THE POLITICAL ECONOMY OF PROTECTION IN BELGIUM

This work in progress report is part of an inquiry being undertaken by the World Bank in conjunction with scholars from twelve industrial countries into the penetration of the markets of industrial countries by exports of manufactures from developing countries. The project seeks to establish the shares of industrial country markets held by the developing countries, changes in such shares in the 1970s, and why they vary among industry groups and countries. The aim is to assist developing and industrial countries to improve their policies through a better understanding of trade patterns and protectionist pressures.

This paper reports the results of the analysis of the causes of protection in Belgium. Tariffs were found to be correlated positively with the total and non-wage value added per person, suggesting that the present structure of the European Community's Common External Tariff supports industries in which Belgium has a comparative advantage. However, industries using scarce natural resources also receive some tariff protection, and non-tariff assistance to industry appears to be skewed toward the more labor intensive products. Government assistance to industry on the whole seems to be favoring sectors that are vulnerable to competition from the developing countries.

The paper was written during the author's visit to the Institute for International Economic Studies at the University of Stockholm where a first version of the study was presented at a seminar. The author is thankful to the participants of that seminar, particularly C. Hamilton, M.E. Kreinin, A. Lindbeck and T.A. Oyejide for their helpful comments. R. Erzan of IIES and W. Nonneman of the University of Antwerp (UFSIA) extended programming assistance and made useful suggestions. The author takes the responsibility for any remaining errors.

Prepared by: P.K.M. Tharakan (Consultant)
Economic Analysis and Projections Department
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I. THE POLITICAL ECONOMY OF PROTECTION

The sharp rise in the protectionist tendencies in the industrialised market economy countries which we are now witnessing is leading to a resurgence of analytical interest in the political economy of protection. A number of authors have recently attempted to explain the structure of protection or governmental assistance to industries in various high income countries by resorting to models of political choice. Various offshoots of the fledgling theory of the political economy of trade policy have been surveyed recently and hence will not be reviewed here in detail. Caves (1976) identifies an "adding machine" model in which the trade policy is shaped by the number of voters who are expected to favour or oppose it, an "interest-group" model which stresses the way groups with common economic interests organize lobbying pressure in order to influence public policy and thirdly a "national policy" model where the emphasis is on integrating the national preference for particular industrial structures in the traditional realm of optimization analysis. The essence of the approach is the use of exogenous variables reflecting the likely impact of pressure groups on trade policy decisions to explain why some industries succeed in receiving more protection or assistance than others. The approach, if not the topic, is relatively new and is hence often characterized by intuitive rather than formal models and sometimes haphazard choice of variables. In the present exercise we shall first attempt to suggest a conceptual framework within which the pressures for protection can be empirically analyzed, note some of the pitfalls surrounding the approach and subsequently isolate and quantify the variables which can be used for such an analysis.

It may be recalled that the essence of the neo-classical argument is that the commodity composition of trade between countries will be determined mainly by the concordance of the pattern of factor-endowment of the trading countries with the factor intensities of the production processes of the commodities traded. The 'positive' element of this proposition consists of the fact that subject to a set of highly restrictive assumptions, it will be able to 'explain' or predict the actual pattern of trade and production. It is also normative in the sense that the predicted pattern of trade and production would be the optimal mix in the inter-industry allocation of resources between countries, as it will not only lead to a better distribution of income between countries, but also to a tendency towards the equalization of the returns to labour and capital within the trading countries.


Part of the post-Leontief paradox literature in this field has stressed that the non-free-good nature of knowledge pertinent both to the production and the demand side could substantially distort the optimal inter-industry mix predicted in a Heckscher-Ohlin world. In the context of the present exercise, the analysis from the production (supply) side which takes into account the 'imperfect' nature of technology markets is less relevant than the analysis from the demand side which stresses the imperfect competition resulting from product differentiation. The essence of the latter argument is that the price of a given product in a given market, at a given point of time, is determined by the slope of the tangent of the production possibilities curve to the highest possible indifference curve and hence the preference of the consumers or the price they are willing to pay for a given variety of a product has to be explained in terms of factors which determine such preferences and not simply accepted as 'given' (Tharakan et al 1978).

The process by which a consumer is persuaded to pay a higher price for a particular brand of a labour-intensive product for its presumed qualitative difference compared to the same product imported from a developing country is not very different from that by which governments are persuaded to protect structurally weak industries for 'national' reasons and consumers to pay a higher price for 'domestic' products. In this instance, the brunt of the persuasion campaigns will be directed at the policy makers so that they may erect or maintain protective barriers. But the success of such efforts hinges substantially on keeping the majority of the citizens of a country persuaded that the effects of protection are beneficial to them or for the country as a whole. For, after all, if the majority of the people were convinced about the detrimental effects of protection, they would not vote for the politicians who set up or maintain such trade barriers. As Downs (1957) points out, in a world where politicians act to maximize their chances of election, the optimal policies implied in a neo-classical model would be still preferred if costless, perfect knowledge could be shown to prevail. Since this is evidently not the case, protectionist pressures tend to have varying impacts. A normally diffused group of consumers, either unaware of the adverse effects of protection on the economy as a whole and on their income in particular, or persuaded that liberalization of trade would be detrimental to the national interests, would tend to accept protection. Even in cases where consumer organisations have created some awareness to the contrary, the high cost of organizing campaigns against the influence of the protectionist lobbies would probably discourage any such action. On the other hand, the import-competing industry, highly aware of the threat to its income level, will organize itself and lobby for protection or assistance.

