stress effective (ERP) rather than nominal tariff rates (NRP) in this study for conceptual reasons. Effective rates measure the potential percentage increase in factor payments created by tariff protection. It is over surplus available to factors that the political process should be striking a bargain. There is considerable evidence from historians that the Canadian political process has indeed appreciated the concept of an effective tariff rate. Barnett (1976) argues that this was the case as early as 1858-59. McDiarmid (1946) and MacKintosh (1939) indicate that it has long been understood that an industry benefited from high tariffs on output but low tariffs on input.[27]

Previous studies do, however, assume that it is the percentage

increase in factor payments created by tariff protection over which the political process bargains; but it equally well could be the total quasi-rent created. Therefore, we also experimented with the dependent variable SURPLUS -- defined as the effective tariff rate times value-added, which gives a first approximation to the total loss that would be occasioned by a move to free trade. Except for the coefficient on SIZE, the results using SURPLUS are very similar to those for ERP and are reported in Appendix C.

Even if the political process did bargain over effective tariffs, nominal tariffs could always be used as regressor.[28] But to do so properly requires input tariffs, effective rates (or their determinants), and the proportion of value added to total costs (Caves [1976]). Ultimately, whether effective or nominal rates are best explained must rest on quantitative evidence. Previous cross-sectional studies of the Canadian tariff structure have not resolved the issue. Both Caves (1976), using 29 to 35 industries, and Helleiner (1977), using 87 industries, found nominal and effective rates to be about equally well explained by the same set of variables. Caves argued that effective rates had slightly better F ratios; Helleiner found the reverse to be true. But the differences were relatively small. Therefore, we estimated the same set of regressions for both effective and nominal tariff rates. However, the explanatory power of the nominal tariff regressions was low and they have been relegated to Appendix B. Moreover, like Caves (1976), we find VAS to be significantly related to nominal tariffs -- which suggests nominal rates are important insofar as they determine effective tariff rates. Our conclusion is that political rent-seeking behaviour focuses more

on effective rates than on nominal rates.[29]

B] The Data

The data used in this study have been taken from a special data base assembled at Statistics Canada for part of a larger project that matches a large number of Canadian and U.S. industries at the Canadian four-digit SIC level. Contrary to earlier work (Caves [1976], Saunders [1980]), the data base consists of all values and not just those publicly available which omit many industries because of confidentiality provisions in the Statistics Act.[30] Since a number of our variables involve U.S./Canada comparisons, we have excluded from our set those industries, primarily miscellaneous, that do not provide relatively good matches between the two countries. We also excluded industries for which the calculated effective tariff rate was highly variable over time and therefore probably subject to measurement error.[31] This leaves a sample of 108 matched industries.

The years chosen for the analysis were 1966 and 1970.[32] The negotiations of the Kennedy Round were concluded in 1966 and its tariff cuts gradually implemented over the next decade. However, most of the changes in effective tariff rates were completed by the early 1970's. By examining 1966 and 1970,[33] we can analyze the extent to which the determinants of the tariff structure were relatively constant. Equally we can examine the determinants of the Kennedy Round tariff cuts. The set of explanatory variables generally pertains to 1970.[34]

## C] The Results

### (i) Tariff Levels

Ordinary least squares (OLS) is used to derive our estimates. While the OLS estimates probably contain some simultaneity bias, they do possess the desirable property of robustness to specification error. Earlier work (Baldwin and Gorecki, 1983a) suggests the costs of going to a larger system of equations for estimation purposes can be relatively great, especially when parts of that larger system are imperfectly understood. In the future, when we satisfy ourselves that each of the components is appropriately modelled, we intend to estimate each of our component pieces as part of a larger simultaneous model.

The results for the regressions using 1966 and 1970 effective tariff rates are contained in Table 3.[35] The beta coefficients along with their t statistics and the level of significance attached to the two-tailed test that the coefficient is zero are reported. Beta coefficients were chosen so as to facilitate comparison of the relative importance of different variables. Beta coefficients come from standardizing all variables such that they have zero means and unit variance. A large coefficient then indicates that the same proportional change in that variable has a larger effect on the dependent variable than the same proportional change in other variables.

Two sets of results are reported in this and subsequent tables. The ones that will be emphasized in the discussion are those obtained when most of the insignificant variables are excluded.

TABLE 3

The Determinants of Effective Tariff Rates in 108 4-Digit Canadian Manufacturing Industries: 1966, 1970

| | 1966 | | | 1970 | | |
|---|---|---|---|---|---|---|
| Variables | Beta | \|T\| | P(\|T\|>0) | Beta | \|T\| | P(\|T\|>0) |
| RELPROD | -.471 | 4.73 | .000(.000) | -.510 | 5.03 | .000(.000) |
| EVA | -.261 | 1.76 | .082(.101) | -.564 | 3.50 | .007(.005) |
| EXP | (-.170) | | (.038) | -.123 | 1.47 | .144(.193) |
| REG | -.184 | 2.16 | .033(.052) | -.117 | 1.40 | .165(.109) |
| TARFD | .186 | 2.27 | .025(.027) | .249 | 3.16 | .002(.017) |
| RCR | -.580 | 2.77 | .007(.035) | -.345 | 3.02 | .003(.117) |
| DIV | | | (.564) | | | (.535) |
| CDR | (-.027) | | (.550) | -.256 | 2.77 | .007(.071) |
| SIZE | -.131 | 1.23 | .223(.242) | -.232 | 2.55 | .012(.045) |
| PRODGOOD | -.154 | 1.69 | .095(.159) | -.157 | 1.69 | .095(.147) |
| WAGE | -.198 | 1.24 | .218(.278) | -.290 | 1.90 | .061(.103) |
| RELWAGE | | | (.325) | .140 | 1.81 | .074(.162) |
| INTRA | -.191 | 2.05 | .043(.052) | | | (.782) |
| VAS | .140 | 1.64 | .105(.131) | | | (.818) |
| RAW | .116 | 1.25 | .214(.273) | | | (.449) |
| RELSIZ | | | (.342) | | | (.817) |
| RELDIV | | | (.661) | | | (.971) |
| AD | | | (.986) | -.109 | 1.14 | .257(.289) |
| RD | | | (.967) | | | (.931) |
| MPLNT | .306 | 2.25 | .027(.121) | .318 | 3.03 | .003(.028) |
| MES | -.325 | 1.73 | .087(.299) | | | (.909) |
| WKNOWN | | | (.659) | | | (.954) |
| GR | | | (.416) | -.109 | 1.31 | .193(.144) |
| FO | | | (.907) | .097 | 1.08 | .284(.740) |
| PERFOR | | | (.919) | | | (.356) |
| $\bar{R}^2$ | .433 | | | .484 | | |
| df | 14,93 | | | 15,92 | | |
| F | 6.829 | | | 7.708 | | |
| P>F | .0000 | | | .0000 | | |

Note: The figures in round brackets come from the regression that used the large set of explanatory variables listed here.

