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*Evaluating the Impact on the Barbados Agricultural Sector
of Altering the Protective Policy Regime:
Special Reference to the Common External Tariff*

by

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IICA OFFICE IN BARBADOS

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"The views expressed herein are those of the authors and do not necessarily reflect those of the Inter-American Institute for Co-operation on Agriculture (IICA)"

Foreword

The trend toward global trade liberalization and the formation of regional integration groupings such as the European Single Market and NAFTA, have had serious implications for Caribbean economies, Barbados included. Such developments have caused serious concerns about the appropriateness of domestic agricultural and trade policies instituted in many Caribbean countries and have raised questions about the congruence of these policies with stated national development objectives.

Within CARICOM, developments over the last five years have emphasized the need to go beyond the traditional sector-specific approach in analyzing policies in relation to the agricultural sector. Consequently, in analyzing the impact of domestic agricultural and trade policies in general and policy measures such as the Common External Tariff in particular, on the agricultural sector in Barbados, an economy-wide approach is required.

The Common External Tariff (CET) which though agreed upon by CARICOM member states in June 1990, was only implemented in Barbados with effect from April 1st, 1993. While the CET was perceived as an instrument by which the regional integration process could be strengthened, it was also intended to increase employment and create a facility through which resources could be more efficiently deployed within CARICOM. Due primarily to the virtual non-existence of the required data, at that time, a comprehensive analysis of the effect of this policy measure was not undertaken.

Mindful of this the Inter-American Institute for Cooperation on Agriculture (IICA) undertook to conduct the present study of the impact of government policies on the agricultural sector in Barbados. While the study is primarily focussed on the agricultural sector, an examination of the impact of policies on other sectors of the economy as well as the impact of other sectoral policies on agriculture has also been undertaken.

Even as this study is submitted, further research which will focus on the impact of the impending tariff reduction under the Revised CET on the Agricultural sectors of Barbados and the OECS is being conceived. In this regard, IICA anticipates further collaboration with its regional and international institutions with which it has been collaborating.

Reginald E. Pierre
Director of Operations, Caribbean Area
and Representative in Barbados

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All errors and omissions are entirely the responsibility of the authors.

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Executive Summary

In this paper, a LASPEYRES quantity index of agricultural production was constructed to assess trends in agricultural production between 1980 and 1991. Government policies in Barbados which impact upon the agriculture sector were identified and discussed. The contribution of CARICOM policies such as the Common External Tariff (CET) regime are explained. The structure of domestic tariff and non-tariff barriers as well as other forms of protection were identified. In addition, the role of various other support schemes which impact upon the agriculture sector were discussed.

The effects on GOB revenue collection at the border, of changing the CET rates were estimated using the World Bank's Software for Industrial Trade and Incentive Analysis (SINTIAT). The programme also provided estimates of weighted nominal protection rates at the sectoral level, along with sectoral price effects. The analysis was based on import data for 1990.

At the commodity level, nominal and effective rates of protection measures were outlined. Estimates were derived from published trade data as well as from data collected from local private and public sector organizations. The effective protection rates proved difficult to estimate owing to data constraints, however, two case studies were conducted on milk production and feed costs, based on their relative importance to the small but expanding livestock sub-sector in Barbados.

The results of this study suggest that lowering the CET rates will cause a reduction in the level of protection particularly to the manufacturing sector. As regards the agricultural sector, the results indicate that increasing the CET rate from 0% to 5% will have severe implications for the cost of machinery and other capital equipment in the sector. As a result however, of CARICOM's recent decision to lower the CET rates over the next five years, concerns over an increase in the CET zero rate have been partially quieted.

The simulation exercises in this study suggest a decline in the order of 25% in GOB revenue collection from import duties when the maximum CET rate is lowered from 40% to 20%. This will also result in a significant decline in the level of protection for the overall economy. Employment will decline in vulnerable industries, such as the garment and apparel industry. The study also suggests that there may be marginal decrease in the cost of living associated with the lower CET rate structure.

The recent proposal to remove non-tariff barriers in Barbados, coupled with the lowering of the CET rates, will require adjustments to the local manufacturing and agricultural sectors, if these are to remain viable by the end of the phasing-in period. The level of tariffs required to protect Barbadian agriculture is particularly high according to the estimated nominal and effective protection rates. Indeed, based on the Government's commitment to preserving the agricultural sector, primary agricultural production will require continued protection via non-tariff measures.

Premised on the objectives laid out in the 1993-2000 Barbados Development Plan, this study recommends that sensitive primary agricultural products should be maintained under a licensing arrangement and that agricultural machinery should continue to be zero-rated under the revised CET regime. It also appears that a reduction in feed and utility costs will be more beneficial to the livestock industry than any other policy initiative now under consideration. Given the potential for further growth in the area of processing, it is recommended that the pork and poultry industries be given special consideration. In the agricultural sector the dairy industry is perhaps the most vulnerable and therefore the GOB may have to resort to considerations other than those addressed in this study if the industry is to continue being viable.

Introduction

The recent decision by CARICOM to lower the CET to a maximum rate of 20% by 1998 gave rise to concerns about the implications for government revenue, sensitive economic sectors, intra-regional trade and the consequent on employment. While the CET was introduced with these concerns in mind, the thrust towards hemispheric trade liberalisation appears to have led to some modification or alteration in the agenda.

In addition to the CET, it may be argued that the indirect tax regime in Barbados - stamp duty and consumption tax - also offers protection to the local agricultural sector. The impact of such protection measures is however expected to be reduced in the near future, with the introduction of a Value Added Tax (VAT) system.

The use of non-tariff barriers also provides considerable protection to the agricultural sector. In fact, unlike the tariff measures which apply to goods of non-CARICOM origin, NTBs are applicable to goods originating from within the CARICOM as well. The recent removal of most import licenses and their replacement by a surtax did not affect a wide range of agricultural products.

With the exception of the livestock industry, over the last two decades the growth of non-sugar agriculture has not been encouraging. Some scope exists for increasing the domestic production of vegetables and meat, since the import value of vegetables (mainly prepared and preserved) and meats reached B\$15.6 million and B\$26.5 million in 1990, respectively. As far back as 1969, however, Ingersent et al. suggested that "import substitution which saves scarce foreign exchange, is one of the strongest arguments for expanding the local production of vegetables, provided that vegetables of an acceptable quality can be produced in Barbados at an acceptable price".¹ The study currently being undertaken identified the growing tourist industry and the seasonality in North American markets as factors which present opportunities for expanding such vegetable production. It was suggested however, that marketing uncertainties and supply problems were two monumental constraints which would need to be addressed if Barbadian producers are to take advantage of these opportunities.

The performances of both export and domestic agriculture suggest that little progress has been made in agriculture since the late 1960s. For the period 1980-1991, total agricultural output

¹ Vegetable Production in Barbados, An Economic Survey Bulletin No. 3, Ministry of Agriculture, Science & Technology

(including sugar) in Barbados fell by an average annual rate of 2.3% (see Table 1 and Figure 1.). This can be attributed to the large declines of 6.7% and 8.4% in the domestic and export agriculture, respectively, (illustrated graphically in Figures 2 and 3). For export agriculture (See Figure 4), the performance of sweet potatoes was perhaps the most disappointing. Cotton output declined between 1980 and 1984, but showed growth potential in the post-1984 period. Onions were the only export crop which showed positive growth between 1986 and 1991. The decline in sugar cane output accelerated in the 1986-91 period, declining at an average annual rate of 10%.

Table 1: Agricultural Growth Rates, Barbados, 1980-91

	1980-86	1986-91	1980-91
EXPORT AGRICULTURE	-4.6	-9.1	-6.7
Sugar Cane	-3.2	-10.0	-6.3
Onions	-0.2	9.2	4.0
Cotton	34.3	-24.7	3.3
Sweet Potatoes	-12.0	-1.6	-7.4
Yams	-20.4	0.0	-11.7
DOMESTIC AGRICULTURE	-11.8	-4.1	-8.4
Beets	-5.3	-2.8	-4.1
Carrots	-13.8	6.4	-5.1
String Beans	-3.9	0.6	-1.9
Tomatoes	-19.8	-1.5	-12.0
Cucumbers	-15.4	1.4	-8.2
Pumpkins	-6.8	-9.7	-8.2
Cabbages	-9.5	-25.8	-17.3
LIVESTOCK PRODUCTS	5.1	6.5	5.8
Pigs	4.5	6.0	5.1
Cows and Calves	-4.8	24.6	7.6
Goats and Sheep	-15.6	12.4	-3.8
Poultry	6.0	6.3	6.1
Eggs	4.5	0.6	2.7
Milk	5.9	6.2	6.0
TOTAL INDEX	-2.5	-2.0	-2.3

Source: Central Bank of Barbados

* These growth rates are calculated using a simple compound formula. The actual figures are shown in Appendix II.