While this line of reasoning provides the basis for the empirical analysis which attempts to explain the structure of protection, the nature of the model necessitates particular care in the interpretation of the results. As Pincus (1975) points out, conceptually, such a model contains two parts, namely, the determinants of the intensity of pressure group activity and the decision making body's response to that pressure.
In the empirical analysis, neither the lobbying pressure, nor the governmental response to such pressure are directly measured. It is implicitly assumed that the explanatory variables such as the degree of regional concentration of industries, magnitude of the value added, and so on accurately reflect the extent of the protectionist pressures, and that the governmental response to such pressures is reflected in the structure of protection. But given the fact that lobbies for industries with given characteristics may not always react towards trade policy in the same manner in every country or in every situation, it is not always possible to predict the sign of the explanatory variables. The question of the governmental response is even more problematic. Governments - hopefully even in parliamentary democracies - might refuse to cede to lobbying pressures and take trade policy decisions on the basis of other considerations. For example, as Helleiner (1977) points out, the pattern of the prevalent tariff structures are the results of successive tariff-cutting bargains on the basis of reciprocity between countries. The national governments do not always have the power to modify the structure of protection, even if they wish to do so. Thus, for example, Belgium, like other members of the European Community, has to accept, most of the time, the Common External Tariffs (CET) as given. One could of course argue that both in the case of international tariff-cutting negotiations and the formation of common regional tariffs, the position taken by the individual governments reflects the pressures generated by the domestic protectionist lobbies. Further, the protectionist interests in most high income countries tend to have some common ground such as opposition to imports of labour-intensive products. They have also organized themselves at regional levels. Nevertheless, given the fact that the nature of trade policy at a given point in time is the net result of the interaction between different kinds of pressures and the responses of decision making bodies at different levels, it would be incorrect to hypothesize a direct relationship between the structure of protection and variables which serve as a proxy for domestic protectionist pressures. But the results of an empirical analysis of the type outlined above could be certainly used to verify whether the structure of protection that has developed through this complex process, does correspond to certain characteristics of the industries.

It is evident that the above line of reasoning is mainly 'positive' rather than normative. Assuming that some of the variables representing protectionist pressures prove to be empirically significant in explaining the structure of protection, one should not, of course, fall into the temptation of rationalizing the process. But the knowledge gained from such an analysis can be of use in the effective encouragement of 'first best' policies. After all, as Caves (1976) states succinctly, "without a positive theory of public decision making, normative economics can only crank out blue-prints for the wise statesman".
II. THE ANALYTICAL RATIONALE

In the empirical analysis of the structure of protection, the dependent variable used by various authors has varied from nominal tariffs (Pincus 1975), nominal and effective tariffs separately (Caves 1976), nominal and effective rates as well as changes in their levels (Helleiner 1977) and effective rates of assistance to an industry (Anderson 1978a, 1978b). Caves (1976) has argued that the effective tariffs are the most appropriate dependent variable because they measure better than the nominal tariffs the net pulls on resource allocation and proportional increases in payments to the domestic factors of production caused by tariffs. But it should be noted that in the Belgian case, strong rank correlation exists between the effective and the nominal rates of protection (Ilzkovitz and Kestens 1978). Nevertheless, in our regressions, we have followed a procedure similar to that of Caves (1976) and Helleiner (1977), by introducing alternatively, the effective and the nominal rates of tariffs as the dependent variable in the regressions, with the purpose of noting any differences that a comparison of the pattern of results might reveal.1/

Most of the above-mentioned authors, with the notable exception of Anderson (1978a, 1978b), have confined their investigation to the structure of tariff protection. But tariffs are only one of the protectionist devices used by most of the countries. Non-tariff barriers (NTBs), in particular, became more prevalent during the 1970s. Information on the NTBs available from the documents of the GATT Joint Working Group on import restrictions (GATT, 1974)2/ was made use of in constructing a sample of dummy variables which were introduced as the dependent variable in separate multiple regressions to investigate the determinants on non-tariff protection. The method used and some of its limitations are explained elsewhere in this paper.

Assistance to industry can often have a protectionist character. In Belgium, the assistance to industry is given mainly within the framework of the Belgian Economic Expansion Legislation3/ which contains measures to foster economic activities in depressed regions. Although

1/ For detailed information on the sources and methods relied upon in the quantification of all the variables used in the present exercise, see the statistical appendix.

2/ The information contained in this document has to be interpreted with caution. It lists all types of measures considered by some members of GATT Working Group on Import Restrictions. It does not imply that the importing countries concerned accept that these restrictions are operative.

data on the cost incurred by the state for this purpose (through interest reductions, capital premiums, etc.) are available for the period studied here, their high level of aggregation and the consequent smallness of the sample precludes meaningful use of multiple correlation regression analysis. Hence, in the case of this particular possible component of protection, we have, as will be explained below, relied on the calculation of Spearman rank correlation coefficient between variables representing the concentration of assistance to industry and each one of the postulated determinants of protection.

The choice of appropriate explanatory variables as proxies for the protectionist pressures is crucial to the whole exercise. Caves (1976) suggests that for all three types of models (see above p 1), the value added per worker \( \text{TVA} \) would be relevant, but its interpretation would be quite different, depending on whether the structure of protection has been determined by the national policy model or by either one of the two other models. He argues that in the case of the "adding machine" model, the relevance of this variable is that, the lower the value added per worker, the more workers benefit from a tariff that protects a given amount of value added from import competition. Helleiner (1977) modifies this somewhat by reasoning that the reciprocity principle in the successive tariff cutting negotiations has led to large (at least before the introduction of the GSP) reductions of tariffs on capital intensive products, so that the structure of the present day tariffs in the industrialised countries is likely to be inversely correlated with unskilled labour intensity or non-wage value added per worker \( \text{NVA} \). Pincus (1975) on the other hand implies that for nationalistic reasons a country is likely to foster industries which use physical and human capital intensively; hence a positive correlation between the structure of protection and value added per worker should be expected. Anderson (1978a) uses a labour intensity variable and expects it to be negatively correlated with the effective rate of assistance. In the present analysis we have used either the total value added per person or the non-wage value added per person, both in free trade prices, as one of the explanatory variables of the Belgian tariff and non-tariff protection, as well as of assistance to the industry.