However, included in brackets are the significance levels and occasionally the beta coefficients of the variables when a large set of variables contained in the table is used. This allows the reader to evaluate the sensitivity of our conclusions to the process used to remove 'insignificant' variables.[36] In what follows, a variable will be taken to be significant if the level of significance is 5 per cent or less, weakly significant if between 5 and 10 per cent.

Of those variables meant to capture competitive disadvantage, the direct measure, relative productivity (RELPROD) is consistently of the appropriate sign and significant. While export intensity (EXP) is negative, it is only significant in the full variable set for 1966. The relative wage (RELWAGE) is positive and weakly significant in 1970. The regional variable (REG), which represents the degree of natural protection, has the appropriate sign and is significant in 1966 but loses significance by 1970. Of the various indirect competitive advantage variables, only labour intensity EVA has the postulated sign and is significant or weakly significant in both years. Contrary to Helleiner, we find that raw material intensity (RAW) is not significant.

Our results and those for the U.S. (Ray [1981]; Lavergne [1983]) support the traditional view that Canada is relatively labour intensive, and the U.S. is capital intensive; for the labour intensity variable EVA is significantly negative for Canada, while both Ray and Lavergne report a significant positive coefficient for the U.S.[37] While only an indirect test, in that it relies upon revealed perceptions of the need for protection, it is suggestive that Harkness and Kyle (1975) and Harkness (1976) were correct when they

concluded there was no Leontieff paradox.[38]

Neither of the indirect structural variable that are meant to capture unexploited plant economies (RELSIZ) or plant specialization in product lines (RELDIV) is significant. These factors are presumably captured by the direct measure of relative productivity (RELPROD).

The proxy variable for elasticity of supply (CDR) has a negative coefficient which is not significant in 1966, but becomes significant by 1970. Thus higher supply elasticity leads to lower tariff rates. With this variable capturing supply elasticity effects, the growth and adversity variables are more likely to measure the equity considerations that influence tariff policy.[39]

Together the signs and significance of RELPROD, EVA, REG, RELWAGE and CDR suggest the cost disadvantage hypothesis is borne out by the results. Where the surplus that can be created by tariffs is higher, effective tariff rates are also higher. But the hypothesis that the factors that determine lobbying costs are important is also confirmed.

Broad-based voter support would seem to be important. The multiplant variable (MPLNT) has a positive and significant coefficient in both years; the plant concentration variable (MES) has a negative and weakly significant sign in 1966. Even the industry size variable (SIZE) suggests broad-based support was important. Admittedly it is negative. However, that SIZE has a negative impact suggests either that it creates a disadvantage because of visibility or that the political process bargains not just over the rate of surplus creation but also over the absolute amount of surplus created by effective

tariff rates. In the latter case, industry size should have a negative coefficient since C(T) and its slope would be positively related to size. The formulation that employs SURPLUS (Appendix C) as dependent variable indicates SIZE has a significant positive coefficient. Thus while ERP is negatively related to industry size, the actual surplus created is greater in larger industries -- thereby suggesting that size yields greater rent and broad-based support pays off where it really counts -- in total surplus created.

The variables that are meant to capture narrower support have no success. The UNION variable is insignificant and not reported. Non-production worker intensity (WHTCOL) was never significant and is treated likewise. Research and development intensity (RD) is not significant. Labour intensity (EVA) was negatively not positively signed indicating that factors other than labour dominated narrow support-based considerations. Foreign ownership (FO) is not significant and the variable capturing foreign interest in trade (PERFOR) does not show any significance.

Nor are organizational costs confirmed as having much importance. The number of working owners (WKOWN) is insignificant. The unionization variable (UNION) was never significant and is not included in the results reported here. The plant concentration term (MES) is negative, not positive. Only the residual concentration term (RCR) is negative and significant. This suggests that the geographic factor that may increase organizational costs is important or that broad-based support factors are not important. Since the latter is at odds with the signs of MPLNT and SIZE, the organizational costs explanation would seem to be the appropriate one here.

The state does however appear to weigh adversity and adaptability. Admittedly growth (GR) is not significant; nor is variability (VAR). However the wage rate (WAGE) was negative and weakly significant in 1970. While Helleiner (1977) also found this result and argued that this variable catches comparative advantage of an industry,[40] it is more likely to reflect national preferences as to equity or adaptability here. The inclusion of relative Canada/U.S. wages (RELWAG) and the non-tariff variable (TARFD) as well as the other competitive disadvantage variables should capture the influences most closely associated with competitive disadvantage.

Two adaptability variables were included. Intra-industry trade (INTRA) was correctly signed and significant in 1966 but not in 1970. The diversity variable (DIV) is not significant. In the past, these variables have been used to proxy two effects -- the effect of adversity and immobility on the benefits curve as well as on voter preferences. Their effect on the benefits curve probably operates primarily through their use as proxies for the elasticity of supply. With the inclusion of CDR, they now should more predominantly measure voter attitudes. Of course the negative sign on EVA and CDR may also be interpreted to show that there was a national preference to aid industries with less adaptability.

The non-tariff trade barrier variable (TARFD) is positive and significant. Industries with high non-tariff barriers have high effective tariff rates. This suggests that industries that seek protection from the rigours of foreign trade are granted protection in more than one way[41] -- a result similar to that which Ray (1981) found for the United States. Producer-good industries (PRODGOOD) generally

have lower effective rates of protection in both years, but the relationship is only weakly significant.