FIGURE 1: TOTAL AGRICULTURE PRODUCTION, BARBADOS 1980-1991

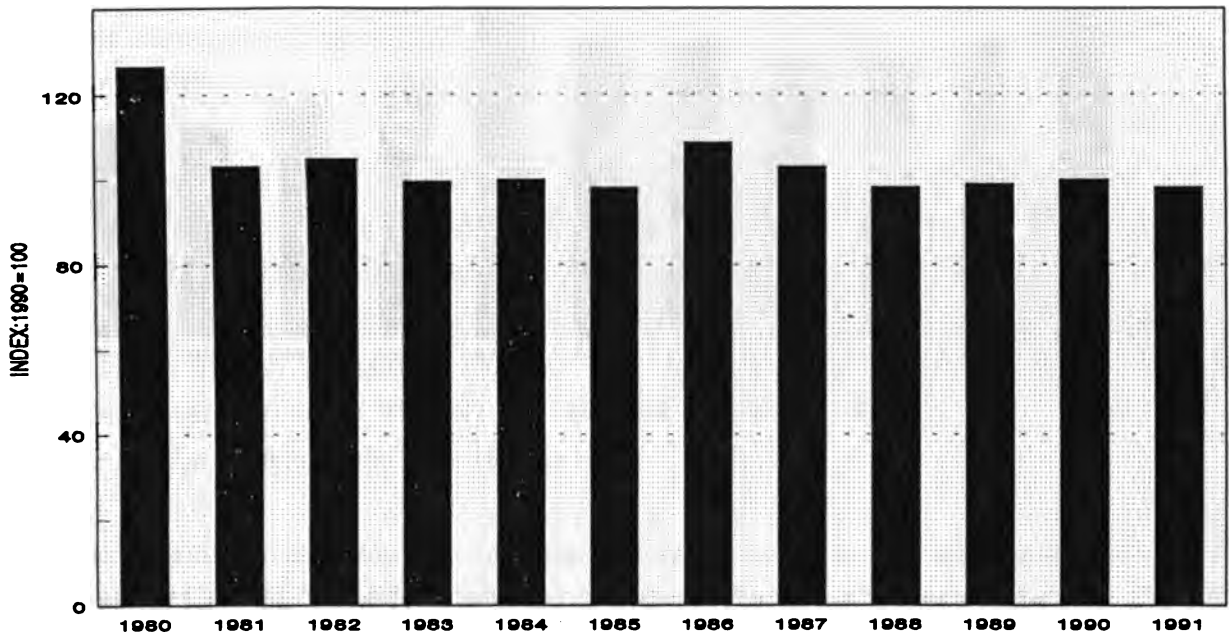


FIGURE 2: DOMESTIC AGRICULTURE, BARBADOS 1980-1991

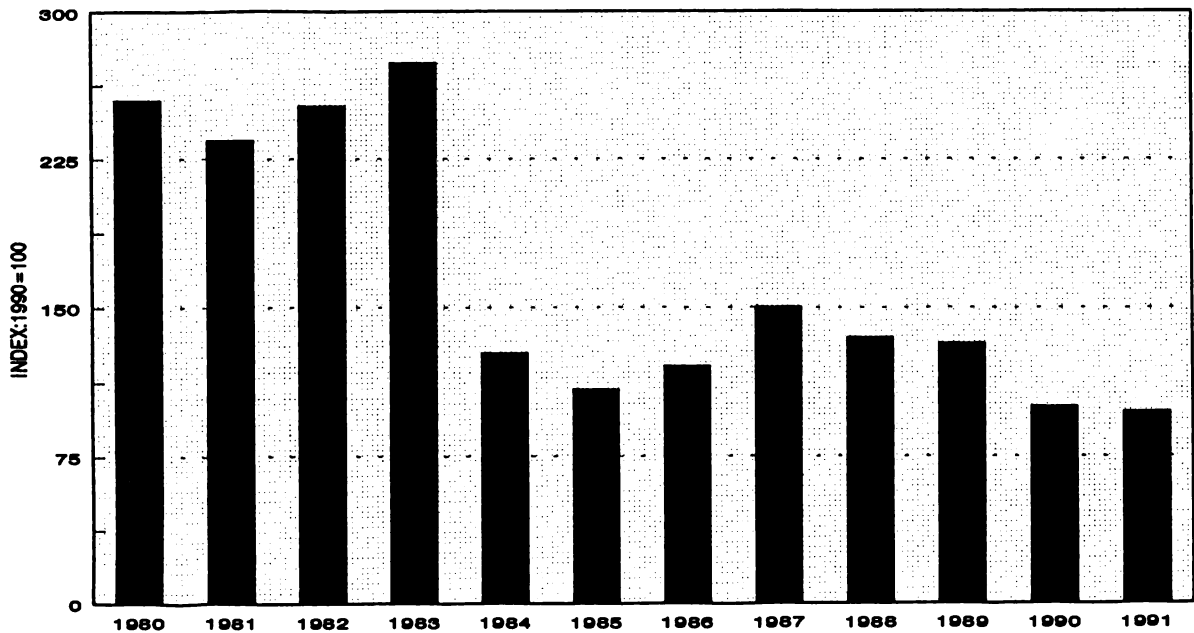


FIGURE 3: EXPORT AGRICULTURE, BARBADOS 1980-1991

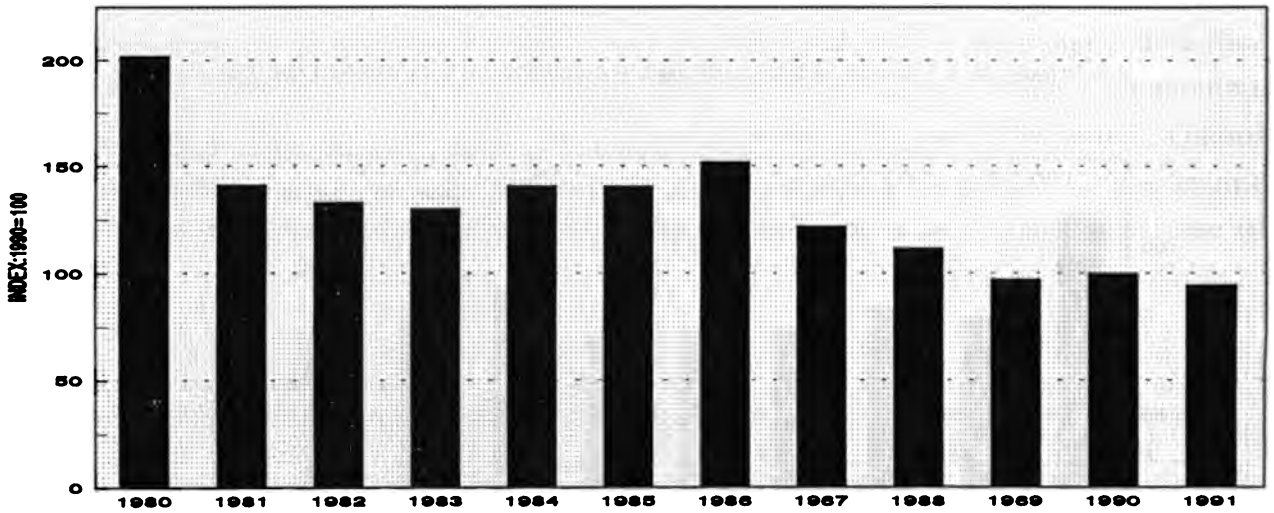
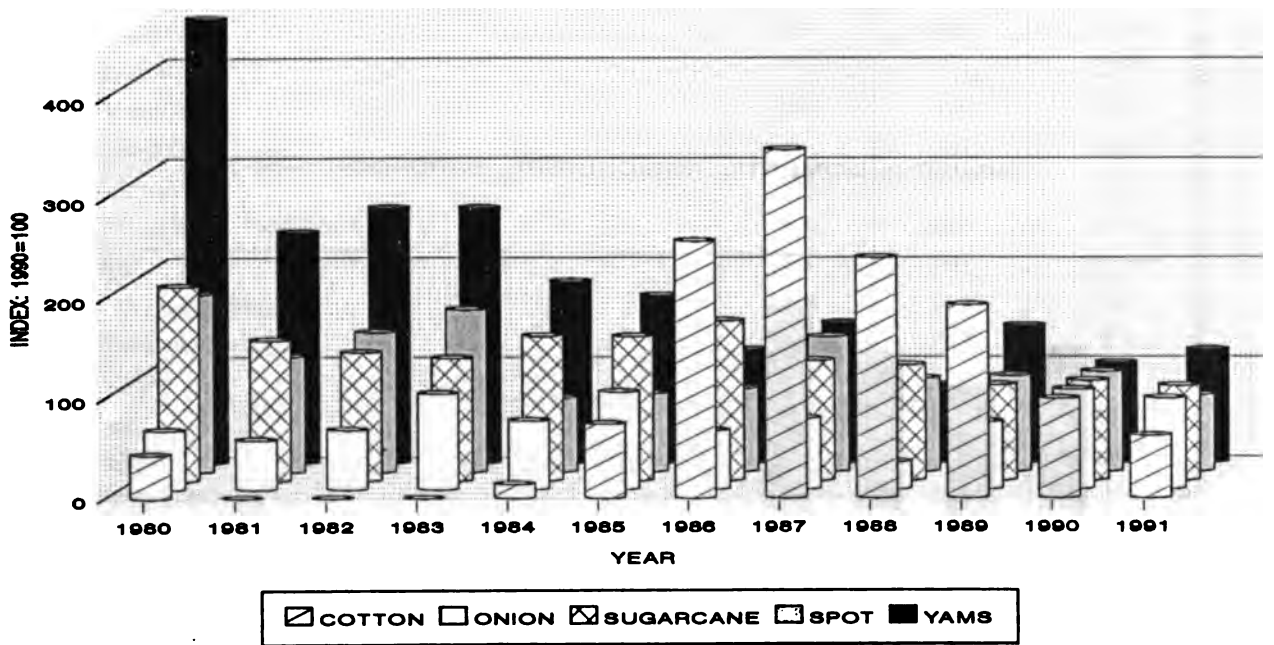


FIGURE 4: EXPORT AGRICULTURE - MAJOR COMMODITIES, BARBADOS 1980-1991



For domestic agriculture, (Figure 5), all the crops showed declines in output during the 1980-91 period. Cabbages topped the list registering reductions in output of 17.3% per annum. In the post-1986 period, only carrots, string beans and cucumbers showed positive growth. Of the other crops, the decline in the output of tomatoes and beets slowed considerably in the post-1986 period. However, the production of pumpkins declined at a faster rate over the second sub-period (1986-1991).

In the livestock industry, (Figure 6), poultry production, the largest sub-sector, grew evenly over the period - averaging just over 6.0% annual growth in both the 1980-86 and 1986-91 sub-period. There was similar growth in milk and pig production, the second and third largest sub-sectors respectively. Cattle, goats and sheep production recovered from significant declines in the pre-1986 period, the latter's recovery was however, insufficient to result in positive growth rates over the entire 1980-91 period. Egg production was the only sub-sector to experience slower growth in the post-1986 period.

The reasons for the poor non-sugar agriculture performance in Barbados are many and varied, ranging from agronomics to weather conditions. Ingersent et al (1969) raised several issues which still remain critical today, almost 25 years later. These issues range from resource availability, cropping and stocking patterns to the relatively low levels of economic returns to investments in agriculture.

FIGURE 5: DOMESTIC AGRICULTURE - MAJOR VEGETABLE COMMODITIES, BARBADOS 1980-1991

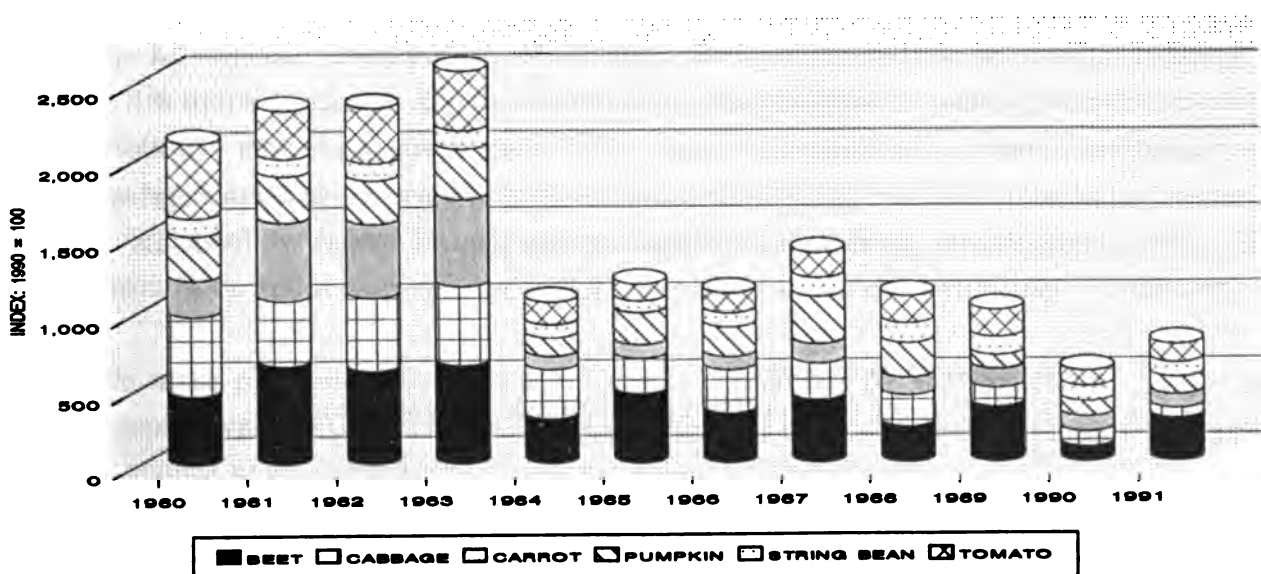
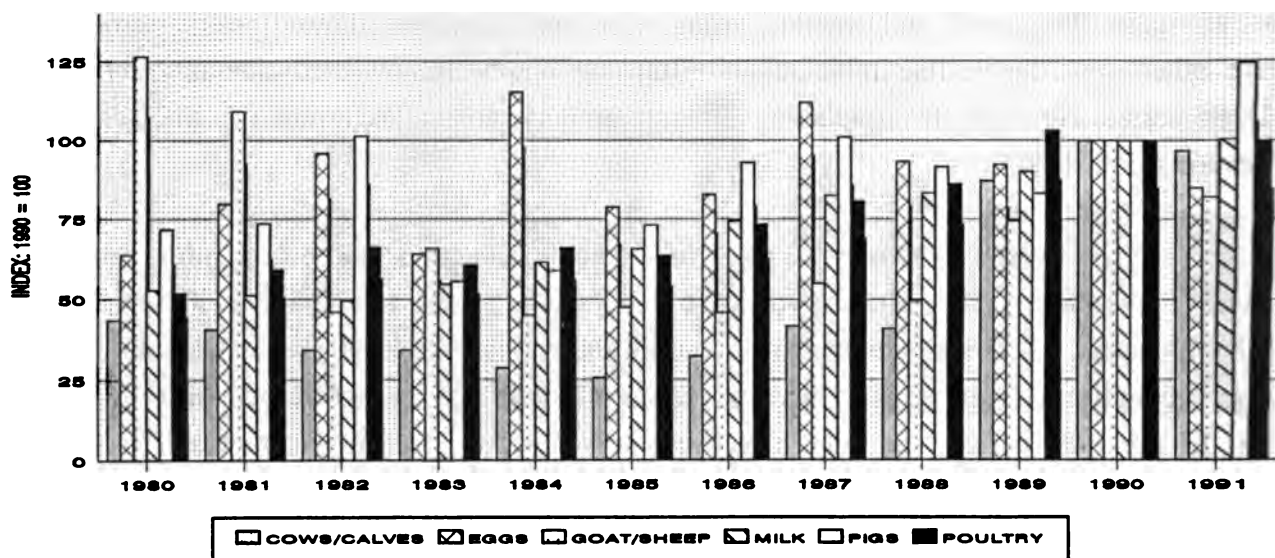


FIGURE 6: DOMESTIC AGRICULTURE - MEAT PRODUCTION, BARBADOS 1980-1991



More recently, Springer (1985) suggested that "the success of the 'non-sugar' agricultural diversification programme depends on a clear delineation of the issues and systematic and specific policies to address these issues with a view to smoothly implementing an integrated production and marketing system".² He proposed that the public sector should engage in regulatory and service functions, while the private sector should concentrate on carrying out production and trade functions.