The second set of explanatory variables used by most of the authors are those representing the degree of concentration in the industry. Anderson (1978a, 1978b), Caves (1976) and Helleiner (1977) use the market share or the share of the output of the largest four firms as a proxy for the pressure for protection that would emanate from such groups. All three authors expect this variable to be positively correlated with the rate of protection or effective rate of assistance. As Pincus (1975) argues tariffs have the characteristics of a public good, and this can give rise to a free rider problem in the sense that a certain number of would-be beneficiaries might try, without contributing to the costs involved in the process, to enjoy the fruits of the efforts of others to persuade the public authorities to
maintain the protection. This problem is likely to be less sharp if the benefits can be appropriated by, and the costs involved assigned to, a limited number of firms. This is often the case in the industries characterised by a high degree of concentration of output. But this argument is not completely without ambiguity. While large firms have greater cohesiveness for lobbying and larger resources at their disposal, they also have often more international connections and sub-contracting arrangements which make them less protectionist. In the present analysis we have used, alternatively, two different indices of concentration, namely, a Herfindahl index ($C_H$) and the market share of the output of the largest four firms ($C_4$).

A similar line of reasoning can be evidently extended to the geographical concentration of workforce by industry. If particular industries have their workforce concentrated in certain regions, they could normally be expected to lobby energetically for greater protection through their regional representatives. But the pattern of the Belgian regional concentration of workforce by industry need not coincide with that of the more influential members of the European Communities, thus casting some doubt on its likely impact on the structure of CET. In the present analysis, we have measured the degree of the geographical concentration of workforce by industry ($RC$) by using a Gini-Hirschman index.

Another set of important explanatory variables used by some authors is some proxy for the vulnerability of an industry, under the assumption that the greater such vulnerability, the greater would be the efforts of the industry to obtain protection or assistance. Anderson (1978a) argues that assistance to such industries could be readily justified by the governments as a welfare measure, especially if rapid change is seen as undesirable. Average wage per employee ($W$), the proxy often used to represent this variable, was also used here.

Among the authors mentioned, Helleiner (1977) alone includes a natural resource intensity variable in the equation to explain the structure of protection. He relied on Vanek's (1963) measure of natural resource intensity for the U.S. for this purpose. He argues that since a number of developing countries compete with the natural resource processing industries in Canada, there is the possibility that protection would be positively correlated with the natural resource content. But he hedges on this by pointing out that most of the large firms operating in this sector might prefer relatively free trade in natural resource products. Belgium is, of course, a clear-out example of a natural resource poor country. We have used an index of natural resource product requirements ($NR$) developed in an earlier study for Belgium (Tharakan, Busschaert, Schoofs and Vaes, 1976).

To sum up: in our empirical analysis we take into account three components of the structure of protection in Belgium, namely:
tariff duties, non-tariff barriers and assistance to industry. Both
nominal and effective tariff rates are analysed. On the basis of
theoretical analysis elaborated above, the various industry charac-
teristics \( \left( \frac{\text{TVA}}{\text{P}}, \frac{\text{NVA}}{\text{P}}, \text{NR}, \frac{\text{w}}{\text{P}}, \text{C}_4, \text{C}_H, \text{RC} \right) \) were related to the
levels of nominal (NT) and effective (ET) rates of protection as well
as to the non-tariff barriers (NTBs). Because \( \left( \frac{\text{TVA}}{\text{P}} \right) \) is a substitute
for \( \left( \frac{\text{NVA}}{\text{P}} \right) \) and \( C_4 \) for \( C_H \), the following alternative formulations were
used:

\[
\begin{align*}
\text{NT} &= f \left( \frac{\text{TVA}}{\text{P}}, \text{NR}, \frac{\text{w}}{\text{P}}, \text{C}_4, \text{RC} \right) \\
\text{NT} &= f \left( \frac{\text{NVA}}{\text{P}}, \text{NR}, \frac{\text{w}}{\text{P}}, \text{C}_4, \text{RC} \right) \\
\text{NT} &= f \left( \frac{\text{TVA}}{\text{P}}, \text{NR}, \frac{\text{w}}{\text{P}}, \text{C}_H, \text{RC} \right) \\
\text{NT} &= f \left( \frac{\text{NVA}}{\text{P}}, \text{NR}, \frac{\text{w}}{\text{P}}, \text{C}_H, \text{RC} \right)
\end{align*}
\]

The same formulations were used to explain effective rates of protection
and non-tariff barriers. In the regressions for NTBs, the dependent
variable took the value of 1 in the cases of those commodities for which
Belgium is reported to use non-tariff barriers, and 0 for all the other
products. There are no theoretical reasons suggesting the appropriateness
of a particular functional form; we chose to use a simple linear
function in our regressions. The data used in the regressions pertain
to the year 1970, which was a relatively normal year in the sense that
no major economic convulsions took place during that period. It was
also the pre-Generalised Scheme of Preferences (GSP) period so that
the tariff rates for that year probably reflect the maximum tariff
protection against imports from developing countries reached in Belgium
during the 1970s. In the case of assistance to industry, estimates of
the industry concentration of the governmental investment incentives
were available for various years. The Spearman rank correlation of
these concentration indices with each one of the explanatory variables
mentioned above were calculated.1/

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1/ Unlike the structure of tariffs, the concentration of assistance
to industry has varied substantially over a period of time.
Hence, in our calculations, we have used data pertaining to the
assistance to industry covering the period 1959-1976.
III. RESULTS

In Table III.1 we have reported the regression results which were obtained by using nominal tariffs as the dependent variable. Each of the four specifications described in the preceding section were regressed at two different levels of aggregation of the sample data to verify whether the degree of aggregation has influenced the pattern of results obtained. In the case of the first four regressions reported in the table, in which the data used consisted of 37 observations, the level of aggregation corresponded to that which is used in the Belgian national industrial statistics. For the last four regressions shown in the table, the same sample of industries were aggregated into 18 observations, corresponding to the Belgian input-output classification of 1970.