The value-added/sales ratio is positive but never significant. National policy therefore does not seem to be aimed at industries with a large tranche of value-added. However, the negative sign on EVA might be interpreted as a national preference for physical capital.

(ii) Tariff Changes Between 1966 and 1970

Up to this point, our analysis has treated the tariff level rather than changes in the level as the focus of the political process. But the present tariff structure is the result of the cumulative effect of previous changes. The lobbying process, at any one time, might be characterized as concentrating not so much on the absolute tariff rate as on the tariff rate change that is being negotiated in a multilateral forum.

In the 1960s, tariff-seekers would have had to recognize the existing tariff structure and multilateral commitments to freer trade as constraints. Indeed the latter might have been so restrictive as to preclude any domestic lobbying effort from having an influence if the Kennedy Round tariff cuts were imposed upon Canada by her larger trading partners. However the Canadian bargaining position created some room for domestic lobby groups. During the Kennedy Round, Canada demanded and received an exemption from the general linear formula that most other countries accepted. (Lavergne [1983], p. 123.)

Changing the focus of the model to tariff reductions still allows the outcome to be analyzed using a diagram similar to Figure 1 -- as long as the horizontal axis is interpreted as declines in the

tariff rather than the absolute value of the tariff. In Figure 1, tariff cuts would be smaller, moving from left to right along the horizontal axis.

The lobbying costs of preventing any tariff decrease should be inversely related to the size of the decline from which protection was being sought because of the Canadian government's acceptance of the multilateral commitment to tariff cuts. The slope of the cost curve should also increase for ever smaller cuts demanded in light of this general commitment. The determinants of the cost curve are hypothesized to be the same as before.

The benefit curve relevant to tariff reductions can be derived from the benefit curve in Figure 1. The curve is just the loss of benefits associated with a tariff change. The new benefit curve so derived will still be affected by an industry's relative cost disadvantage. If those industries with the greatest cost disadvantage have succeeded initially in obtaining higher tariffs (which our regression results indicate was the case), then ceteris paribus (the same lobbying cost curve) the slope of the benefit curve must be steeper for the industries with the greater cost disadvantage. As such smaller tariff cuts for those industries with the greatest cost disadvantage would be predicted.

The slope of the new benefits curve will also depend upon the elasticity of supply. If factors of production are completely immobile, the short-run supply curve will be vertical and the loss of benefits much greater than if the supply curve is more elastic. Thus the tariff decline should be less where supply is more inelastic.

Thus the tariff rate change equation should be determined by

the same set of explanatory variables as was used previously. The one additional variable included in this regression is the tariff level at the beginning of the period. The larger the original tariff rate, the greater is the scope for tariff reductions. Its inclusion therefore normalizes the reduction for the bargaining process which, Lavergne (1983) emphasizes, focused on a formula that heavily stressed this original rate.

Estimation of the determinants of changes in the tariff rates can be accomplished either by using

1) $ERP_{t-1} - ERP_t = a(ERP_{t-1}) + BX$

or

2) $ERP_t = (1-a)ERP_{t-1} - BX$

where X is a vector of explanatory variables, and B is the associated vector of coefficients. While the maintained hypothesis is the same in each case, the estimated parameters will in general not be the same. Since there is no a priori reason for choosing one over the other, both were estimated. Differences between the two were relatively minor, and only the coefficients associated with version #2 have been reported in Table 4.

In Table 4, we report estimates both for a large set of explanatory variables and for a reduced set where the most insignificant have been excluded. It should be noted that the sign of the coefficients reported in Table 4 indicates the extent to which the variable has influenced the extent of the tariff decline; i.e., a positive coefficient indicates a larger decline.

TABLE 4

The Determinants of Kennedy Round Tariff Rate Changes in 108 4-Digit Canadian Manufacturing Industries: 1966, 1970

| Variable | Beta | \|T\| | P(\|T\|>0) |
|---|---|---|---|
| ERP66 | .896 | 10.28 | .000(.000) |
| RELPROD | .300 | 2.82 | .006(.016) |
| EVA | .498 | 3.21 | .002(.021) |
| EXP | | | (.877) |
| REG | | | (.709) |
| TARFD | -.177 | 2.25 | .027(.236) |
| RCR | .181 | 1.57 | .120(.864) |
| DIV | | | (.175) |
| CDR | .206 | 2.38 | .019(.058) |
| SIZE | .187 | 2.19 | .031(.101) |
| PRODGOOD | | | (.505) |
| WAGE | .342 | 2.40 | .019(.226) |
| RELWAGE | -.167 | 2.28 | .025(.323) |
| INTRA | | | (.167) |
| VAS | | | (.287) |
| RAW | | | (.986) |
| RELSIZ | | | (.240) |
| RELDIV | | | (.653) |
| AD | .163 | 1.86 | .066(.158) |
| RD | | | (.937) |
| MPLNT | -.197 | 1.91 | .059(.120) |
| MES | | | (.428) |
| WKOWN | | | (.631) |
| GR | +.103 | 1.34 | .184(.218) |
| FO | | | (.578) |
| PERUSA | -.084 | 1.10 | .273(.182) |
| $\overline{R}^2$ | .52 | | |
| df | (13,94) | | |
| F | 10.01 | | |
| P>F | .000 | | |

Note: The figures in round brackets come from the regression that used the large set of explanatory variables listed here.

(a) The dependent variable is ERP1970, using model (2) in the text.

The results of Table 4 are broadly consistent with conclusions that could have been drawn by comparing the size and significance of the coefficients for 1966 and 1970 in Table 3. Estimation of the determinants-of-tariff-change equation, however, does help to focus attention on the most significant determinants of the change -- as opposed to the heuristic nature of conclusions that emerge from a perusal of Table 3 alone.