Presently, apart from the stated objectives in the Agricultural Plans and annual Budget speeches, there is no 'comprehensive' agricultural development strategy for Barbados. Nevertheless, the sector is still being examined by policy-makers and the political directorate, especially as a means of tackling the country's high unemployment problem. In his recent budget address of March 1993, the Prime Minister of Barbados stated that agriculture will be given high priority so that the country can increase its output of food. Beyond this, agriculture is generally expected to perform the following important roles:

- i. to improve food security;
- ii. to employ the existing farm population at 'decent' incomes;

² Important Issues of Agricultural Diversification and Its Implementation in Barbados. Economic Review December 1985, XII(3) pp.4 24-30.

- iii. to act as an employer of last resort;
- iv. to earn foreign exchange;
- v. to provide raw material for industry; and
- vi. to contribute to certain environmental tasks.

To achieve these objectives, policy-makers and planners will need to adopt a complementary set of policy measures in which the number of strategies must be at least as large as the number of objectives. There is no evidence to suggest that such strategies are being implemented to address the issues and constraints facing the agricultural sector in Barbados.

To address the specific objectives of this study, the strategies, programmes and policies as they relate to agriculture are partially summarised in Part I. This is followed by an outline of the CET in relation to the agricultural sector. An empirical analysis of the effect of changes to the CET rate structure on the sector is also presented in Part II. Two alternative methods of measuring protection are presented in Part III and these are applied to a limited range of products on the basis of data availability. Finally, based on the findings of the study, conclusions and recommendations are rendered.

This objectives of this study are as follows:

1. To analyze the impact of the Common External Tariff (CET) and other forms of border intervention policy measures on sectoral prices and government revenue in Barbados. The implications of the existing CET structure for Government revenues will be evaluated and the level of protection accorded to agriculture will be estimated via the construction of nominal and effective rates of protection measures.
2. To measure the impact of border intervention measures (e.g. consumption taxes and duties) on the agricultural sector with special reference to the poultry, dairy, pork and vegetable producing industries. The likely impact on Government revenues and employment will be analyzed and an assessment made of the relative level of protection offered to agriculture arising from changes in the tariff structure in relation to manufacturing.
3. To make recommendations on feasible policy measures for the agricultural sector, in keeping with the GOB's macroeconomic objectives of increased export competitiveness, sustained government revenues and the creation of employment.

Part I: Policy Environment

In Barbados, the macroeconomic policy framework continues to favour the tourism, manufacturing and service sectors over agriculture. These sectors were expected to provide economic growth, foreign exchange earnings, employment and a stable economic environment characterized by low levels of inflation. Nevertheless, there have been a number of sector-specific initiatives aimed at encouraging production in the agricultural sector. Most of the initiatives were in the form of border intervention measures, particularly in relation to competing products from non-CARICOM countries. Such policy measures were based in part on the vulnerable nature of the Barbados agricultural sector which continues to be constrained by, inter alia, low soil fertility, a proliferation of small size farms and a volatile commodity pricing structure.

According to the National Development Plan of 1988-1993, in the mid-1980s there were approximately 22,258 hectares of arable land over 70% of which was allocated to the production of sugar cane. As part of Government's policy, the Plan stated that with the stabilisation of sugar production between 90,000 and 100,000 tonnes, land now reserved for the cultivation of sugar cane production would be available for other agricultural purposes. It is instructive to note that by 1993, sugar production had declined to just over 54,000 tonnes, yet there was hardly any increase in the amount of land used for non-sugar agriculture; a substantial amount of land therefore became idle.

In order to encourage land owners to rehabilitate idle lands, the 1993-2000 Development Plan proposes that a land tax regime be implemented in which idle lands will attract a high (punitive) rate of taxation, while lands engaged in production will qualify for discounts or tax credit (see page 188, Development Plan 1993-2000). This initiative, while potentially increasing land under production, will not necessarily address many of the constraints such as inappropriate farm size and the lack of property rights (less than 1% of the farming population still controls over 80% of the arable land). In this regard, policy-makers, recognising that successful commercial farming requires more than just access to land, have included mechanisms which could facilitate easier access to credit, extension and research services, land preparation and marketing advisory services. These measures are central to the Government of Barbados' overall programme which aims at revitalizing the agricultural sector (see page 188, Development Plan 1993-2000).

Similar to the preceding Development Plan, the 1993-2000 version recognises the importance of an appropriate pricing environment to the survival of the non-sugar producing

agricultural sub-sector. The implied policy appears to be that the GOB will achieve this objective by promoting greater planning of production at the farm level such that supply and demand can be better coordinated (see page 162, Development Plan 1988-1993).

Protective Structures in the Agricultural Sector

It can be argued that the agricultural sector has received substantial protection and support at both the domestic and regional levels, via both tariff and non-tariff measures. At the regional level, the implementation of the CET has given some priority to regionally produced agricultural products. At the domestic level, apart from the support outlined, additional tariff protection for competing extra-regional goods, as well as non-tariff barriers have been employed to protect the domestic non-sugar producing sub-sector. The latter measures have limited competition within the domestic market, apparently to the detriment of the local consumers who have paid artificially high prices for several commodities. This experience is, however, by no means unique to the agricultural sector.

The CET

The Common External Tariff (CET) emerged as a result of a lengthy process of consensus building among CARICOM member countries. Apart from the objective of harmonizing tariffs across CARICOM countries, the desire to protect specific economic activities seemed to have been a critical consideration in designing the CET. Agreement on an appropriate rate structure was reached only within the last two years, some twenty years after CARICOM states agreed in principle on the need to have a uniform tariff regime. The rate structure is common to all CARICOM members and is based on two categories of goods, inputs; and final products.

Inputs include primary, intermediate and capital goods. Final products are further categorised into basic and non-basic goods. In addition, the rate structure differentiates between competing and non-competing goods. Goods are considered to be competing if the regional industry has the potential to supply 75% of the regional market. This categorization holds whether or not this potential to supply is actually realized.

Consumption Taxes and Stamp Duties

Consumption taxes and stamp duties were introduced in 1980 and 1982, respectively. The consumption tax is imposed on the CIF value plus import duty (CET), while the stamp duty is

imposed on the CIF value alone at a standard rate of 20% for goods from extra-regional sources. Since 1989, there has been no change to the stamp duty rate. There is, however, a reciprocal arrangement not to pay duty among CARICOM members. Since 1991, the basic consumption tax rate has increased from 10% to 21%; other rates particularly on sensitive agricultural products are somewhat higher. Changes to these two major taxes are made in accordance with the revenue requirements of the GOB, rather than to protect specific sectors in the economy.

Non-Tariff Barriers (NTB)

Border intervention on agricultural products is comprised predominantly of non-tariff barriers. There are six types of NTBs used in Barbados, four of which affect the agricultural sector: prohibitions, price controls, quotas and quantitative restrictions.

Prohibition (P)

Except for health and safety, there are no stated reasons why an item is prohibited from importation into Barbados. However, of the 67 items, both agricultural and non-agricultural, for which importation is prohibited, only five are not locally processed or produced. This may suggest that local producers are being protected from extra-regional competition. If these items are imported from regional sources licenses are required, therefore the prohibition is not total.

Price Controls (PC)

Price controls are used for specific foodstuffs. The price control list includes a very narrow range of items such as potatoes, chicken wings and flour.

Quotas (Q) and Quantitative Restrictions (QR)

There is a subtle difference between quotas and quantitative restrictions, however, these two policy instruments are considered together because their implications for government revenues may be the same. A quota refers to a specific quantity of an item which is imported; while, without specifying the quantity, a government may use other means of restricting the quantity of an item that is imported. These two policy instruments are the most prevalent forms of non-tariff barriers used to protect domestic agricultural producers.

While these instruments are applied predominantly to non-CARICOM imports, they are also imposed on some items traded from intra-CARICOM sources. Table 2 shows the import values for some items affected by NTBs for the calendar year 1990.

Table 2: Import Values (Bds\$) for Selected Items, 1990.

	NON-CARICOM	CARICOM
Meats	26,494,220	-
Ham & Bacon	3,251,300	-
Fish	4,097,280	3,350,258
Milk, Milk Products and Egg	12,106,512	7,268
Vegetables*	13,897,920	1,718,941
Preparations of Flour	1,694,960	2,789,279
Jams and Jellies	1,313,690	1,322,104
Beverages	574,930	13,147,789
Feeds	2,058,750	153,795
Fresh Fruits	3,214,526	946,066
Mixed Condiments	3,812,140	-
Processed Foods	325,020	1,265,095
Sugar	5,382,460	50,345
Building Materials	2,113,750	908,626
Clothing	13,211,152	3,730,054
Furniture & Other Parts	2,841,240	3,782,843
TOTAL	96,389,850	33,072,463

* Mainly preserved and prepared
SOURCE: Central Bank of Barbados

The revenue implications of removing the NTBs have been estimated at BDS\$2.5 million for fiscal year 1994/95. This estimate was not substantial because the license was non-binding for several of the commodities, therefore its removal did not significantly affect imports. Two lists of imported items were affected by the imposition of a surtax. The more sensitive goods received a surtax of 100%, while a surtax of 100% less the CET rate was imposed on other less sensitive commodities. All sensitive agricultural products remained under license (see Miscellaneous Controls Act Cap. 329, Laws of Barbados). It is expected that the surtax will be phased-out over a four year period ending sometime in 1998.

Support Schemes

Apart from tariff and non-tariff measures, there are other schemes in place which assist Barbadian farmers. These include the Farm Incentive Scheme, the Sugar Industry Price Support Scheme, the Motor Tractor Cultivation Scheme and the Irrigation Programme. In fiscal year 1991/92, GOB expended \$0.1 million and \$1.4 million on the first two schemes, respectively. The Motor Tractor Cultivation Scheme serviced the needs of 4,912 farmers and under the Irrigation Scheme, farmers received water at the highly subsidized price of 44 cents per cubic meter in 1991.

The Development Plan for 1993-2000 suggests a revamping of the Agricultural Incentives Programme and the implementation of an alternative programme to:

- 1) encourage production for the export market in order to boost foreign exchange earnings;
- 2) promote adoption of modern and efficient farming practices;
- 3) promote sustainable agricultural development and
- 4) encourage land owners to bring lands which are lying idle back into commercial agricultural use.

The alternative incentives schemes will include:

- a. minimum guaranteed prices for selected non-sugar export crops;
- b. a guaranteed price for cotton;
- c. support for the establishment of irrigation facilities;
- d. provision of planting material for orchard crop production;
- e. specialized credit schemes for production of orchard crops, livestock and cut-flowers; and
- f. provision of an Export Revolving Fund to support non-sugar exports.

Part II: Implications of Changes to CET Rates

From its inception, the CET accorded special treatment to the agricultural sector and so offered the highest level of protection to primary and processed agricultural commodities. In the most recent restructuring of the CET, the Council agreed to allow duty free importation of inputs for agriculture, including insecticides and herbicides, planting materials and a range of fertilizers.

Revenue Effects

The CET rate structure has general effects on GOB revenue, acting through import duties. However, neither the direction nor the magnitude of the effects are easy to determine. This is because an increase in the tariff does not necessarily guarantee more revenue, neither does a lowering of the tariff necessarily imply less revenue. Whether revenue will increase or decrease will depend on the response of demand for imports.