As can be seen from the table, at both levels of aggregation, the total value added per person is positively and significantly correlated with the structure of nominal tariff protection in Belgium. The pattern remains the same in alternative formulations when total wage value added per person is replaced by non-wage value added per person. Thus in Belgium, in contrast to Canada or Australia, the structure of nominal tariff protection is favourable to industries with high value added per person.

The national resource product requirement variable has consistently yielded a positive sign but is not significant in the first four regressions at any of the acceptable levels. When the data used are more aggregative (in the last four equations) the level of significance of this coefficient shows some improvement and is acceptable, in alternate specifications, at 10 or 15 per cent confidence levels. In general, the performance of the NR variable suggests that the CET provides some protection to natural resource processing industries in natural resource scarce Belgium.

The average wage per employee (\(\frac{W}{P}\)) consistently yielded a negative sign. In the first four regressions this coefficient is significant at 5 per cent confidence level. In the next two regressions, for which the data were used in a more aggregative form, this variable remained equally significant. Note, however, that in the last two specifications (regressions 1.7 and 1.8) its level of significance shows a slight decline. In Belgium as in other industrial countries, industries with low average wage levels, which probably contain a large number of low-skilled labourers, tend to receive high nominal tariff protection.

Neither of the indices of industrial concentration yielded significant results. This could at least partly result from tension between the diverging attitudes of large firms towards the question of protection; they find it easier to appropriate the benefits of
### TABLE III.1: RESULTS OF THE REGRESSIONS IN WHICH NOMINAL TARIFFS (NT) WERE USED AS THE DEPENDENT VARIABLE

<table>
<thead>
<tr>
<th>REGRESSION NUMBER</th>
<th>CONSTANT (NT)</th>
<th>TVAR (P)</th>
<th>NWA (P)</th>
<th>NR</th>
<th>W (P)</th>
<th>C4</th>
<th>C_H</th>
<th>RC</th>
<th>R²</th>
<th>F</th>
<th>NUMBER OF OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>I.1.</td>
<td>725.066*</td>
<td>7.457*</td>
<td>(2.932)</td>
<td>1.549</td>
<td>-8.188*</td>
<td>0.483</td>
<td>-3.070*</td>
<td>0.34</td>
<td>3.20</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.554)</td>
<td></td>
<td>(0.993)</td>
<td>(-2.620)</td>
<td>(0.868)</td>
<td>(-2.035)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.2.</td>
<td>723.328*</td>
<td>4.537*</td>
<td>(2.928)</td>
<td>1.556</td>
<td>-5.256*</td>
<td>0.483</td>
<td>-3.063*</td>
<td>0.34</td>
<td>3.21</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.559)</td>
<td></td>
<td>(0.997)</td>
<td>(-1.991)</td>
<td>(0.868)</td>
<td>(-2.032)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.3.</td>
<td>694.031*</td>
<td>7.651*</td>
<td>(2.778)</td>
<td>1.489</td>
<td>-7.543*</td>
<td>0.00725</td>
<td>-2.685*</td>
<td>0.33</td>
<td>2.98</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.608)</td>
<td></td>
<td>(0.940)</td>
<td>(-2.428)</td>
<td>(0.042)</td>
<td>(-1.817)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.4.</td>
<td>692.277*</td>
<td>4.654*</td>
<td>(2.774)</td>
<td>1.495</td>
<td>-4.535*</td>
<td>0.00728</td>
<td>-2.680*</td>
<td>0.33</td>
<td>2.99</td>
<td>37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(3.614)</td>
<td></td>
<td>(0.945)</td>
<td>(-1.749)</td>
<td>(0.0426)</td>
<td>(-1.814)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.5.</td>
<td>1194.708*</td>
<td>5.976*</td>
<td>(1.681)</td>
<td>1.583*</td>
<td>-9.032*</td>
<td>0.293</td>
<td>-7.025*</td>
<td>0.39</td>
<td>1.46</td>
<td>18</td>
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<tr>
<td></td>
<td>(2.212)</td>
<td></td>
<td>(1.383)</td>
<td>(-1.803)</td>
<td>(0.280)</td>
<td>(-1.139)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.6.</td>
<td>1030.73*</td>
<td>3.538*</td>
<td>(1.624)</td>
<td>1.521*</td>
<td>-6.934*</td>
<td>0.443</td>
<td>-4.678</td>
<td>0.49</td>
<td>2.28</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.914)</td>
<td></td>
<td>(1.466)</td>
<td>(-1.808)</td>
<td>(0.469)</td>
<td>(-0.838)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.7.</td>
<td>1252.93*</td>
<td>6.223*</td>
<td>(1.779)</td>
<td>1.296*</td>
<td>-8.403*</td>
<td>-0.133</td>
<td>-7.429*</td>
<td>0.38</td>
<td>1.49</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.311)</td>
<td></td>
<td>(1.141)</td>
<td>(-1.713)</td>
<td>(-0.417)</td>
<td>(-1.208)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>I.8.</td>
<td>1062.32*</td>
<td>3.583*</td>
<td>(1.669)</td>
<td>1.399*</td>
<td>-6.460*</td>
<td>0.0386</td>
<td>-4.740</td>
<td>0.48</td>
<td>2.20</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.292)</td>
<td></td>
<td>(1.330)</td>
<td>(-1.688)</td>
<td>(0.133)</td>
<td>(-0.850)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The figures in brackets are t values. 
(x) Indicates that the coefficient is significant at 5% confidence level; (*) indicates that the coefficient is significant at 10% confidence level, and, (x) indicates that the coefficient is significant at the 15% confidence level.
protection, but the nature of their operations tends to make them more free-trade oriented. In contrast to the concentration of output variable, the variable representing the geographic concentration of workforce by industry (RC) has a negative coefficient, which is highly significant in the first four regressions although it is less so in the last four. A possible explanation of this puzzling result is that the pattern of the geographic concentration of workforce by industry in the major member countries of the Community, which probably has influenced the structure of the CET, is the opposite of that of Belgium. This hypothesis has to be verified.