Kennedy Round tariff cuts were largest where the benefits from existing tariffs were least. The cost disadvantage variables, which led to higher tariffs in 1966 and 1970, also tended to cause the Kennedy Round tariff cuts to be larger. Relative productivity (RELPROD) has a significantly positive coefficient. So too does the labour intensity variable (EVA). Industries which received non-tariff protection (TARFD) and higher tariffs in 1966 (ERP66) received lower tariff cuts. Industries with higher relative wages compared to the U.S. received lower tariff cuts; RELWAGE had a significant negative coefficient. In addition, both the supply and demand elasticity variables had the postulated effect. Higher supply elasticity led to greater tariff cuts; CDR had a significant positive coefficient. Higher advertising intensity (a proxy for higher demand elasticity) had a weakly positive coefficient -- though it may be proxying the foreign ownership special interest effect.[42] These results corroborate those in the earlier section that the tariff structure is related to the benefits to be derived therefrom.

The broad-based support hypothesis underlying the cost curve is also given further support -- though with a slight modification. SIZE has significantly positive coefficient indicating larger

industries suffered a greater decline; but multiplant (MPLNT) industries had less of a decrease. This suggests a political process that was trading off numbers of votes for greater geographical coverage. As before, none of the specific interest group variables like UNION, FO, WKOWN and MES were significant.

As with the 1966 and 1970 tariff equations, few organizational cost variables seem to matter for the Kennedy Round tariff cuts. As before, only the multiplant concentration variable RCR is at all important -- and then only very marginally at the 12 per cent level. Where concentration arises because of the relative multiplant nature of the leading firms, tariffs were decreased somewhat more.

Of the altruistic considerations that were previously found to be significant, only the wage rate (WAGE) has a significant coefficient. The same equity considerations that previously led to a higher tariff for low wage industries also led to less of a decrease during the Kennedy Round. Once again, the fact that RELWAGE is included and has a significant sign in accord with the competitive disadvantage thesis; as does the TARFD variable, suggests the wage variable is picking up equity considerations that determine the slope of the lobbying cost curve.

In conclusion, the results show that considerations affecting both the benefits and costs of tariffs have influenced tariff changes since 1966. Moreover, political considerations appear to have dictated that, as tariffs were lowered, broad-based support related to size was sacrificed for support from constituencies that were more widely distributed geographically.

## VII CONCLUSION

This paper has extended previous Canadian work by expanding substantially both the number of industries and variables used and by trying to develop a somewhat more fully specified model of the rent-seeking process. It also looks at the tariff structure over time, thereby allowing conclusions to be drawn about stability of the determinants of the rent-seeking process.

Caves' (1976) study points to concentration as the most significant determinant of the tariff structure. He suggests that narrow-based support is more important than broad-based support. In contrast, Saunders (1980) finds relative productivity and export intensity to be the most significant variable though he leaves unanswered the issue as to the nature of the political base that is catered to by the process. Helleiner (1977) argues that it is unskilled-labour intensity (as measured by the wage rate) that is generally the most significant variable with a negative coefficient. In his analysis, this variable is left to catch both equity and domestic competitive disadvantage.

Our results show that competitive disadvantage variables are consistently signed as postulated and highly significant. Like Ray's (1981) study of the American tariff structure, we find the tariff structure is therefore consistent with joint maximization of industry profits. Our results also confirm that supply and demand elasticity variables, previously omitted in the Canadian case, have the signs consistent with the joint maximization analogy. In this respect then, we reinforce the results suggested by Saunders.

The political process suggested by our results is quite

different from Caves' work. It is broad-based not narrow-based support that emerges from the analysis. Organizational costs are less important with only multiplant activity in concentrated industries having a sign that accords with this explanation of the determinants of the tariff process. However, voters do seem willing to consider adversity and adaptability characteristics. Thus while self-seeking behaviour is an important determinant of the tariff process, altruism would appear to act as a constraint upon the process. Nevertheless, the significance of these variables is less than the competitive disadvantage variables. Altruism based on characteristics not correlated to real disadvantages is relatively unimportant. But then this probably says more about the perspicacity of the political process than about its lack of compassion.

# APPENDIX A

## Variable List and Definitions

| | |
|---|---|
| AD | is the advertising/sales ratio for the industry times a dummy variable that takes on a value of 1 if the industry produces non-durable goods, and 0 otherwise (see Porter (1974). |
| CDR | is the cost disadvantage ratio for small as opposed to large plants where economies of scale are expected to be important: the ratio of value-added per man-hour of the smallest plants accounting for 50 per cent of industry employment divided by the value-added per man-hour for the largest plants accounting for 50 per cent of industry employment all multiplied by a dummy variable which takes on a value of one when MES takes on a value greater than its median. This formulation is based on our earlier work. See, in particular, Baldwin and Gorecki (1983b). |
| CON4 | is the four-firm concentration index: the proportion of industry shipments accounted for by the four largest unconsolidated enterprises. |
| DIV | is the incidence of enterprise diversification: the percentage of industry shipments accounted for by establishments owned by consolidated enterprises that are single industry firms. |
| ERP | is the effective tariff rate in an industry. It is calculated to take into account exports, indirect taxes and subsidies (see Wilkinson and Norrie [1975].) |
| EVA | is the ratio of wage and salary earners to value added. |
| EXP | is the proportion of domestic shipments that is exported. |
| FO | is the proportion of industry shipments accounted for by foreign-owned enterprises. An enterprise is defined as foreign controlled if there is effective foreign control. Effective control may exist where less than 50 per cent of the stock is owned by a foreign corporation. This data was supplied by the Multinational Enterprise Division of Statistics Canada. |
| GR | is the rate of growth of real industry shipments: defined as the slope coefficient from the regression of the logarithm of industry real sales on time over the period 1970-79. |