The SINTIA-T program (Software for Industrial, Trade, and Incentives Analysis) allows the user to simulate the effect on import revenue resulting from changes in tariff rates as well as from changes in the value of imports.³ Changes in imports may occur both endogenously and exogenously. The quantity of imports may be changed exogenously, based on the user's estimates. Endogenous changes in quantity, however, arise because of demand response to consumer price movements, which may result from changes in import duties, the exchange rate, or scarcity rents. Details of the methodology used in simulating the revenue effects are provided in Appendix III.

Based on standard aggregated import groups, the following elasticity assumptions are made in undertaking the simulations on revenue.

Table 3: Assumed Elasticity Estimates for Standard Import Groups

Imports	Case 1	Case 2
(i) Agriculture (raw materials)	-1.00	-1.00
(ii) Mining (raw materials)	-1.00	-1.00
(iii) Consumer Goods	-2.00	-1.00
(iv) Intermediate Goods	-1.00	-1.00
(v) Capital Goods	-0.50	-1.00

Additional assumptions include:

- (i) that the maximum nominal rates of protection have been lowered to 45%, 35%, 20% and the minimum rate of protection of 0% raised to 5% in Tables 4, 5, 7 and 8.
- (ii) that there are no exogenous changes in the volume of imports; and
- (iii) that no currency devaluation occurs.

³ The World Bank's SINTIA-T program is used to provide a systematic description of the nominal protection resulting from official tariffs and other import duties. In addition possible revenues calculations can be made under various assumptions about import elasticities and devaluation.

In Tables 4 and 5, estimated total revenue is calculated by summing the hypothetical revenues for all commodities. R_2 is compared to R_1 to determine the hypothetical percentage change in revenue associated with the simulated changes (shown in column 5 of the two Tables). The simulated import value M_2 is shown in column 3 and the percentage change in the value of imports in local currency is shown in column 6 of the tables.

Under Scenario 1 (see Table 4), the imposition of a maximum rate of 45% causes import duties to decline by almost 1% (0.9).⁴ It is instructive to note that while the potential revenue from import duties in 1990 was approximately \$232.3 million, actual collections were only \$112.3 million. The deviation arises due to the discretionary power of the Minister of Finance to grant concessions on import duties, as well as from sector specific policy measures which relieve or exempt some importers from duty. Thus, in dollar terms, the 1% decline might have represented a loss of approximately \$1.1 million. Imposing maximum rates of 35% and 20% imply declines in revenues from import duty of 5.4% and 25.6%, respectively. On the other hand raising the zero-rated items to 5% increased revenues by 3.0% or \$3.3 million more than the \$112.3 million collected in 1990.

TABLE 4: TOTAL REVENUE OF TARIFF CHANGES (1990) - SCENARIO 1

	Original	Simulation 1	Simulation 2	Simulation 3	Simulation 4
Nominal Rate of Protection		45%	35%	20%	5%
Total Value of Imports	1,155,729,250	1,160,415,030	1,182,336,220	1,245,251,060	1,145,596,790
Imports Duty Revenue	232,347,500	230,368,400	219,866,830	172,885,490	239,427,200
% + increase/-decrease revenue		-0.9	-5.4	-25.6	+3.0
% + increase/-decrease imports		0.4%	2.3%	7.7%	-0.9

Source: World Bank SINTIA-T Computer Program
 Elasticity = -1
 Multiply values by 100 to get actual values.

⁴ Table 6 shows the relative distribution of imports according to tariff positions and forms the basis for the relative effects of adjustments to the maximum and minimum tariff rates.

TABLE 5: TOTAL REVENUE OF TARIFF CHANGES (1990) - SCENARIO 2

	Original	Simulation 1	Simulation 2	Simulation 3	Simulation 4
Nominal Rate of Protection		45%	35%	20%	5%
Total Value of Imports	1,155,729,250	1,158,300,590	1,170,378,300	1,210,756,270	1,148,153,320
Imports Duty Revenue	232,347,500	229,416,910	215,681,560	165,986,530	239,555,020
% +increase/-decrease revenue		-1.3	-7.2	-28.6	+3.1
% +increase/-decrease imports		0.2%	1.3%	4.8%	0.7

Source: World Bank SINTIA-T Computer Program
Elasticity = -1, -1, -2, -1, -.5
Multiply values by 100 to get actual values.

Under Scenario 2, where it was assumed that the elasticity of import demand was unitary, lowering the maximum rate resulted in a greater loss in revenue than under Scenario 1. The differences in the simulations are the reductions in the elasticity of consumer demand for imports from -2.0 to -1.0 and the increase in the elasticity of demand for capital imports from -0.5 to -1.0. According to Table 5, by lowering the elasticity of demand for consumer goods, the increase in imports and hence revenues, were less than under Scenario 1 (0.2 and -1.3 as compared with 0.4 and -0.9 under Scenario 1). The gain from increasing the elasticity of demand for capital goods therefore proved insufficient to compensate for the associated loss in revenues.

SINTIA-T program does not permit an analysis of changes in the pattern of trade resulting from changes in the CET rates, which may be a drawback since lower rates on extra-regional commodities may result in reduced demand for CARICOM goods, especially in the medium to long term. If such a phenomenon occurs, an increase in import duty may result as the pattern of demand switches from CARICOM to non-CARICOM sources. Such changes in the pattern of trade are likely to affect the analysis.

Sectoral Protection

This section employs a measure of weighted average nominal rates to assess the relative levels of protection offered by the CET to various sectors of the economy (see Appendix IV).

The nominal rates of protection are weighted by the value of imports. It must be noted however, that weighted nominal rates of protection would normally be lower than un-weighted protection, because products with high tariffs tend to be less often imported and vice-versa. (See SINTIA-T User's Guide, 1988)

Tables 6 and 7 illustrate the sectoral and sub-sectoral distribution of the weighted average nominal rates of protection for the Barbados economy in 1990. For the overall economy, the rate of protection averaged 18.2% which is similar to that of the manufacturing sector (18.7%). The sub-sectoral distribution of protection in the manufacturing sector varied substantially however, with rates of 35.1% for the textiles and leather products to rates of 10.6% for basic metals. Table 6 indicates that the agriculture and mining sectors are almost equally protected with rates of 8.3% and 8.2%, respectively. The results also indicate an implicit import substitution bias against agriculture.

Simulation 1, Table 6, which constrains the maximum nominal rate to 45% suggests that protection for the overall economy declines only marginally, by 0.2 percentage points or 1.6%. This is indicative of the fact that the three rates in excess of 45% represented only 60 tariff positions or 1.5% of the total and accounted for only 1.6% of total imports. According to the analysis (Tables 7 and 8), none of the sectors loses substantially from the imposition of a maximum tariff rate of 45%.

TABLE 6: NOMINAL WEIGHTED RATES OF PROTECTION BY MANUFACTURING SUB SECTORS (1990) - SCENARIO 1

	Original	Simulation 1	Simulation 2	Simulation 3	Simulation 4
Nominal Rate of Protection		45%	35%	20%	5%
Agriculture	8.3	8.1	7.57	5.25	12.2
Mining	8.2	8.2	8.2	7.8	10.7
Total Manufacturing	18.7	18.4	17.3	13.2	19.4
Consumer Goods	25.5	25.0	22.4	15.3	26.5
Intermediate Goods	13.9	13.9	13.7	11.8	14.8
Capital Goods	15.0	15.0	14.7	12.0	15.3
Overall Average	18.2	18.0	16.9	12.9	19.1

% compares simulated value with original value

TABLE 7: NOMINAL WEIGHTED RATES OF PROTECTION BY MANUFACTURING SUB-SECTORS (1990) - SCENARIO 2

	Original	Simulation 1	Simulation 2	Simulation 3	Simulation 4
Nominal Rate of Protection		45%	35%	20%	5%
Food, Beverages & Tobacco	16.4	16.1	14.9	10.7	18.1
Textiles & Leather	35.1	35.1	31.2	19.4	35.2
Wood, Cork & Products	10.9	9.9	9.2	7.5	14.7
Paper & Printing	12.5	12.4	11.7	9.9	17.8
Chemicals, Petroleum Coal	17.5	17.3	16.7	13.3	20.4
Non-metallic Minerals	19.5	19.5	19.4	15.4	10.7
Basic Metal	10.6	10.6	10.6	10.4	20.6
Metal Products	20.4	20.2	18.8	14.3	10.7
Other Manufacturing	24.0	23.5	22.8	18.6	24.0
Overall Average	18.7	18.4	17.3	13.2	19.4

Under simulation 3, Table 5 where a maximum rate of 20% is applied, a weighted average rate of protection of 12.9% is derived for the overall economy. This represents a reduction of 5.3 percentage points or 29.1%. In relative terms, the level of protection on manufacturing had experienced the greatest decline of 5.5 percentage points, with textiles and leather being the hardest hit. Having benefitted from the highest level of protection prior to 1991, the textiles and leather sub-sector experienced a sharp decline in protection from 35.1% to 19.4%, as a consequence of the imposition of a maximum CET rate of 20%. The basic metals sub-sector was least affected as the results in Table 8 indicate that protection moved from 10.6% to 10.4% in the post-simulation scenario. Of the other sub-sectors, wood, cork products and metal products displayed reductions in the level of protection of 31.2% and 29.9%, respectively.

A less radical change to the maximum CET rate of 35% (Simulation 2, Table 7) induces a 7.14% decline in protection for the overall economy. Compared to Simulation 3 for which the maximum rate of 20% was applied, the level of protection declined by less for the manufacturing sector than for the overall economy (Tables 7 and 8). This results primarily from the initially high level of protection accorded to that sector.

The analysis suggests that the impact of increasing the minimum CET rate from 0% to 5% is not significant for the overall economy. According to Table 7, the economywide nominal

weighted average rate of protection declined for all sectors (See Tables 7 and 8, simulation 4). However, this change in protection was fairly significant for agriculture and mining and a few manufacturing sub-sectors.

The increase in the CET from 0 to 5% may seem somewhat paradoxical based on the results in Tables 7 and 8. Logically, an increase in the CET rate would be expected to result in a reduction in the level of protection, and hence in negative signs associated with the estimates for simulation 4 in Tables 7 and 8. This highlights a shortcoming of the SINTIA-T package, which assesses protection for final products, as compared to intermediate inputs, which comprise most of the factors under consideration for the agricultural sector.

The estimates for simulation 4, more accurately reflect an increase in the cost of intermediate inputs, associated with the move from 0 to 5%. As regards the impact on protection, assuming unitary elasticities throughout, the results suggest that as cost increases, the level of protection, *ceteris paribus*, will decline. The extent of the declines are given by the estimates in Table 6 and 7 for this simulation. To more adequately assess the impact on the agricultural sector of moving to a 5% CET rate, some measure of the effective rate of protection is required. Such a rate is difficult to compute for the overall economy however, so this measure is computed for specific commodities and the results presented later in the study.

Premised on the unitary elasticity assumption justified above, Table 7, simulation 4 indicates that protection in the agricultural sector could likely decline by as much as 4 percentage points or 47.0%. It is noteworthy that agricultural machinery and fertilizers among other primary inputs, which carry a zero rate, are the most significant imports in this category. A significant number of items in the mining sector, are similarly zero rated.

Within the manufacturing sector, protection for domestically produced food products, beverages and tobacco declined by 1.7 percentage points or 10.4%, however, the largest decline recorded was for wood and cork products (29.4%) and paper and printing (21.6%).

Cost of Living Effects

The SINTIA-T program permits an indirect method of analyzing the cost of living effects by changing the nominal rates of protection on imports. According to equation 33 in Appendix III, the ratio of the simulated value of domestic consumer price of importables (P_2) to the

original value of domestic consumer price of importables (P_1) may be represented as:

$$P_2/P_1 = (1+t_2)/(1+t_1) \quad (1)$$

Our analysis assumes that there is no currency devaluation and no price increase due to rents. As such, both $p=0$ and $d=0$. As a result:

$$P_2/P_1 = (1+t_2)/(1+t_1) \quad (2)$$

where t_2 is import duty used in the simulation which is approximately equal to the un-weighted nominal rate of protection; and t_1 is the initial import duty for a product or average import duty for a sub-sector.