In Table III.2, we have reported the regression results obtained by using the effective rates of tariffs (ET) as the dependent variable. In general, the pattern of the results obtained is very similar to that of the preceding exercise, in which the nominal rates were the dependent variable. Irrespective of the level of aggregation, the coefficients of total value added per person (TVA) and non-wage value added per person (NVVA) are positive and highly significant. The natural resource product requirement variable (NR) has once again a positive coefficient in all equations and is more significant here than in the previous regressions explaining nominal protection. This lends further support to the belief that effective rates of protection tend to be higher for industries processing primary products.

The coefficient of the variable $W_P$ has again consistently yielded a negative sign, but its level of significance is noticeably lower, particularly when the set of data used are more aggregative. Both the Herfindahl index and the market share of the largest four firms have turned out, once again to be unimportant in explaining the structure of protection. Similar results were obtained for the variable representing the regional concentration of the workforce (RC) which is negatively correlated with the structure of effective protection, probably for the reasons which were suggested for the nominal tariff rates. Note that the summary statistics reported in Table I.1, which are respectable for cross-section regressions, show marginal improvements for most of the equations in Table II.2. Analysis of the simple correlation coefficients and the scatter of residuals indicated no serious problems of multicollinearity.

The positive and significant correlation between the value added variables and the nominal and effective rates of protection warrants further consideration. It is of course possible that with a different sample and with different estimation procedures, the significance of this positive correlation might deteriorate or even disappear. But given that the present sample covers a substantial part of the products entering into Belgian foreign trade, it is unlikely - and here one

---

1/ A list of the products as well as their share in the total value added can be obtained from the author.
**TABLE III.2: RESULTS OF THE REGRESSIONS IN WHICH EFFECTIVE TARIFFS (ET) WERE USED AS THE DEPENDENT VARIABLE**

<table>
<thead>
<tr>
<th>REGRESSION NUMBER</th>
<th>CONSTANT</th>
<th>TVA (P) NOVA</th>
<th>NR</th>
<th>W (P)</th>
<th>C4</th>
<th>CH</th>
<th>RC</th>
<th>R²</th>
<th>F</th>
<th>NUMBER OF OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>II.1.</td>
<td>1087.29*</td>
<td>13.015*</td>
<td>3.602*</td>
<td>-11.186*</td>
<td>0.246</td>
<td>0.36</td>
<td>-7.493</td>
<td>0.36</td>
<td>3.49</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>(2.368)</td>
<td>(3.341)</td>
<td>(1.244)</td>
<td>(-1.928)</td>
<td>(0.238)</td>
<td>(-2.676)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.2.</td>
<td>1084.39*</td>
<td>7.921*</td>
<td>3.613*</td>
<td>-6.070*</td>
<td>0.245</td>
<td>0.36</td>
<td>-7.482</td>
<td>0.36</td>
<td>3.50</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>(2.364)</td>
<td>(3.347)</td>
<td>(1.248)</td>
<td>(-1.239)</td>
<td>(0.237)</td>
<td>(-2.674)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.3.</td>
<td>1051.05*</td>
<td>13.234</td>
<td>3.480*</td>
<td>-10.562*</td>
<td>-0.097</td>
<td>0.36</td>
<td>-7.145</td>
<td>0.36</td>
<td>3.50</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>(2.295)</td>
<td>(3.404)</td>
<td>(1.198)</td>
<td>(-1.854)</td>
<td>(-0.309)</td>
<td>(-2.636)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.4.</td>
<td>1048.15*</td>
<td>8.053*</td>
<td>3.491*</td>
<td>-5.361*</td>
<td>-0.0968</td>
<td>0.36</td>
<td>-7.134</td>
<td>0.36</td>
<td>3.51</td>
<td>37</td>
</tr>
<tr>
<td></td>
<td>(2.291)</td>
<td>(3.411)</td>
<td>(1.202)</td>
<td>(-1.128)</td>
<td>(-0.39)</td>
<td>(-2.634)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.5.</td>
<td>1048.50*</td>
<td>9.372</td>
<td>4.221*</td>
<td>-9.410</td>
<td>-0.465</td>
<td>0.40</td>
<td>-16.033</td>
<td>0.40</td>
<td>1.63</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>(1.344)</td>
<td>(1.795)</td>
<td>(1.907)</td>
<td>(-0.971)</td>
<td>(-0.229)</td>
<td>(-1.344)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.6.</td>
<td>1587.56*</td>
<td>5.458*</td>
<td>4.121*</td>
<td>-5.984</td>
<td>-0.227</td>
<td>0.47</td>
<td>-12.378</td>
<td>0.47</td>
<td>2.09</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>(1.240)</td>
<td>(2.229)</td>
<td>(1.969)</td>
<td>(-0.773)</td>
<td>(-0.119)</td>
<td>(-1.240)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.7.</td>
<td>1883.06*</td>
<td>9.620*</td>
<td>3.945*</td>
<td>-9.108</td>
<td>-0.361</td>
<td>0.42</td>
<td>-16.490*</td>
<td>0.42</td>
<td>1.73</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>(1.394)</td>
<td>(1.863)</td>
<td>(1.811)</td>
<td>(-0.968)</td>
<td>(-0.592)</td>
<td>(-1.398)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>II.8.</td>
<td>1583.63</td>
<td>5.406*</td>
<td>4.080*</td>
<td>-5.881</td>
<td>-0.0991</td>
<td>0.47</td>
<td>-12.461*</td>
<td>0.47</td>
<td>2.10</td>
<td>18</td>
</tr>
<tr>
<td></td>
<td>(1.244)</td>
<td>(2.204)</td>
<td>(1.952)</td>
<td>(-0.769)</td>
<td>(-0.171)</td>
<td>(-1.105)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The figures in brackets are t values.