| | |
|---|---|
| INTRA | is a measure of the importance of intra-industry trade. It is defined as (EXP + IMP - absolute value (EXP-IMP)/ (EXP+IMP)). |
| COMP | is a measure of comparative advantage. It is defined as one plus (exports minus imports divided by the sum of exports plus imports). |
| MES | is the importance of economies of plant scale variable: the ratio of an estimate of MES to the value of shipments of the Canadian industry. The estimate of Canadian MES is the average size measured in shipments of the largest plants which account for the top 50 per cent of industry shipments. |
| MPLNT | is the market share of multi-establishment unconsolidated enterprises. An unconsolidated enterprise is the agglomeration of all establishments within an industry under common control. |
| NRP | is the nominal tariff protection which is defined as the actual duties collected divided by the value of total imports less duties. |
| PERFOR | is the percentage of imports from the U.S.A. made by foreign-controlled firms. Source: Statistics Canada, (1981) #67-509. |
| PRODGOOD | is a dummy variable that takes on a value of one for industries that primarily sell to other industries, 0 otherwise. For a definition of the distinction, see Caves et al. (1980). |
| RAW | Expenditure on primary commodities out of $100 spent by industry on all inputs. Source: Dominion Bureau of Statistics, The Input-Output Structure of the Canadian Economy. For a definition, see Caves et al. (1980). |
| RCR | is the residual concentration level: the difference between the four-firm concentration ratio (CON4) and four times the ratio of minimum efficient scale plant to industry shipments (MES). As such it measures the degree to which concentration results from multiplant operation. |
| RD | is the research and development intensity of the industry: defined as the percentage of R & D personnel to all wage and salary personnel for 1975. |
| REG | is a dummy variable that takes on a value of one for regional industries, 0 otherwise. |

| | |
|---|---|
| RELDIV | is a measure of plant diversity relative to the number of industry products. It is defined as (1-WH4D)/(1-1/N4) where WH4D is the average plant Herfindahl index of product diversity and N4 is the number of products (defined at the 4-digit Industrial Commodity Classification level) produced in the industry. |
| RELPROD | is a measure of Canadian/U.S. relative labour productivity corrected for price differentials assuming pricing up to the tariff: the ratio of total value-added per production worker in Canada to its U.S. counterpart multiplied by (1-ERP). See Saunders (1980). |
| RELSIZ | is a measure of Canadian relative size disadvantage: the ratio of average plant size in Canada to the estimate of U.S. MES for the same industry. U.S. MES is defined as the average size (shipments) of the largest U.S. plants which account for the top 50 per cent of industry shipments. |
| RELWAG | is a measure of Canadian/U.S. relative wages: the value of wages and salaries paid per wage and salary earner in the Canadian industry divided by its U.S. counterpart. |
| SIZE | is the number of wage and salary earners employed in the industry. |
| TARFD | is a dummy variable that takes on a value of one for industries with high non-tariff barriers. We would like to thank T. Hazledine for this variable. |
| VAR | is the variability of industry sales: the mean squared error from the regression of the logarithm of real value of total shipments on time, 1970-1979. |
| VAS | is the ratio of value-added to sales. |
| WAGE | is the average wage of wage and salary earners. |
| WHTCOL | is the ratio of non-production workers to the end year value of gross capital stock measured in 1971 dollars -- non-production workers are the difference between the number of wage and salary earners and wage earners. |
| WKOWN | is the ratio of the number of working owners and proprietors to the end-year value of gross capital stock measured in 1971 dollars. |
| WKRS | is the ratio of wage and salary earners to the end year value of gross capital stock measured in 1971 dollars. |

| | |
|---|---|
| UNION | is the percentage of the work-force that is classified as unionized. |
| SURPLUS | is the product of the effective tariff rate times value-added. |

## APPENDIX B

## The Determinants of Nominal Tariff Rates

The results of the nominal tariff rate (NRP) equations are reported in Table B-1 for the years 1966 and 1970. In each case, we report the coefficients for regressions where the large set of explanatory variables is used and where the most insignificant variables are excluded. A comparison of the two provides an evaluation of the robustness of the results to specification error and problems arising from multicollinearity.

As in the effective tariff rate equations, nominal tariff rates are lower for producer good industries (PRODGOOD), for regional industries (REG), for high labour intensity industries (EVA) and for larger industries (SIZE). They are higher for industries characterized by geographical dispersion (MPLNT). In contrast with the effective tariff rate equations, adaptability seems somewhat more important. Diversification (DIV), the extent of intra-industry trade (INTRA) and growth (GR) all lead to lower tariffs. Each of these variables, it was argued, was likely to be related to the industry's ability to adapt to changes resulting from trade liberalization.

The other highly significant variable in the nominal tariff rate equations is the ratio of value-added to sales (VAS). That it is significant for nominal tariffs but not for effective tariffs accords with Caves' [1976] finding and his interpretation that effective and not nominal tariffs are the primary concern of the political process. Since

TABLE B-1

The Determinants of Nominal Tariff Rates in 108 4-Digit Canadian Manufacturing Industries: 1966, 1970

| | 1966 | | | 1970 | | |
|---|---|---|---|---|---|---|
| Variables | Beta | \|T\| | P(\|T\|>0) | Beta | \|T\| | P(\|T\|>0) |
| RELPROD | | | (.180) | | | (.247) |
| EVA | -.219 | 1.85 | .068(.072) | -.305 | 2.49 | .015(.048) |
| EXP | | | (.261) | .203 | 2.13 | .036(.094) |
| REG | -.257 | 2.93 | .004(.076) | -.233 | 2.59 | .011(.087) |
| TARFD | | | (.651) | | | (.662) |
| RCR | | | (.600) | | | (.881) |
| DIV | .281 | 2.09 | .039(.250) | .271 | 1.93 | .057(.149) |
| CDR | | | (.519) | | | (.356) |
| SIZE | -.113 | 1.27 | .207(.272) | -.216 | 2.27 | .023(.176) |
| PRODGOOD | -.355 | 3.99 | .000(.032) | -.333 | 3.66 | .000(.038) |
| WAGE | | | (.519) | | | (.516) |
| RELWAGE | | | (.361) | .101 | 1.10 | .272(.310) |
| INTRA | -.161 | 1.67 | .098(.257) | | | (.483) |
| VAS | .265 | 2.92 | .004(.015) | .239 | 2.62 | .010(.029) |
| RAW | | | (.823) | | | (.845) |
| RELSIZ | | | (.850) | | | (.972) |
| RELDIV | | | (.988) | | | (.906) |
| AD | | | (.924) | | | (.921) |
| RD | | | (.717) | | | (.700) |
| MPLNT | .297 | 2.58 | .011(.076) | .355 | 3.14 | .002(.079) |
| MES | | | (.879) | | | (.600) |
| WKOWN | | | (.892) | | | (.780) |
| GR | -.253 | 2.62 | .010(.049) | -.246 | 2.47 | .015(.038) |
| FO | | | (.406) | -.112 | 1.04 | .300(.297) |
| PERFOR | | | (.444) | | | (.568) |
| $\bar{R}^2$ | .26 | | | .26 | | |
| df | 9,98 | | | 11,96 | | |
| F | 5.198 | | | 4.39 | | |
| P>F | .000 | | | .000 | | |

Note: The figures in round brackets come from the regression that used the large set of explanatory variables listed here.