Table 8 illustrates the approximate increases in the cost of living resulting from adjustments to the nominal rates of protection attributable to import duties under the various simulations used in the study. Changing the level of protection is dependent on the sectoral distribution of imports. According to Table 9, lowering the maximum rates to 45%, 35% and 20%, *ceteris paribus*, results in an average decline in the price level of -0.5%, -2.1% and -6.7% respectively, for the overall economy. On the other hand, an increase to 5%, *ceteris paribus*, in the goods carrying a zero rate increases the cost of living by less than 1% for the overall economy.

The results also indicate that the most radical effects of lowering the maximum rate to 20% are the declines in the cost of manufactured items (-6.9%), followed by agricultural goods (-5.8%) and minerals (-0.5%). In the manufacturing sub-sectors, the cost of consumer goods fell by 10.4%, capital goods by 4.0% and intermediate goods by 2.7%.

The major implication of an increase to 5% in the rate on goods which presently carry a zero rate lies in the effect on prices. Items which are presently zero-rated include food imports within CARICOM, such as meats, milk, eggs, vegetables, wheat, rice, fish, flour, poultry, seasoning, butter, cheese and live animals; mineral imports of chalk, cements, earths, slate, coal, petroleum, metallic ores; steel and steel products; medicaments and vaccines; glass and its related products; fertilizers; wood and books.

The simulation results suggest that the increase to 5% raises the cost of living by 0.7% for the overall economy (See Table 9). The largest increases were recorded in the mining sector (3.4%) followed by the agricultural sector (1.7%). Increases in the manufacturing sub-sectors were all below 1% with intermediate goods realizing the largest increase of 0.9%.

Implications for the cost of living of changes to the CET rates are also dependent on trade patterns. Consumption and production patterns are influenced by changes in the prices of imports as well as exports which may also have an indirect impact. Increased prices of imports used in production (raw materials) affect costs which in turn affect prices of domestically produced products, as well as export prices. Thus, altering the structure of the CET will affect the whole price structure and will therefore exert both direct and indirect influences on the cost of living.

TABLE 8: REPORT ON CHANGE IN PRICE LEVEL BY SECTORS (1990)

	Original	Simulation 1 %Δ	Simulation 2 %Δ	Simulation 3 %Δ	Simulation 4 %Δ
Nominal Rate of Protection		45%	35%	20%	5%
Agriculture	17.9	17.7 -0.2	16.6 -1.1	11.1 -5.8	19.9 1.7
Mining	4.6	4.6 0	4.6 0	4.1 -0.5	8.2 3.4
Total Manufacturing	22.0	21.4 -0.5	19.2 -2.3	13.6 -6.9	22.7 0.6
Consumer Goods	30.3	29.4 -0.7	25.5 -3.7	16.7 -10.4	30.8 0.4
Intermediate Goods	13.5	13.3 -0.2	12.6 -0.8	10.4 -2.7	14.5 0.9
Capital Goods	15.9	15.3 -0.5	14.8 -0.9	11.3 -4.0	16.2 0.3
Overall Average	21.3	20.7 -0.5	18.7 -2.1	13.2 6.7	22.1 0.7

In summary, reducing the maximum rate of the CET to 20% over four years (by 1998), assuming there are no domestic changes in the structure of Barbados' economy, would result in revenue losses of approximately 25% of the import duty collections in 1990 of \$112.3 million. This loss may be countered, albeit marginally, by any increase in import duties resulting from the increased demand for non-CARICOM products induced by a switch in consumption patterns associated with the lower CET rate. The results suggest that the level of protection for the overall economy would have declined with manufacturing being hardest hit, particularly the textiles and leather sub-sectors.

Part III: Estimating Coefficients of Protection

Protection offered to the agricultural sector has taken two basic forms, tariff and non-tariff barriers, of which the latter predominated. A tariff impacts the domestic price of imported commodities as well as the quantity of production, consumption and imports. Non-tariff barriers also affect prices. Imposing the CET on primary and processed imported agricultural commodities raised their prices and increased returns to domestic producers of import competing products. In agriculture, domestic producers were expected to capture a larger share of the market and in so doing boost production and exports. Non-tariff barriers restricted the importation of commodities depending on the local demand and supply conditions. The operation of these policy measures resulted in domestic commodity prices being kept artificially high. The incentive effect of these policy measures on domestic producers is the focus of the following section.

While the methodology used in the previous section calculated the weighted nominal protection at the sectoral level, there are other methodologies for calculating nominal and effective protective rates at the commodity level. Two such methodologies are developed in this section.

Nominal Protection Coefficients (NPCs) and Effective Protection Coefficients (EPCs) are the most common measures of protection but more 'informed' measures may be identified. According to Tsakok (1990) these include effective protection and effective subsidy coefficients (EPCs and ESCs), which further measure returns to major non-traded and primary inputs.

The nominal protection coefficient is defined as the ratio of the domestic price of a commodity to its border price.⁵ The border price is defined as the price in the international market converted into local currency using the appropriate exchange rate.

The nominal protection coefficient (NPC) is given by the following:

$$\text{NPC}_j = \frac{P_j^d}{P_j^b} \quad (3)$$

⁵ Tsakok, Isabelle. Agricultural Price Policy: A Practitioner's Guide to Partial Equilibrium Analysis, pp 56-59.

where: P^d = domestic price;
 P^b = border price i.e. foreign price x exchange rate, thus the border price is the foreign price in domestic currency;
 j = commodity under study.

The border prices used in this study can be regarded as the "non intervention price" i.e. the price that would prevail in the absence of policy-induced distortions. The domestic price is defined as the retail price in the domestic market which includes the effect of intervention.

The nominal protection coefficient (NPC) can assume a range of numerical values. If $NPC > 1$, domestic producers or intermediaries are receiving a higher price after intervention than they would without intervention. This implies positive protection for producers but represents a tax on consumers. If $NPC < 1$, then the reverse holds in that consumers are protected whereas producers are taxed. This would serve as a disincentive to production of the commodity in question. If $NPC = 1$, then the structure of protection is neutral. In general, the greater the divergence of the NPC from unity, the greater the price distorting effect of policy and the greater or lesser is the incentive or disincentive to decision makers (producers and consumers).⁶

Several of the policy measures implemented by governments affect not only the price of outputs but also the price of inputs used in the production process. Thus it is desirable to measure the impact of policy, not only at the output level as reflected in the NPC, but also at the production end. A measure which facilitates this is the Effective Protection Coefficient (EPC) or its alternative, the Effective Rate of Protection (ERP). The effective protection coefficient of a commodity is the ratio of the value added in domestic prices to the value added in border prices.⁷

It should be noted that the difference between the NPC and the EPC is that, in addition to output prices, the EPC also takes into consideration the cost of traded inputs.

⁶ Tsakok, op. cit, pp 56-59.

⁷ Tsakok, op. cit, pp 79-80.

The EPC is expressed as follows:-

$$EPC_a = \frac{V_a^d}{V_a^b} \quad (4)$$

where: V_a^d = value added in domestic prices; and
 V_a^b = value added in border prices.
 a = commodity under study.

Value added in Equation (2), refers to the value that is added through the production process over and above the value of the traded inputs, i.e. it is the return to the primary resources, for instance land, labour and capital, and to the non-traded intermediate inputs such as seeds and planting material.

The EPC can also be expressed in percentage form, as the effective rate of protection (ERP), where:

$$ERP = \frac{V_a^d - V_a^b}{V_a^b} \times 100 = (EPC - 1) \times 100 \quad (5)$$

The EPC can assume a range of numerical values. If $EPC > 1$, then domestic producers are receiving a greater return on their resources as a result of government policy than they would in the absence of intervention, (i.e. they are enjoying positive protection which represents a potential incentive to expand production). Conversely, when $EPC < 1$, producers are receiving reduced returns as a result of policy intervention, (i.e. they would be better off paying and receiving border prices instead of domestic prices for both inputs and output) and this represents a potential disincentive to production. On the other hand, when $EPC = 1$, the structure of protection is neutral and producers are neither protected nor discriminated against as a result of the policies pursued. The results of the analysis utilizing the above equations are presented below.

In estimating value-added, several approaches may be used, of which the simple Corden method is the most convenient to quantify. Via this method, value-added is computed as the sum of the returns to land, labour and invested capital directly involved in the productive activity and to land, labour and capital embodied in the use of non-traded intermediary inputs.

Operationalization of the nominal protection rate requires the comparison of the domestic price of final goods with the world price for comparable products. Apart from data collected

from local firms, trade data was used to extend the range of commodities, with the C.I.F. price being used as a proxy for the border price, and local wholesale prices being used as a proxy for domestic prices.

The following shortcomings exist with respect to the trade data used in this study:

- 1) it is aggregated, making it difficult to consistently compare like products;
- 2) the quantity information is not always reliable; and
- 3) there is sometimes inconsistency between f.o.b and c.i.f data - a commodity exported from T & T to Barbados should reflect the same quantity based both on the f.o.b and c.i.f data, for the respective countries.

Notwithstanding these weaknesses, the two measures provide relative levels of protection among the various commodities used. The estimates reveal the extent to which the commodities would be vulnerable if a policy to remove the tariff and non-tariff barriers was pursued. As policy indicators, EPCs are usually considered to be better than NPCs, because they consider returns to the entire productive activity, not just output or inputs markets.

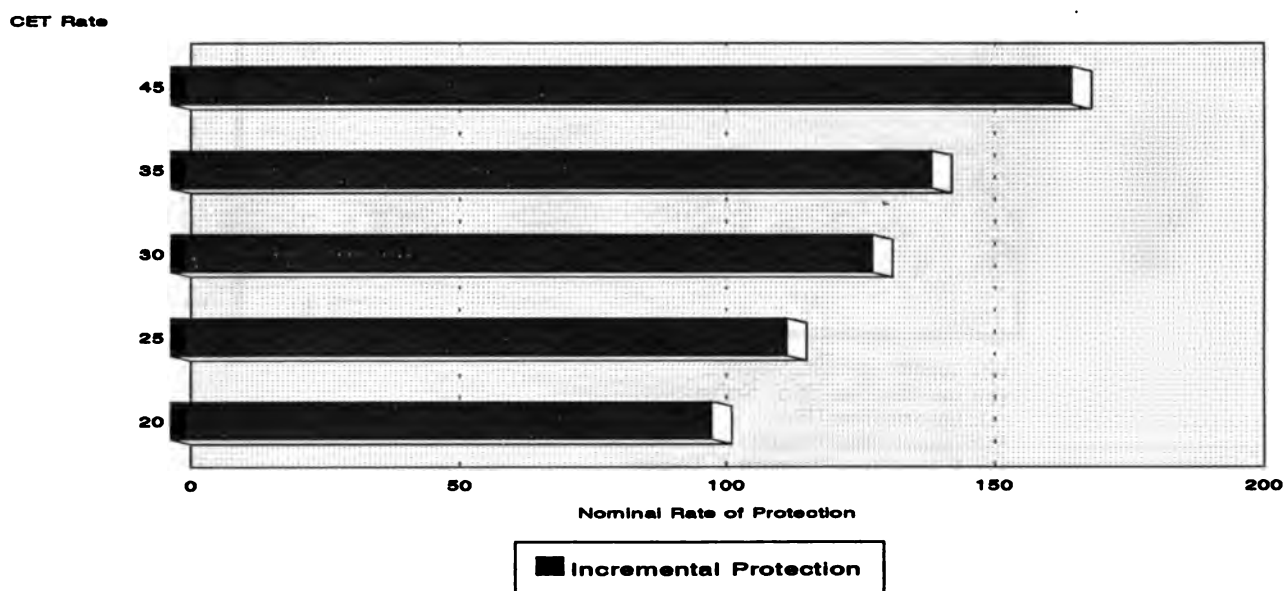
Part: IV Discussion of Results

Protection measures were computed for various domestically produced agricultural and agro-processed commodities. The paucity of data precluded the computation of effective rates of protection for all sixteen agricultural commodities investigated however, sufficiently detailed information was obtained to compute effective rates of protection for picnic hams, carrots, beets, onions, yams, pork, poultry and milk.