(•) Indicates that the coefficient is significant at 5% confidence level; (°) indicates that the coefficient is significant at 10% confidence level, and, (x) indicates that the coefficient is significant at 15% confidence level.
chooses one's words carefully - that the use of alternative samples or procedures would yield a significant negative correlation between the structure of tariff protection and value added per person in Belgium. If the value added per person is a good proxy for capital intensity,1 if the results obtained are indeed unconventional insofar as they suggest that the structure of the nominal and effective protection tends to favour capital intensive industries in a highly capital-endowed country. As the cross-section data pertain to the last year of the pre-GSP period, it can be hardly argued that the structure of tariff protection could have taken an opposite orientation in the ensuing years. Part of the answer to the riddle could be that Belgium, as a small high income country trading mostly with other high income countries, suffers diseconomies of scale which cannot be compensated by capital intensity alone.2 We have empirically verified elsewhere3 that, while capital intensity has some significance in explaining the 'revealed comparative advantage' of Belgium vis-à-vis the developing world, it has none in the explanation of Belgium's comparative advantage with the rest of the world. Given this vulnerability, it is possible that industries with high capital intensity, facing competition from their counterparts in other high income countries, exert whatever pressure they can muster at the European level to preserve a structure of tariff protection that is in their favour.

This by itself does not of course, mean that Belgian trade policy is not protectionist particularly with respect to the products for which the developing countries have comparative advantage. It is quite possible that in a given country, the high value added industries might succeed in obtaining tariff protection while labour intensive industry groups are awarded non-tariff barriers and assistance. We shall now proceed to test the latter part of this proposition.

Table III.3 shows the results of the regressions in which the non-tariff barriers (NTBs) were used as the dependent variable. The basic statistical problems associated with the models in which the dependent variable is dichotomous and equal to one or zero (depending in the present case, on whether the imports are subjected to NTBs or not) have been dealt with elsewhere4 in detail and will

1/ There is some evidence that in the Belgian case this is a rather good proxy, see Tharakan and Vandoorne (1979).

2/ This point has been dealt with in more detail by Dreze (1959) and (1960), Tharakan et al (1978).

3/ These results are available from the author on request.