(1) $$NRP_{OUT} = VAS\ ERP + (1-VAS)NRP_{INP}$$

where $NRP_{OUT}$ is the nominal output tariff and $NRP_{INP}$ is the nominal input tariff, $NRP_{OUT}$ should be a function of VAS and the determinants of effective tariff rates (ERP) if the political bargain is struck over ERP.

## APPENDIX C

## The Determinants of the Surplus Created by Effective Tariff Rates

In the main body of the paper, we chose to model the determinants of the rent-seeking process by focusing on effective tariffs (ERP), rather than nominal tariffs (NRP). The former is likely to be more directly related to the surplus created by the tariff structure than the latter. The relative explanatory power of the ERP compared to the NRP equations supports this view.

Notwithstanding the above, if our objective is to develop a model of the rent-seeking process, we may be interested not so much in effective rates as in the surplus generated by tariffs. Effective rates, as we have calculated them, measure the percentage by which value added available to domestic factors would be reduced by free trade. The actual reduction, in the first approximation, is the effective tariff rate multiplied by value added (SURPLUS).

In order to test whether the determinants of the rent-seeking process are different for ERP as opposed to SURPLUS, the latter variable for 1970 was regressed on the same set of explanatory variables as were previously used for 1970 effective tariff rates. The resulting regression coefficients are reported in Table C-1. The regressions in each case were performed on the 108-industry set. The results for the large set of explanatory variables and for the reduced set are both reported. As before, the significance levels for the coefficients of the large set are placed in brackets.

The two approaches yield similar results for the productivity

TABLE C-1

The Determinants of the Surplus Generated by the Effective Tariff Rate Structure Across 108 4-Digit Canadian Manufacturing Industries: 1970

| | 1970 | | |
|---|---|---|---|
| Variables | Beta | \|T\| | P(\|T\|>0) |
| RELPROD | -.290 | 2.96 | .004(.027) |
| EVA | -.609 | 4.12 | .001(.001) |
| EXP | -.243 | 2.75 | .007(.024) |
| REG | | | (.465) |
| TARFD | | | (.382) |
| RCR | -.155 | 1.35 | .180(.292) |
| DIV | | | (.836) |
| CDR | | | (.856) |
| SIZE | .311 | 3.40 | .001(.031) |
| PRODGOOD | | | (.773) |
| WAGE | -.339 | 2.26 | .026(.117) |
| RELWAGE | .114 | 1.38 | .170(.251) |
| INTRA | -.203 | 2.14 | .035(.109) |
| VAS | .213 | 2.49 | .015(.022) |
| RAW | | | (.198) |
| RELSIZ | -.136 | 1.52 | .131(.122) |
| RELDIV | .116 | 1.41 | .163(.235) |
| AD | | | (.868) |
| RD | | | (.862) |
| MPLNT | .278 | 2.49 | .015(.039) |
| MES | | | (.612) |
| WKOWN | | | (.816) |
| GR | | | (.254) |
| FO | -.210 | 2.29 | .024(.189) |
| PERFOR | .141 | 1.77 | .081(.127) |
| $\overline{R}^2$ | .45 | | |
| df | (14,93) | | |
| F | 7.18 | | |
| P>F | .0000 | | |

Note: The figures in round brackets come from the regression that used the large set of explanatory variables listed here.

(RELPROD), and employment intensity (EVA) variables. Export intensity (EXP) now becomes significant. Thus, competitive disadvantage leads to higher effective tariffs and higher surplus. Special interest groups have more impact in the surplus formulation. Foreign ownership (FO) leads to less surplus but the importance of U.S. trade variable (PERFOR) has a significantly positive coefficient. The equity variable (WAGE) maintains its significance and the adaptability variable (INTRA) becomes significant when it was not in the ERP formulation. Finally, the proxy for extensive geographic distribution MPLNT (broad-based support) keeps the significance it had in the effective tariff rate formulation.

These results indicate that, even though it is SURPLUS that ultimately must interest the factors of production that lobby for tariff protection, the determinants of ERP are still of intrinsic interest. SURPLUS depends upon size, and if some of the industry characteristics that determine ERP are unrelated to industry size, their relationship to surplus -- the product of ERP and total value-added (an industry size measure) -- may be quite different from that of ERP.

SIZE, the proxy for broad-based support considerations no longer has a negative sign when SURPLUS rather than ERP is the dependent variable. In SURPLUS, it has a positive sign which is significant. While large industries may obtain somewhat lower tariff rates, they obtain larger surpluses. Thus, using SURPLUS would lead us to conclude that the broad-based voter model, is relevant. Indeed, it is this result that is probably the most interesting for the SURPLUS formulation. While there are a number of interest-group

variables, which are independent of SIZE, that affect the determinants of ERP, ultimately SIZE does matter. The larger the industry, the more surplus it is able to generate from engaging in rent-seeking behaviour.

## Footnotes

1. Lavergne (1983), pp. 32-33.

2. Baldwin and Gorecki (1983a, 1983b, 1983c, 1983d).

3. Caves (1976), Helleiner (1977), Saunders (1980).

4. See Wilkinson and Norrie (1975) for a discussion of the difference between the effective tariff rates calculated with and without these corrections.

5. There are three exceptions -- Printing and publishing; Machinery, and Transportation equipment -- where nominal tariffs exceeded effective tariffs. For Printing and publishing, and Machinery, the difference between nominal and effective tariffs narrowed considerably during the period. In all three instances, both the effective and nominal tariffs are below those of the manufacturing sector as a whole.