The analysis for picnic hams for which the impact of reducing the CET rate on imported competing product was analysed proved particularly inciteful. According to the analysis domestically produced picnic hams receive protection equivalent to 168% of the border price as a result of the 45% tariff imposed on their importation. If the CET rate were reduced to 35%, Figure 7 indicates that the level of nominal protection declines to 142%, and with a 20% tariff, the level of nominal protection received declines to just over 100%. The analysis suggests that if the level of the CET was reduced, the level of protection accorded to domestic producers of picnic hams would decline substantially. It is also evident from the data and the associated

analysis that even with a 45% tariff rate, the domestic industry would find it difficult to compete with imports. To adequately protect domestic producers (i.e. to make them price competitive with imports), the analysis suggests that the nominal tariff rate would have to be quite high.

FIGURE 7: NOMINAL RATE OF PROTECTION FOR DOMESTICALLY PRODUCED PICNIC HAMS BARBADOS, 1993.



Since the decision has been taken by the GOB to support producers of picnic hams, in order to ensure farm-firm viability, the product remains under license. This offers producers additional protection from both foreign and regional imports and ensures farm-firm profitability at levels substantially above those which would have been possible in the absence of such policy interventions. In terms of the cost of such policy measures, the nominal protection rates suggest that consumers are implicitly taxed, as they are constrained to pay higher prices for the product.

Nominal rates of protection are also reported in Table 9, for several other agricultural and agro processed commodities. While no simulation in terms of changing CET was undertaken for these commodities, the results in Table 9 indicate that there was considerable dispersion across commodities. Import data and prices from the major exporters into Barbados, both regionally and extra-regionally, were used in computing the nominal protection rates. Consequently, some gauge of Barbados' competitiveness for specific commodities vis-a-vis some of its major trading partners may be gleaned from the results.

TABLE 9: NOMINAL PROTECTION RATES FOR SELECTED AGRICULTURE PRODUCTS, BARBADOS, 1993.

	NPR (%)
Chicken Wieners	15
Bacon	40
Sweet Potatoes ^(a)	67
Onions ^(b)	207
Carrots ^(c)	166
Tomatoes ^(c)	99
Yams ^(a)	61
Cucumbers ^(d)	83
Whole Chicken	240
Biscuits (Unsweetened)	20
Whole Wheat ^(e)	10
Feed ^(f)	30

- (a): Imports from St. Vincent
- (b): Imports from USA; Netherlands; Canada
- (c): Imports from USA
- (d): Imports from Guyana
- (e): Imports from Trinidad & Tobago
- (f): Barbados vs Trinidad Cost

The nominal protection rates for chicken wieners, whole wheat and unsweetened biscuits were fairly low, all being less than 20% of the border price for respective competing imports. All the other eight commodities included in Table 9, remain under license.⁸ For these commodities the level of protection ranges from a low of 40% for bacon to over 200% for onions and whole chickens.

Table 10 and Figure 8 report both nominal and effective rates of protection for a broad cross section of commodities produced in Barbados. The data used was obtained from domestic producers, and was utilized to check the consistency of the results obtained in Table 9, with those derived via published trade data. Except for chicken and yams the estimates for commodities which were common across both data sources were fairly consistent. The divergences in the estimates for yams was due to the significantly lower border price for imports originating in countries other than St. Vincent.

⁸ See Miscellaneous Controls Act., Cap. 329, 1994.

FIGURE 8: PROTECTION COEFFICIENTS FOR SELECTED AGRICULTURAL COMMODITIES, BARBADOS, 1993

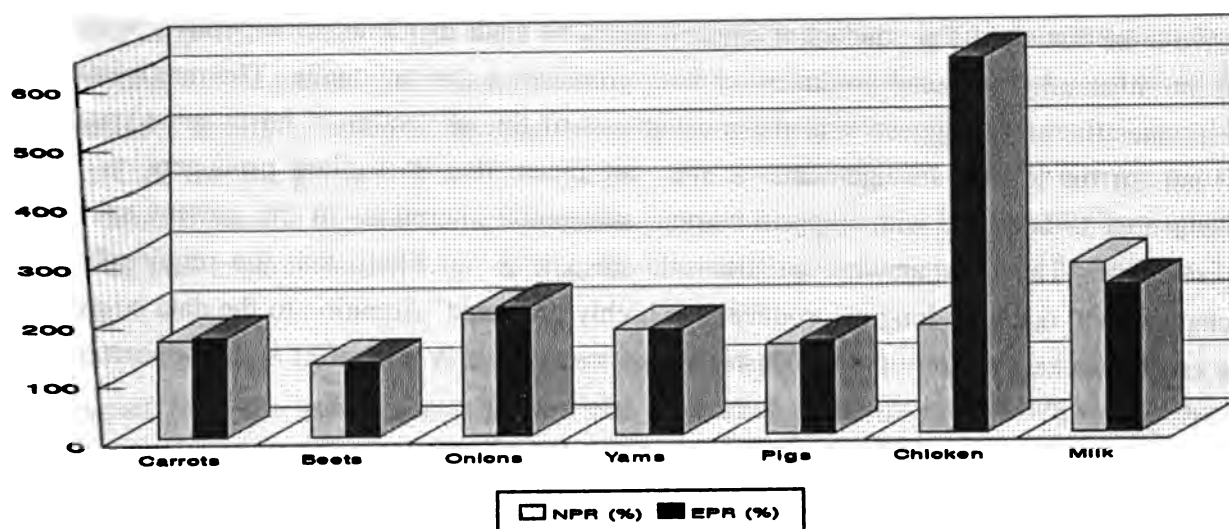


TABLE 10: PROTECTION COEFFICIENTS FOR SELECTED AGRICULTURE COMMODITIES, BARBADOS, 1993.

	EPR (%)	NPR (%)
Carrots	170	166.0
Beets	127.1	126.0
Onions	218.9	207.0
Yams	179.8	180.0
Pork	158.0	152.2
Chicken	636.0	184.0
Milk	250.0	285.7

Both the NPR and EPR estimates were fairly similar for carrots, beets, onions, and yams, indicating that domestic agricultural policy interventions did not have a particularly significant impact.⁹ The results also indicate that producers of these commodities benefitted substantially from the existing regime of policy measures. According to the results, there was a small differential between the NPR and EPR for pork, which also benefitted from positive protection.

⁹ The result may also be indicating the relative absence of domestic support measures beyond the tariff, consumption taxes and service charges levied on competing commodities at the border.

As was expected, the EPR for chicken was especially high, indicating that producers are highly favoured. The substantial gap between the NPR and the EPR for this commodity indicates that existing programmes have been quite instrumental in transferring income to producers. The base data as well as the results of the analysis suggest that an unrealistically high tariff would have to be instituted if producers of chicken are to be made artificially competitive with imports from either other regional producers or with producers extra-regionally. The magnitude of the estimates therefore suggests that the societal cost of this protection is fairly substantial. Were it not for the license arrangements, it does not appear that Barbadians producers would have been able to compete with imports without substantial alterations to the present structure of production. This is somewhat paradoxical, since it is not likely that the required structural changes will occur as long as producers are highly protected. Attention to the data suggests that a careful reexamination of the industry's cost structure may still offer some opportunities for savings.

The protection coefficients were also significant for milk. This was due in no small measure to the licenses which are required to import the product from both regional and extra-regional sources. There was however, a fairly sizeable differential (35.7%) between the EPR and the NPR estimates. The divergence is accounted for by the various taxes on intermediate inputs used in processing the final product. Making any meaningful prognosis regarding the domestic milk producing sub-sector is particularly complex, since the industry is integrated with dairy producers, intermediate input suppliers and various service contractors. To accurately evaluate the cost of protection, it would be necessary to evaluate each of these linkages as individual activities, a task which is beyond the scope of the present study.

Nominal rates of protection for broad economic sectors computed via the SINTIA-T programme are reported in Table 11. According to the NPR estimates, textiles and apparel were more heavily protected than either the agriculture and agro-processed or industrial manufacturing sectors. That textiles and apparel were highly protected (all NPR estimates are positive) is the result of deliberate legislation imposed from as early as 1934 with the Importation of Textiles (Quota) Act which guaranteed protection to manufactured goods of British origin. The 1934 legislation established quotas for textiles from foreign countries and instituted licenses for imports in excess of the quota limit. Over the years similar legislation, such as the Miscellaneous Controls Act of 1970 along with its subsequent amendments expanded the coverage of commodities requiring import licenses from regional and extra-regional sources. While subsequent amendments to the 1970 Miscellaneous Act, such as the Export and Import (Restriction) Act, were wider in scope protection of textiles and apparels remained a central feature.

It was not until 1994 that licenses on the importation of a number of items were removed. In many instances though, the licenses were non-binding and the affected items no longer benefitted from tariff protection. Either a 100% surtax or a 100% less the CET rate was imposed on imports of items which were considered to be sensitive. While it is intended that these surtaxes will be phased out over a four-year period, a committee will recommend whether these measures should be extended beyond the initial four-year period. The results in Table 11 which indicate that the garment industry continues to receive the highest level of protection are therefore consistent with the spirit of these various pieces of legislation. The results also suggest that textiles and apparel benefit from substantial non-tariff protection measures in addition to tariffs.

Apart from the use of non-tariff barriers, a number of Barbadian private sector firms (industrial manufacturing as well as textiles and apparel) benefitted from incentives under the Fiscal Incentives Act, the Customs Act, and more recently, the Foreign Sales Corporation Act. The basic objective of these Acts was to create a stable economic environment in which firms could generate employment and increase foreign exchange earnings. For industrial manufacturing commodities, the results in Table 11 indicate that while approximately half benefitted from positive protection, the other half was being negatively protected. In instances where other regional producers were the major competitors, the results suggest that domestic Barbadian producers were being taxed relative to their CARICOM counterparts.

It is instructive to note that in several cases regional imports into Barbados are exempt from stamp duties because of reciprocal arrangements and oft times many regional non-Barbadian producers are allowed to source their inputs duty-free. Generally, imports are also exempt from consumption taxes, except where a corresponding consumption tax applies to the domestically produced product. In contrast, Barbadian producers are quite often not exempt from input duties and are also required to pay consumption taxes, a situation which leads to what is now generally referred to in the economic literature as 'cascading'. This has contributed to the relative disadvantageous position in which some Barbadian industrial manufacturing firms find themselves vis-a-vis their regional counterparts.

TABLE 11: NOMINAL PROTECTION RATES FOR PRODUCTS BY BROAD SECTORAL GROUPINGS

	NPR (%)
Agriculture & Agro-processed	
Sausages Canned	63.9
Sausages Not Canned	30.5
Biscuits Unsweetened	-3.5
Biscuits Sweetened	-7.2
Sweet Potatoes	51.4
Yams	72.0
Breadfruit	90.9
Groundnuts	56.2
Edible Molasses	100.9
Pepper	-26.1
Margarine	18.3
Imitation Lard & Subs.	20.0
Beer	-10.4
Rum, Less than 80% proof	18.1
Industrial/Manufactured	
Water-thinned Paints	29.2
Other Paints	3.2
Other Medicants	-56.1
Perfumes & Toilet Waters	-48.9
Cosmetics & Skin Care Products	-16.9
Organic Surf. Agents	-1.5
Insecticides in Retail Packages	79.0
Paper Bags	-41.9
Cardboard Boxes	98.5
Other Package Containers	69.8
Boxfiles	-12.9
Toilet Paper	-29.8
Sanitary Napkins	22.4
Building Cement	2.2
Structures etc., Steel	-48.0
Cans	-34.9
Casks, Drums	23.1
Gauze, cloth wire	16.3

TABLE 11 (Cont'd): NOMINAL PROTECTION RATES FOR PRODUCTS BY BROAD SECTORAL GROUPINGS, BARBADOS 1990.