TABLE III.3: RESULTS OF THE REGRESSIONS IN WHICH NON-TARIFF BARRIERS (NTBs) WERE USED AS THE DEPENDENT VARIABLE

<table>
<thead>
<tr>
<th>REGRES SIGN. NUMBER</th>
<th>CONSTANT</th>
<th>$\frac{\text{TVA}}{P}$</th>
<th>$\frac{\text{NWA}}{P}$</th>
<th>NR</th>
<th>$\frac{N}{P}$</th>
<th>$C_4$</th>
<th>$C_H$</th>
<th>RC</th>
<th>$R^2$</th>
<th>F</th>
<th>NUMBER OF OBSERVATIONS</th>
</tr>
</thead>
<tbody>
<tr>
<td>III.1</td>
<td>0.517$^x$</td>
<td>-0.00125</td>
<td>-0.00235</td>
<td>-0.00218</td>
<td>-0.00159$^o$</td>
<td>0.00349$^o$</td>
<td>0.18</td>
<td>1.38</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.178)</td>
<td>(-0.336)</td>
<td>(-0.849)</td>
<td>(-0.393)</td>
<td>(-1.598)</td>
<td>(1.303)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.2</td>
<td>0.517$^x$</td>
<td>-0.00077</td>
<td>-0.00235</td>
<td>-0.00266</td>
<td>-0.00158$^o$</td>
<td>0.00349$^o$</td>
<td>0.18</td>
<td>1.38</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.178)</td>
<td>(-0.341)</td>
<td>(-0.850)</td>
<td>(-0.568)</td>
<td>(-1.600)</td>
<td>(1.304)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.3</td>
<td>0.539$^x$</td>
<td>-0.00142</td>
<td>-0.00251</td>
<td>-0.00313</td>
<td>-0.000415$^o$</td>
<td>0.00283$^x$</td>
<td>0.17</td>
<td>1.23</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.212)</td>
<td>(-0.377)</td>
<td>(-0.894)</td>
<td>(-0.569)</td>
<td>(-1.372)</td>
<td>(1.080)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.4</td>
<td>0.538$^x$</td>
<td>-0.000873</td>
<td>-0.00251</td>
<td>-0.00368</td>
<td>-0.000415$^o$</td>
<td>0.00283$^x$</td>
<td>0.17</td>
<td>1.23</td>
<td>37</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.218)</td>
<td>(-0.383)</td>
<td>(-0.895)</td>
<td>(-0.801)</td>
<td>(-1.372)</td>
<td>(1.081)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.5</td>
<td>0.183</td>
<td>-0.00442</td>
<td>-0.00208</td>
<td>-0.00363</td>
<td>-0.000638</td>
<td>0.0132$^x$</td>
<td>0.38</td>
<td>1.47</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.152)</td>
<td>(-0.968)</td>
<td>(-1.076)</td>
<td>(-0.429)</td>
<td>(-0.360)</td>
<td>(1.271)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.6</td>
<td>0.334</td>
<td>-0.00189</td>
<td>-0.00201</td>
<td>-0.00628</td>
<td>-0.000779</td>
<td>0.0117$^x$</td>
<td>0.36</td>
<td>1.39</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.280)</td>
<td>(-0.830)</td>
<td>(-1.033)</td>
<td>(-0.871)</td>
<td>(-0.439)</td>
<td>(1.117)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.7</td>
<td>0.197</td>
<td>-0.00425</td>
<td>-0.00227$^x$</td>
<td>-0.00356</td>
<td>0.000345</td>
<td>0.0129$^x$</td>
<td>0.39</td>
<td>1.56</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.167)</td>
<td>(-0.941)</td>
<td>(-1.190)</td>
<td>(-0.433)</td>
<td>(-0.647)</td>
<td>(1.252)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>III.8</td>
<td>0.338</td>
<td>-0.00212</td>
<td>-0.00231$^x$</td>
<td>-0.00543</td>
<td>-0.000455</td>
<td>0.0112$^x$</td>
<td>0.39</td>
<td>1.56</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.292)</td>
<td>(-0.946)</td>
<td>(-1.210)</td>
<td>(-0.778)</td>
<td>(-0.858)</td>
<td>(1.091)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note: The figures in brackets are t values.

($^x$) Indicates that the coefficient is significant at 5% confidence level; ($^o$) indicates that the coefficient is significant at 10% confidence level, and, ($^x$) indicates that the coefficient is significant at 15% confidence level.
not be analyzed here. The essence of the problem is that in dealing with dichotomous dependent variables, the assumption that the disturbance variances are constant from observation to the OLS method does not produce the best linear unbiased estimates. Also the calculated probability of obtaining a zero or a one can fall outside the (0, 1) interval. This must be borne in mind in analyzing the results presented in Table III.3.

In addition to the problem of heteroscedasticity mentioned above, note that the results of the regressions in which the NTBs were used as the dependent variable have yielded results of poor quality. Although the total value added per person and the non-wage added per person have consistently yielded negative signs, the level of significance of the estimated coefficients is very low. The other independent variables have yielded similarly poor results with the exception of the regional concentration of the work force by industry (RC) which is positively correlated with the occurrence of non-tariff barriers and is significant, in alternate specifications, at 10 to 15 per cent confidence level. This particular result which is clearly different from that obtained in analyzing the structure of tariff protection is more in accordance with the conventional theoretical formulation. It is mainly explained by the fact that the NTBs are largely concentrated in the textile sector which has a rather high regional concentration in Belgium.

The pattern of the government assistance given to Belgian industry is of special relevance in the present analysis as its structure depends, unlike tariff protection and NTBs, almost entirely on national centers of decision. As was mentioned in section II, the assistance to industry in Belgium is given mainly within the framework of the Belgian Economic Expansion Legislation and consists mainly of interest reductions, capital premiums, etc. The inter-industry assistance thus provided can be ranked according to the investment it helped to generate. Given the fact that the amount of assistance thus extended to the industry has shown considerable fluctuations annually, it would be appropriate to analyze the inter-industry concentration of assistance over a period of time.1/ In a recent study, Taeymans and Vanwynsbergh (1979) have calculated the concentration indices of government assistance to industry for 1959-76 as a function of the investment generated, for a small and highly aggregative sample.2/ Table III.4 shows the Spearman rank correlation coefficient between the weighted index of the concentration of assistance to the industry, and the different independent variables used in the preceding multiple correlation regressions.

---

1/ An analysis of the assistance to industry for the year 1970 would be also somewhat superfluous as some components of such assistance have already entered into the calculation of the effective rates of protection for that year.

2/ See the statistical appendix for the method used in the calculation of this index.
TABLE III.4: SPEARMAN RANK CORRELATIONS BETWEEN INDUSTRY CHARACTERISTICS AND CONCENTRATION OF ASSISTANCE TO INDUSTRY

<table>
<thead>
<tr>
<th>INDUSTRY CHARACTERISTICS</th>
<th>SPEARMAN RANK CORRELATION COEFFICIENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\frac{TVA}{P}$</td>
<td>-.548</td>
</tr>
<tr>
<td>$\frac{NWVA}{P}$</td>
<td>-.571</td>
</tr>
<tr>
<td>NR</td>
<td>-.619</td>
</tr>
<tr>
<td>$\frac{W}{P}$</td>
<td>-.548</td>
</tr>
<tr>
<td>$C_4$</td>
<td>.119</td>
</tr>
<tr>
<td>$C_H$</td>
<td>.071</td>
</tr>
<tr>
<td>$RC$</td>
<td>-.476</td>
</tr>
</tbody>
</table>
The first point to be noted in analysing the table is that none of the Spearman rank correlation coefficients show acceptable level of significance, although the magnitude of the first four variables approach the 0.05 significance level. Both the total value added per person ($\frac{IVA}{P}$) and the non-wage value added per person ($\frac{NWVA}{P}$) show an inverse rank correlation, suggesting that investment subsidies have been going mainly to industries with low value added per person. A similar, negative rank correlation is found in the case of wages per person ($\frac{W}{P}$), the natural resource product requirements (NR) and the regional concentration of work force by industry (RC). Assistance to industries having low average wages is in accordance with the pressure group theory of protection. But the negative sign of the RC variable and its rather low level of significance suggest that as far as the concentration of assistance for investment is concerned, the regional concentration of workforce by industry has not had much of an impact.
IV. CONCLUSIONS