6. Unfortunately time series data on the tariff equivalent of non-tariff barriers are not available to us.

7. Ultimately a model of tariff-seeking behaviour should be set within the larger context of all rent-seeking behaviour. This would involve explaining not only when rent is sought but also why it is sought in the form of tariffs rather than as cash subsidies or non-tariff barriers.

8. R. Baldwin (1982).

9. Alternately, the horizontal axis might be interpreted as effort devoted to lobbying for the profit-maximizing tariff level. The benefits curve then measures the expected value of the benefits.

10. See Lavergne (1983), p. 71.

11. This presumes the tariff probability function does not go to zero before the maximum benefit is attained.

12. We are assuming that the skewness of the tariff probability distribution is not a function of the maximum benefit achievable because of considerations that affect the cost curve.

13. The empirical factor proportions literature may not help us much with predictions since Wahl (1961), Postner (1975), and Harkness (1983) define an industry differently than we do. They use input-output tables to calculate overall factor intensity -- including materials, even if they are traded internationally.

14. We experimented with a comparative advantage variable that measured the extent to which exports are large relative to imports. It consistently had a negative sign as would be expected if tariffs restricted imports. However the same simultaneity problem that exists for the imports variable also is present for this variable and so it was excluded. Its exclusion did not affect the results materially.

15. R. Baldwin (1982), p. 271.

16. Caves et al., (1980); Baldwin and Gorecki (1983b). Note that in light of our earlier work, this variable is defined as the cost disadvantage ratio in small markets and zero elsewhere.

17. Fuss and Gupta (1981) outline the conditions where this variable will be directly correlated with an estimate of scale economies. Ray (1981) uses scale elasticity as a variable to proxy domestic supply elasticity.

18. In related work we estimated the scale elasticity at the industry level and found the resulting estimates to be correlated with CDR.

19. See External Affairs (1983), p. 31.

20. See Lavergne (1983), pp. 93-94.

21. Ibid.

22. VAS is positively correlated with the dummy variable PRODGOOD -- whether an industry produces primarily for other industries rather than for final demand. This suggests VAS is negatively correlated with the stage of the production process.

23. Lavergne (1983) argues that if nominal tariff rates escalate towards the final processing stage, a low VAS will tend to be associated with a low prohibitive tariff rate. To the extent that the prohibitive tariff level acts as a ceiling on tariff rates, the relationship between VAS and the effective rate could be positive. This argument presumes the tariff escalation phenomenon and is therefore incomplete.

24. The effective tariff rate chosen is that which corrects for exports and commodity tax-subsidy data (see Wilkinson and Norrie [1975]). When we tried the uncorrected effective tariff rate, similar but less significant results were obtained. Earlier studies by Caves (1976) and Saunders (1980) use the unadjusted Melvin and Wilkinson estimates from 1963 that were based on the Census of Manufactures rather than on input-output tables. Helleiner (1977) used the unadjusted Wilkinson and Norrie data that did not correct for exports.

25. Lavergne, 1983, p. 51.

26. These correlations are for 108 4-digit industries. They exclude from the 167 sample, all miscellaneous industries, those for which we could not get good U.S./Canada industry definition matches, and industries where year to year changes in effective tariff rates suggest measurement error. The latter include the petroleum and tobacco sectors (1510, 3651, and 3652). The latter three were excluded, because, as is evident from Table I, effective rates in these sectors were characterized by extreme variability. This is the result not so much of changes in tariffs but in value-added to sales ratios.

27. See Caves (1976), p. 292.

28. Ibid., p. 293.

29. This conclusion must be tempered by the recognition that our nominal tariff rates are estimated not by using pre-tariff trade weights but by using post-tariff weights. When this is done, estimated average tariff rates can change even when the components are unchanged -- because the weights may change.

30. For further details on the data base, the reader may refer to Baldwin and Gorecki (1983b, 1983d).

31. Not all such omitted industries were subject to the same degree of variability in measured effective tariff rates. Petroleum and Coal products (3651 and 3652) and Tobacco (1510) were the worst. Therefore we also estimated our relationships, excluding only these industries. The results were not markedly different from those reported here.

32. The 1970 tariff rate used was actually the average of 1970 and 1972. This average was chosen to reduce errors in measurement of effective tariff rates that arise from random movements in the value/added sales ratio of a particular industry.

33. We also performed the same regressions for 1978 but the results are not reported here. They were basically the same as those for 1970 nominal tariff rates; but they differed in a number of respects for effective tariff rates. The latter occurred because the seventies saw a dramatic increase in inflation rates which affected value-added in a number of industries. Since effective tariff rates depend critically upon the accurate measurement of value-added, these changes led to effective tariff rate movements that were not entirely the result of nominal tariff rate changes and which complicate the analysis. This is much less of a problem when comparing the years 1966 and 1970.

34. See Baldwin and Gorecki (1983b, 1983d) for a more detailed discussion of the variables used and their sources. Definitions are provided in Appendix A of this paper.

35. In Table 3 and subsequent tables, we omit several variables discussed previously -- UNION, WKRS, WHTCOL, and VAR. These variables were discarded because they never were significant.

36. Although numerous explanatory variables were included, multicollinearity did not emerge as a major problem. Variables which were significant when a complete set was run, were generally still significant with unchanged signs when the more insignificant variables were excluded. The results were robust to different methods used for deciding which variables to exclude. For reporting purposes here, we finally used a stepwise routine to exclude insignificant variables.

37. The possibility that the negative sign on EVA is indicative of a national preference for industries with large amounts of capital relative to labour cannot be ruled out. But then an explanation for the different signs on this variable in Canada and the United States would have to rely upon rather different national preferences.

38. EVA and TARFD are positively correlated. Therefore non-tariff barriers, which are principally aimed at third world nations, indeed protect those industries where high labour intensity does not afford an advantage. But once these industries are accounted for, either by excluding industries having a non-tariff barrier, or by using a dummy intercept for these industries, employment intensity (EVA) has a significantly negative coefficient.

39. Lavergne (1983) notes that others have argued that EVA should be positively related to supply elasticity if labour is more mobile than capital. In this case EVA should have the same sign as CDR. Since CDR is included we attribute the negative coefficient on EVA to comparative advantage and not supply elasticity effects.