	NPR (%)
Textiles & Apparel	
Blouses of cotton, not knitted	64.1
Blouses of other material, not knitted	88.7
Coats/Jackets for Females/Infants of cotton, not knitted	17.1
Coats/Jackets for Females/Infants of other materials	60.9
Drawers for Males of Cotton, Not Knitted	86.84
Jackets, Blazers etc., for Males of Cotton, Not Knitted	61.3
Jerseys, Pull-overs etc., of Cotton Knitted	58.8
Nightwear for Females/Infants of Cotton Knitted	23.6
Other Outer Garments for Males of Cotton Not Knitted	14.9
Other Undergarments for Males of Cotton Not Knitted	41.5
Shirts for Males of Cotton Not Knitted	47.6
Shirts for Males of Cotton Knitted or Crocheted	12.4
Shirts for Males of Other Materials Not Knitted	93.5
Shirts for Males of Synthetic Fibre Not Knitted	72.9
Skirts of Cotton Not Knitted	45.6
Skirts of Other Materials Not Knitted	29.1
Suits for Males of Cotton Not Knitted	23.1
Suits for Males of Man-Made Fibres Not Knitted	30.5
Trousers and the Like for Males of Man-Made Fibre	35.7
Trousers and the Like for Males of Other Materials	51.0
Undervests for Females/Infants of Cotton Knitted	90.5
Undervests/Sportsvests for Males of Synthetic Fibre Knitted	66.4
Undervests/Sportsvests for Males of Cotton Not Knitted	92.9
Undervests/Sportsvests for Males of Any Other Fibre Knitted	118.3

The results for the agricultural and agro-processing sector exhibited greater dispersion than that of either industrial manufacturing or textiles and apparel. This notwithstanding, the results in Table 11 indicate that all the products receiving negative protection were agro-processed. Taxes on capital equipment, packing materials and spare parts might have contributed significantly to this result. Barbadian agro-processing firms have argued with some justification that their regional counterparts received more favourable treatment in relation to the sourcing of inputs, while at the same time facing tax environments in their countries similar to that faced by domestic Barbadian firms. In some instances, cascading was also evident for specific agro-processing industries.

Agro-processing aside, the results continue to suggest that primary agricultural commodities benefitted, and in some instances substantially so, from the existing policy regime. It is evident that non-tariff barriers and in particular licenses, more than any other policy measure, have accounted for the majority of the protection afforded to the sector.

The tariff protection offered to the productive sectors has been somewhat ad hoc as the need to generate revenue more than any other consideration continues to determine the GOB's decisions to alter existing rates. In addition, while taxes are being imposed on competing final goods, there is still some measure of uncertainty over the tax treatment of inputs to the productive sectors.

Generally, the level of protection received by all productive sectors was positive. This was especially the case for textiles and apparel where nominal protection rates were all positive and significant. In some respects the removal of import licenses, lowering of the common external tariff, phasing out of surtaxes and the pending implementation of the VAT to replace stamp duties and consumption taxes, will reduce the level of protection to these sectors. Simultaneously, the treatment of inputs across productive sectors ought to be made more transparent. It appears that Barbadian consumers and taxpayers, who now pay the cost for the protection afforded to the productive sectors, will be the ultimate beneficiaries of the proposed reforms to the policy regime.

Part V: Conclusions and Recommendations

To accurately determine the effects on import revenues of changes to tariff rates, it is necessary to compute the elasticities of demand for both the sectors and commodities of interest. While the estimates of these demand elasticities were not included in the present study, the methodology allows for reliable introspection of the impact on import revenues to the GOB which is likely to be generated by changes to the CET rate. Changing the maximum CET rate to 45% causes revenue from imports to decline by 0.9%, with an associated increase in the value of imports of 0.4%. If the maximum rate is changed to 35%, the results indicate that Government revenue from imports will decline by approximately 5.4%. However, the value of imports will increase by 2.3%. Changing the rate to 20% causes an increase in the value of imports into Barbados of 7.7%, this however results in a decline in import revenue to the GOB of approximately 25.6%. If the minimum CET rate is increased from 0% to 5%, there is a resultant decrease in the value of imports of 0.9%; GOB import revenues however, increase by approximately 3%.

Presently the structure of the CET accords a nominal weighted rate of protection of approximately 18.2% to the manufacturing, agricultural, mining, consumer goods, intermediate goods and capital goods sectors of the Barbados economy. In total, changing the maximum CET rate to 45% diminishes the level of protection accorded to the sectors combined by 1.1%. The impact is however somewhat disproportionate across individual sectors with protection to the agriculture sector declining relatively more than that of the other sectors.

The results suggest that if the maximum rate is changed to 35%, overall protection across all sectors declines by approximately 7.1%. The level of protection accorded to the agricultural sector would decline by approximately 9.6%. Changing the maximum rate to 20% would reduce the level of overall protection across all sectors by 29.1% and that of the agricultural sector by 37.3%. If however the minimum CET rate increased from 0% to 5%, the general level of protection across all sectors of the economy would be increased by approximately 5%. Changing the rate in this manner however, increases agricultural protection by an estimated 47%. This result is somewhat perverse since most of the affected items are intermediate inputs rather than final goods, so that the rate change ought only to result in increasing cost with little or no impact on the overall level of protection.

The impact of these simulated changes in the CET rate structure on the cost of living in Barbados has been estimated using the SINTIA-T program. This study concludes that changing the maximum rates to 45%, 35% and 20% will result in associated reductions in the cost of living at 0.5%, 2.1% and 6.7%, respectively. However, increasing the minimum rate from 0% to 5% increases the cost of living by roughly 0.7%. The results of the effective rates of protection for certain agricultural products were somewhat varied. Onions and yams, commodities which have been targeted for exports, were found to have an ERP estimate of 219%, and 180%, respectively. The ERP estimates for carrot and beets, which have been identified as import substitutes were found to be 170% and 127%, respectively. For the meat and meat processing sub-sector, the ERP for chicken of 808% was the highest of all four products studied. Milk, had an ERP of 250% and pork, an ERP of 158%.

In general, the results of the study indicate that the Barbados agricultural sector receives a fairly high level of protection from non-CARICOM competition. The degree of protection may however, be overstated since no adjustments are made for policy interventions which may have impacted the price of competing imports. The results suggest that consumer prices are positively correlated with the level of protection accorded to the agricultural sector. Alternatively, the results indicate that one way to increase agricultural production (if one subscribes to the food security view), is to institute high levels of protectionism. The problem associated with this

approach is that it may result in inefficiency and resource misallocations. In addition, it is quite possible that high domestic food prices due to inefficient agricultural production, could reduce access to adequate food supplies for some segments of the population. Decreased agricultural protectionism on the other hand could result in greater dependency on imported food, but would most likely result in cheaper food for all. It therefore appears that the policy option adopted in pursuit of food security depends critically on how the concept is itself defined.

From the results, it appears that in the medium-long term, employment, particularly in the garment industry will decline as a consequence of the new CET rates. As liberalized sectors gain as a result of efficiency increases, it is quite possible that employment opportunities may again open up in more competitive industries. The employment effects resulting from the new rates remain uncertain however since output in this sector is determined more by the special arrangements than by competitive forms. In agriculture the impact may be delayed because of the special treatment accorded to the sector.

Based on the results of the study, the following recommendations are advanced keeping in mind the overall macroeconomic objectives of the GOB to increase export competitiveness and employment.

- 1) Nominal and effective rates of protection for final agricultural and industrial goods in Barbados may have to be reduced to lower the cost of living, but this move will render these sectors less competitive in the short run and will reduce revenue to the Government of Barbados. In this regard, the recent initiative in CARICOM to lower the maximum CET rate to 20% by 1998 with special treatment given to the agricultural sector will allow the Barbados economy time to make some of the necessary adjustments. A rate of 40% will remain on final agricultural products.
- 2) The CET rate of 0% should not be raised to 5% during the phase-out period. Although raising the rate will increase revenue to the GOB, it will also dramatically increase the cost of agricultural inputs. This will increase costs in the agricultural sector at a faster rate and will make the sector generally less competitive. In the recent initiative, a zero rate will remain on agricultural inputs.
- 3) Notwithstanding the proposal to maintain adequate levels of protection (both tariff and non-tariff), extensive research should be conducted to identify the agricultural sub-sectors which will be competitive/uncompetitive in a liberalized trading environment.

- 4) **Non-tariff trade barriers should be removed immediately on essential agricultural production inputs. On final goods, it is difficult to justify the magnitude of an equivalence tax required to offer the same protection to agricultural products as the existing NTBs, therefore NTBs should be retained at least until 1998. This would give the policy-makers time to assess the implications of lowering the CET.**
- 5) **The few remaining price controls on agricultural and consumer food products should be phased out with some urgency. This will create some relief from high food prices to consumers in Barbados. In this regard, it is noteworthy that since the removal of controls on poultry in 1992, consumer prices on chicken have declined.**
- 6) **Avenues to reduce the feed costs for livestock farmers should be explored. Intensive pasture management and the use of domestic products and by-products continue to be potentially inexpensive substitutes for imported protein and energy feeds.**

A recent initiative to replace stamp duties and consumption taxes by a Value Added Tax (VAT) system - which is supported by the author - will have implications for the level of protection offered to competing agricultural products. The rate in the VAT will be lower than the combined nominal rates of the existing 20% stamp duty and the basic consumption tax rate of 21% on extra-regional agricultural goods. This will significantly lower the level of protection and prices of competing agricultural products from extra-regional sources.

APPENDIX I: Case Studies

Case 1: Milk

The results of this case study are based on the cost of production of milk as of March 1992.

The herd size:	50 cows
Output/Annum:	170,000 kg of Milk
Production Period:	1 Year
Farm Size:	16 ha

- 1) Average total cost of production may vary from \$1.10 - \$1.24 per kg of milk produced.
- 2) Variable costs represent 75% - 85% of total costs of which the three largest components are:

	VC	TC
Feed	30.7%	24.1%
Labour	21.7%	17.0%
Utilities	10.3%	8.1%

- 3) In 1991 Pine Hill Dairy paid an average price of Bds\$1.54 per kg for fresh milk.
- 4)
 - a) As of June 1992 the wholesale price in the U.S. for milk was approximately Bds\$0.58 per kg.
 - b) For 1991, the average export price of milk from Trinidad & Tobago was Bds\$1.38 per kg.
 - c) An equivalence tax (E.T.) of 15% may protect local producers from competition with milk from Trinidad & Tobago while the tax will have to be in excess of 100% to protect from US competition.
- 5) The production of evaporated milk is another source of concern for the dairy industry in Barbados.
 - Recent data suggests that a can of evaporated milk (415 ml) costs \$1.14 to produce without tax on the inputs. Tax inclusive the cost is \$1.19. The average retail price is approximately \$1.76 per can.

$$\text{NPR} = \frac{1.19 - 0.60}{0.60} = 98\% \quad (6)$$

Alternatively

$$\text{NPR} = \frac{1.14 - 0.60}{0.60} = 90\% \quad (7)$$

- With no tax on inputs the Pine Hill Dairy will save approximately 20,400/month (17,000 cases x 24 cans x \$.05/can) or \$244,800/annum on the production of evaporated milk.
- 75% of the Pine Hill Dairy's revenue is derived from milk products.
- Pine Hill Dairy employs about 200 workers.
- A wipe-out of the dairy industry may imply a loss of 150 jobs at the Pine Hill Dairy, not to mention the dairy farmers who employ about two persons for every fifty (50) cows.
- Condensed milk is imported already canned for the Pine Hill Dairy from the Netherlands, Jamaica or Trinidad and Tobago.
- There are other domestic linkages with the Pine Hill Dairy which include:
 - 1) packaging material - milk boxes
 - 2) distribution of milk products
 - 3) cans

Some ten (10) firms depend heavily on the Pine Hill Dairy for their survival - i.e. including the production of juices and yogurt.

Case 2: Feed

- **Feed is the major cost in the rearing of livestock averaging between 60% and 70% of total variable cost (see chart).**
- **In the production of feed, raw materials account for about 70-75% of the overall cost - maize is the major raw material.**
- **The evidence suggests that the cost of feed produced in Trinidad and Tobago is about 30% less than in Barbados.**
- **It is believed that the following factors contribute to the difference of 30%:**
 - i. **energy cost is believed to be 50% of Barbados' cost;**
 - ii. **taxes on inputs in addition to an intermediary in the trading of maize;**
 - iii. **labour cost is higher in Barbados;**
 - iv. **economies of scale favor the feed manufacturers in Trinidad and Tobago.**
- **At present Barbados Mills is the sole importer of maize. Feed manufacturers are therefore forced to pay a mark-up on the imported maize.**
- **Lowering the price of feed may be achieved by:**
 - i. **reducing energy cost possibly by lowering consumption taxes;**
 - ii. **removal of taxes on imported inputs and licensing requirements;**
 - iii. **pursuit of an incomes policy to narrow the wage cost differential;**
 - iv. **merging of the feed producers in Barbados.**
- **Benefits of lowering feed cost:**
 - i. **cheaper domestic prices of chicken, pork, beef, eggs, etc;**
 - ii. **increased potential for export of agro-processing products;**
 - iii. **potentially higher profit margins which may encourage greater investment in the more viable enterprises;**
 - iv. **apart from benefits to locals, the tourist industry may look more favorably at linking with the agricultural sector.**

- **Cost of lowering feed cost:**
 - i. **possible job losses in the short-term within the feed industry.**

Apart from the use of taxation to protect the local manufacturing and agricultural sectors, other policy initiatives are necessary to improve their competitiveness in a 'free-market' economy. The reduction in feed cost is one such initiative that will have significant effect in the medium-term. Another major initiative may be a reduction in the cost of energy. Ironically such initiatives may prove to be far more critical than lowering wage costs.