We have tried to explain the pattern of nominal and effective tariffs, non-tariff barriers, and the inter-industry concentration of governmental assistance. The national government's control over the first two components of protection are much less than that over NTBs and assistance to industry. Possibly partly for that reason, as well as because of certain special characteristics of the Belgian economy, the pattern of results we have obtained differs, in some respects, from those found in other industrial countries. Thus for the sample of products taken into account, nominal and effective tariffs are positively correlated with total value added per person and non-wage value added per person. It cannot of course be argued that the interests of the Belgian lobbies or the pressures emanating from them had any decisive impact on the structure of the CET. But given that Belgian industries face intense competition from non-community high income countries with endowment patterns which are similar to that of Belgium, it is quite likely that the most influential among the Belgian industrial lobbies would be happy with the maintenance of whatever protection which the present pattern of the CET can provide for the high value added industries. On the other hand, industries using scarce natural resources, appear to receive some tariff protection, particularly when the effective rates are taken into account.

There is, of course, the possibility that while the structure of tariffs provides some protection against competition from non-community high income countries, the pattern of non-tariff barriers and assistance to industry is skewed in favour of the more labour intensive items. Because of the low statistical significance of the results obtained in the empirical analysis of the structure of the NTBs and of the concentration of assistance to industry, it is not possible to fully confirm - or reject - this hypothesis. In general, the indications are that government assistance to industry on the whole favours sectors with characteristics making them vulnerable to competition from the developing countries. Thus, even a relatively open economy such as Belgium's appears to use various national and regional protectionist devices to shield industries facing competition origination from countries with differing endowment patterns.
STATISTICAL APPENDIX

Data on effective and nominal protection rates (ET and NT) are from the recent work of Ilzkovitz and Kestens (1978) and European Community sources. The products for which non-tariff barriers (NTBs) are operative were identified with the help of the information contained in GATT (1974). Data on the inter-industry concentration of assistance for investments are from Taeymans and Vanwynsberghe (1979). The latter authors estimated the concentration index by dividing the sector's share of government assistance by the share of the investment generated.

Data on total value added per person (\(\text{TVA}_p\)) and non-wage value added per person (\(\text{NOVA}_p\)) are from Tharakan, Busschaert, Schoofs and Vaes (1976). In this study, the value added per person was calculated for each of the industries by taking the total sales and the transfers to other establishments, deducting from them the cost of the materials used, and adjusting these results for changes in inventories of finished products and of goods in processing between the first and the last day of the year. The figures were deflated to take account of the impact of tariffs on value added.

The natural resource product requirements are also from the Tharakan, Busschaert, Schoofs and Vaes (1976) study in which the method of an earlier study by Vanek (1959) was followed. The procedure used is as follows: the structure of the input-output table is defined as

\[(I-A)x = f\]

where 
- \(I-A\) = the identity matrix minus the matrix of direct coefficients;
- \(x\) = the vector of total output, and,
- \(f\) = the vector of final demand.

The same structure can be also represented as:

\[(I-A)^{-1}f = x\]

where: 
- \((I-A)^{-1}\) = the inverse of \((I-A)\) or the matrix of the direct and indirect coefficients.

Matrix \((I-A)^{-1}\) consists of elements \(b_{ik}\) which indicate the input of good \(i\) which is required to produce a unit of final demand of good \(k\). We are interested here only in the additional amount of natural resource products \(i^*\) that are required to produce one unit of \(k\). The natural resource products were specified to contain the following sectors in the Belgian input-output table:
(01) agricultural wood and forest products;
(02) fishing products;
(14) coal;
(16) crude petroleum and natural gas;
(33) iron ore;
(34) ores of non-ferrous metals;
(35) non-metallic minerals.

The total natural resource product requirements (NR) for each of the products k:

\[ \sum_{i} b_{i k} x_{i} \]

The data used in the calculation of average wages per employee \( \frac{W}{P} \) are from N.I.S. (1973). The Herfindahl index of concentration \( C_H \) and the share of the four largest firms \( C_4 \) are from Van Lommel, E., Liebaers, D., De Brabander, B. and Demeulemaere, J. (1976). In that study \( CH \) was calculated using the following version of the Herfindahl formula:

\[ C_H = \frac{\sum_{i=1}^{n} X_i^2}{n(\sum_{i=1}^{n} X_i)^2} \]

where: \( X_i \) = the output of enterprise \( i \).

Data available in N.I.S. (1975) on the industrial workforce per district in Belgium were used to calculate the indices of regional concentration of workforce per industry (RC). The following version of the Gini-Hirschman formula was used for that purpose:

\[ RC = 100 \sqrt{\sum_{i=1}^{n} \left( \frac{w_i d_{ij}}{\sum_{i=1}^{n} w_{ij}} \right)^2} \]
where: \( w_{ij} \) = total workforce in industry \( i \) in year \( j \).

\( w_{id}^j \) = the workforce in industry \( i \) in district \( d \) in year \( j \).

If the entire workforce in a given industry were concentrated in one district, the coefficient obtained by the above formula would be, of course, 100.
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