40. WAGE may represent human capital per employee. If Canada is rich in human capital, it might take on a negative sign for comparative advantage reasons. Wilkinson's work (1968) suggested WAGE is positively correlated with export performance; therefore it may be catching this rather than the equity effect. However, with the large number of competitive disadvantage variables we have also included, we feel this possibility is slight. Our inclusion of RELWAG was meant to allow for this alternate possibility.

41. The same regressions were performed on a reduced sample with all non-tariff barrier industries excluded. There were few differences. Therefore we feel the non-tariff dummy is essentially catching excluded variables that affect tariff protection in these particular industries.

42. Advertising intensity (AD) and foreign ownership (FO) are positively correlated. Exclusion of AD causes FO to become weakly significant with a negative coefficient.

## Bibliography

Baldwin, J. 1975. The Regulatory Agency and the Public Corporation, Cambridge, Mass.: Ballinger.

Baldwin, J.R. and P.K. Gorecki with J. McVey and J. Crysdale. 1983a. Entry and Exit to the Canadian Manufacturing Sector: 1970-1979, Economic Council of Canada Discussion Paper #225.

_____. 1983b. Trade, Tariffs, and Relative Plant Scale in Canadian Manufacturing Industries: 1970-1979. Economic Council of Canada Discussion Paper #232.

_____. 1983c. The Relationship Between Plant Scale and Product Diversity in Canadian Manufacturing Industries. Economic Council of Canada Discussion Paper #237.

_____. 1983d. Trade, Tariffs, and Product Diversity in Canadian Manufacturing Industries: 1970-1979. Economic Council of Canada Discussion Paper #247.

Baldwin, R.E. 1982. "Political Economy of Protectionism" in J.N. Bhagwati, ed., Import Competition and Response, pp. 263-286. NBER. Chicago: University of Chicago Press.

Barnett, D.F. 1976. "The Galt Tariff: Incidental or effective protection?" Canadian Journal of Economics, IX 3, August, 389-407.

Breton, A. 1964. "The Economics of Nationalism", Journal of Political Economy, 72, 376-86.

Canada. External Affairs. 1983. A Review of Canadian Trade Policy. Ottawa: Ministry of Supply and Services.

Canada. Statistics Canada. 1981. Canadian Imports by Domestic and Foreign Controlled Enterprises. Catalogue #67-509. Minister of Supply and Services.

Caves, R.E. 1974. "Causes of Direct Investment: Foreign Firms' Shares in Canadian and United Kingdom Manufacturing Industries", Review of Economics and Statistics, 56, 279-93.

Caves, R.E. 1976. "Economic Models of Political Choice: Canada's Tariff Structure", Canadian Journal of Economics, IX-2, 278-300.

Caves, R.E. et al. 1980. Competition in the Open Economy, Cambridge. Mass.: Harvard University Press.

Daly, D. and S. Globerman. 1976. Tariff and Science Policies: Applications of a Model of Nationalism. Toronto: University of Toronto Press for Ontario Economic Council.

Forster, B. 1979. "The Coming of the National Policy: Business, Government and the Tariff, 1870-1879", Journal of Canadian Studies, XIV-3, 39-49.

Fuss, M. and J.K. Gupta. 1981. "A Cost Function Approach to the Estimation of Minimum Efficient Scale, Returns to Scale, and Suboptimal Capacity: with an Application to Canadian Manufacturing", European Economic Review 15, 123-35.

Harkness, J. and J.F. Kyle. 1975. "Factors Influencing United States Comparative Advantage", Journal of International Economics, 5 May, 153-165.

Harkness, J. 1978. "Factor Abundance and Comparative Advantage", American Economic Review 68 (December), 784-800.

Harkness, J.P. 1983. "The Factor Proportions Model with Many Nations, Goods and Factors: Theory and Evidence", Review of Economics and Statistics, 298-305.

Helleiner, G.K. 1977. "The Political Economy of Canada's Tariff Structure: An Alternative Model", Canadian Journal of Economics, X-2, 318-26.

Lavergne, R.P. 1983. The Political Economy of U.S. Tariffs: An Empirical Analysis. Toronto: Academic Press.

Jarrell, G.A. 1978. "The Demand for State Regulation of the Electric Utility Industry", Journal of Law and Economics, XXI, October: 269-296.

MacKintosh, W.A. 1939. The Economic Background of Dominion-Provincial Relations, Appendix 3, Report of the Royal Commission on Dominion Provincial Relations (Ottawa).

McDiarmid, O.S. 1976. Commercial Policy in the Canadian Economy, Cambridge, Mass.: Harvard University Press.

Olson, M. 1965. The Logic of Collective Action: Public Goods and the Theory of Groups. Cambridge, Mass.: Harvard University Press.

Peltzman, S. 1976. "Towards a More General Theory of Regulation", Journal of Law and Economics, 17,

Pinus, J. 1975. "Pressure Groups and the Pattern of Tariffs", Journal of Political Economics, 83-4, 757-78.

Porter, M. 1974. "Consumer Behaviour, Retailer Power and Market Performance in Consumer Goods Industries", Review of Economics and Statistics, 56 (November): 419-36.

Postner, H.H. 1975. Factor Content of Canadian International Trade: An Input-Output Analysis. Ottawa: Economic Council of Canada.

Ray, E.J. 1981. "The Determinants of Tariff and Non-Tariff Trade Restrictions in the United States", Journal of Political Economy, 89-1, February, 105-121.

Saunders, R.S. 1980. "The Political Economy of Effective Tariff Protection in Canada's Manufacturing Sector", Canadian Journal of Economics, XIII-2, 340-48.

Stigler, G.J. 1974. "Free Riders and Collective Action: An Appendix to Theories of Regulation", Bell Journal of Economics V-2, 359-65.

Wahl, D.F. 1961. "Capital and Labour Requirements for Canada's Foreign Trade", Canadian Journal of Economics and Political Science, 27, 394-58.

Wilkinson, B.W. 1968. Canada's International Trade: An Analysis of Recent Trends and Patterns. Montreal: Private Planning Association of Canada.

Wilkinson, B.W. and K. Norrie. 1975. Effective Protection and Return to Capital. Ottawa: Economic Council of Canada.