APPENDIX II:

Methodology for Computing the Output Index

This note on the Index of Non-Sugar Agriculture (INSAP) production mirrors the note by Cox (1976) on a volume index of agricultural production. The Laspeyres Index number formulation is utilized. This requires the selection of a base year, the choice of weights and the computation of relatives, sub-indices and an overall index.

Selection of the base year

1990 was chosen as the base year since prices and data are most reliable for more recent years. If price data was available, 1986 could have been used since it was the year in which real GDP growth was highest and the inflation rate and GDP deflator lowest. Data limitation, however, precluded 1986 being used as the base year. The selection and classification of items, follows the same criteria outlined in Cox (1976), (refer to Table IIA).

Weights and Computation

The index of non-sugar agriculture output is the weighted arithmetic mean of the quantity relatives of the selected commodities and is computed as:

$$\text{INSAP} = \frac{\sum_{i=1}^n qr_i w_i}{\sum_{i=1}^n w_i} \quad (8)$$

where: qr_i is the quantity relative
 w_i is the commodity weight and
 n is the number of items in the index

As a first step, the weights are computed for the various commodities. The weight of a given commodity (w_i) is represented by its share in the value of output in 1990 (the base year). Notationally w_i is given as:

$$w_i = \frac{q_{oi} P_{oi}}{\sum_{i=1}^n q_{oi} P_{oi}} \quad (9)$$

where: P_o is the base price
 q_o is the base year quantity

The weights for the various sub-sectors are computed as the sum of its individual commodity weights i.e. export agriculture, domestic agriculture and livestock industry.

The quantity relatives (qr_i) for each commodity is the ratio of the quantity of a commodity produced in a given period to the quantity produced in the base year:

$$qr_i = \frac{q_{1i}}{q_{oi}} \times 100 \quad (10)$$

To calculate the commodity group index which is also a weighted arithmetic mean of the quantity relatives of all items comprising the group, such as export agriculture, domestic agriculture and livestock industry, the following formula is used:

$$CGI = \frac{\sum_{i=1}^k qr_i w_i}{\sum_{i=1}^k w_i} \quad (11)$$

where K is the number of commodities in the group.

To compute the index for all products, the formula in equation (22) is used. However, the overall index can also be obtained by multiplying each commodity group index by its weights and summing the results. Mathematically, this is represented by:

$$INSAP = W_1 CGI_1 + W_2 CGI_2 + W_3 CGI_3 \quad (12)$$

TABLE 12: INDEX OF AGRICULTURAL PRODUCTION

	UNITS 000	Weights	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991
EXPORT		0.413	201.9	133.2	140.6	152.0	111.6	100.0	94.4					
Sugar Cane	Tonnes	0.361	194.8	128.6	145.0	160.3	115.9	100.0	94.8					
Onions	kg	0.008	59.5	49.8	69.1	97.7	58.9	71.4	67.9	100.0				
Cotton	kg	0.001	44.1	0.0	14.2	74.9	258.5	241.7	100.0					
Sweet Potatoes	kg	0.024	177.8	139.8	74.0	82.9	135.2	95.9	100.0					
Yams	kg	0.018	445.4	256.4	182.1	113.3	77.8	137.4	113.3					
DOMESTIC		0.056	254.8	252.0	127.0	134.8	100.0							
Beets	kg	0.001	454.6	612.5	293.4	328.6	235.7	100.0						
Carrots	kg	0.025	165.5	167.0	75.9	61.1	107.9	122.2	92.6					
String Beans	kg	0.011	116.7	114.1	86.0	76.2	122.2	116.7	94.4					
Tomatoes	kg	0.006	488.2	360.8	148.1	129.6	177.8	100.0						
Cucumbers	kg	0.003	233.7	485.3	87.6	91.6	127.1	122.9	91.7					
Pumpkins	kg	0.002	294.2	282.7	119.4	192.4	226.9	100.0						
Cabbages	kg	0.008	519.6	477.4	325.1	285.7	207.1	100.0						
LIVESTOCK		0.531	54.7	59.8	67.2	57.6	65.7	63.8	73.8	83.2	84.0	96.7	100.0	
Pigs	kg	0.058	71.6	73.5	101.4	58.9	73.1	73.1	93.1	101.1	83.2	100.0		
Cows and Calves	kg	0.034	43.4	40.5	34.2	34.2	28.7	25.7	32.3	41.6	40.8	87.2	100.0	
Goats and Sheep	kg	0.001	126.4	45.9	65.7	44.8	47.6	45.9	55.0	55.0	49.6	74.5	100.0	
Poultry	kg	0.303	51.9	59.3	66.2	60.6	66.0	63.6	73.4	80.9	86.4	103.1	99.7	
Eggs	kg	0.040	63.7	79.8	95.9	64.1	115.1	82.8	112.0	92.4	100.0			
Milk	kg	0.096	52.8	51.2	49.6	54.6	61.5	65.7	74.4	82.6	83.4	90.3	100.0	
TOTAL INDEX			126.6	104.8	100.0	108.7	98.2	98.9	100.0					

APPENDIX III:

Calculation of the Revenue Effect in a Simulation

Calculation of the Initial Import Duty Revenue

Total hypothetical revenue from initial import duties is calculated by summing the product of import duties and corresponding import values. The initial value of imports for a product or for a sub-sector (i.e. groups of products) can be represented as follows:

$$M_1 = Q_1 F E_1 \quad (13)$$

where M_1 = initial value of imports

Q_1 = initial quantity of imports

F = price of imports in foreign exchange

E_1 = initial exchange rate (local currency per unit of foreign currency)

The hypothetical revenue, assuming duties are collected as listed, is calculated as follows:

$$R_1 = M_1 t_1 \quad (14)$$

where t_1 = initial import duty for a product or average import duty for a sub-sector

Calculation of the Simulated Import Duty Revenue

A simulation may involve changes in the value of imports on which revenue calculations are based, as well as changes in import duties. The quantity of imports may be changed exogenously, based on Theuser's estimates. Endogenous changes in quantity may arise because of demand response duties, the exchange rate, or scarcity rents. The value of imports will also change if the exchange rate is adjusted. The new import tax base is calculated by adjusting the initial import tax base (M_1), taking into account exogenous changes in the volume of imports, devaluation or revaluation, import demand elasticities, and changes in consumer prices caused by fluctuations in import duties or exchange rates.

The following variables can be selected by the user through the simulation menus (subscript 2 indicates a simulated value):

- t_2 - import duty used in the simulation (the default is t_1);
- m - exogenous change in the volume of imports (the default is zero);
- d - rate of devaluation -- i.e., the percentage by which the local currency value of foreign exchange has risen (the default is zero);
- p - percentage by which domestic consumer prices (P) increases as a result of changes in the exchange rate and scarcity rents, separate from the effect of changes in import duties (if d is entered, then a choice must be made between $p=0$, $p=d$, or $0 < p < d$: if d is not entered, then $p=0$);¹⁰
- e - price elasticity of import demand, defined as the ratio of the total percentage change in quantity demanded of the import to the percentage change in domestic price associated with the change in other variables:

$$e = \frac{(Q_2 - Q_1) / Q_1}{(P_2 - P_1)} \quad (15)$$

Any or all of the above variables can be entered. The variables m , d , and p are entered as percentages. m and p can be entered for standard or user-defined import groups. 'e' is entered as a negative value or as zero for no endogenous change in the import tax base. It can

¹⁰ The difference between d and p implicitly captures the extent to which rents on traded goods have diminished. These rents may be attributable to scarcity (induced by quantitative restrictions) or to other sources of monopoly power of distributors of importables. Let P represent the domestic consumer price of importable and r represents the increase in price due to rents to:

$$\begin{aligned} P_1 &= FE_1(1+t_1)(1+r_1) \\ P_2 &= FE_2(1+t_2)(1+r_2) \end{aligned}$$

Substituting $E_2/E_1 (1+d)$, the ratio of the domestic consumer price after all the changes to the initial price is:

$$P_2/P_1 = (1+d)(1+t_2)(1+r_2)/(1+t_1)(1+r_1)$$

Let $p = (1+d)(1+r_2)/(1+r_1) - 1$. Then $(1+p)/(1+d) = (1+r_2)/(1+r_1)$, i.e. the ratio of the impact of devaluation on domestic prices relative to the impact on border prices equals the ratio of the impact on rents on domestic prices after devaluation (and any associated policy changes). If devaluation eliminated all rents for a commodity, then $r_2=0$ and $p = (1+d)/(1+r_1) - 1$.

be entered for standard or user-defined import groups. If non-zero elasticities are chosen, the default is -0.5 for capital goods, -1.0 for agriculture, mining and intermediate goods, and -2.0 for consumer goods. It should be noted that these are illustrative figures, not empirical estimates.

The formula for the calculation of the new import tax base is derived in the following steps:

1. Exogenous change in the volume of imports:

$$Q_1 = Q_1(1+m) \quad (16)$$

2. Endogenous change in the volume of imports, assuming non-zero import demand elasticities:

- (a) Impact of changes in import duties, the exchange rate, and scarcity rents on domestic prices:

$$P_2/P_1 = (1+p)(1+t_2)/(1+t_1) \quad (17)$$

- (b) From the elasticity formula, starting from exogenously changed imports as a base:

$$Q_2 = Q_1[1+e(P_2/P_1 - 1)] \quad (18)$$

Substituting from (1) and (2.a):

$$Q_2 = Q_1(1+m) [1+e\{(1+p)(1+t_2)/(1+t_1) - 1\}] \quad (19)$$

3. As a result of devaluation:

$$E_2 = E_1(1+d) \quad (20)$$

4. Substituting into $M_2-Q_2FE_2$ (the simulated value of imports for a product or a sub-sector) from (2.b) and (3):

$$\begin{aligned} M_2 &= FE_1(1+d)Q_1(1+m) [1+e\{(1+p)(1+t_2)/(1+t_1) - 1\}] \\ &= M_1(1+d) (1+m) [1+e\{(1+p)(1+t_2)/(1+t_1) 1\}] \end{aligned} \quad (21)$$

This is the formula used in the simulation. For zero elasticity, the formula reduces to:

$$M_2 = M_1(1+d)(1+m) \quad (22)$$

The hypothetical revenue is calculated by summing the hypothetical revenues for all commodities. R_2 is compared to R_1 to determine the hypothetical percentage change in revenue associated with the simulated changes. M_2 is also listed, together with the percentage change in the local currency value of import.¹¹

¹¹ If the change in the local currency value of imports is c , then the change in the foreign exchange value of imports would be equal to $(1+c)/(1+d) - 1$.

APPENDIX IV:

Calculation of Weighted Nominal Protection

Using Economic Indicators At Nominal Values

Weighted average nominal rates of protection using economic indicators at their nominal value are calculated according to the following formula:

$$A_j = \sum_i (T_{ij} W_{ij}) / \sum_i W_{ij} \quad (23)$$

where A is the weighted average nominal rate of protection for sector j. If the weights are at the CCCN or HS level, T is the nominal rate of protection (eg., customs tariff) that corresponds to product i of sector j, and W is the value of the economic indicator that corresponds to product i. If the weights are at the sub-sector level, T is a simple arithmetic mean of the nominal rates of protection the correspond to sub-sector i of sector j, and W is the value of the economic indicator that corresponds to sub-sector i.

The overall weighted nominal rate of protection for a group of sectors is calculated according to the following formula:

$$A = \sum_j (\sum_i [T_{ij} W_{ij}]) / \sum_j (\sum_i W_{ij}) \quad (24)$$

Using Economic Indicators At Deflated Values

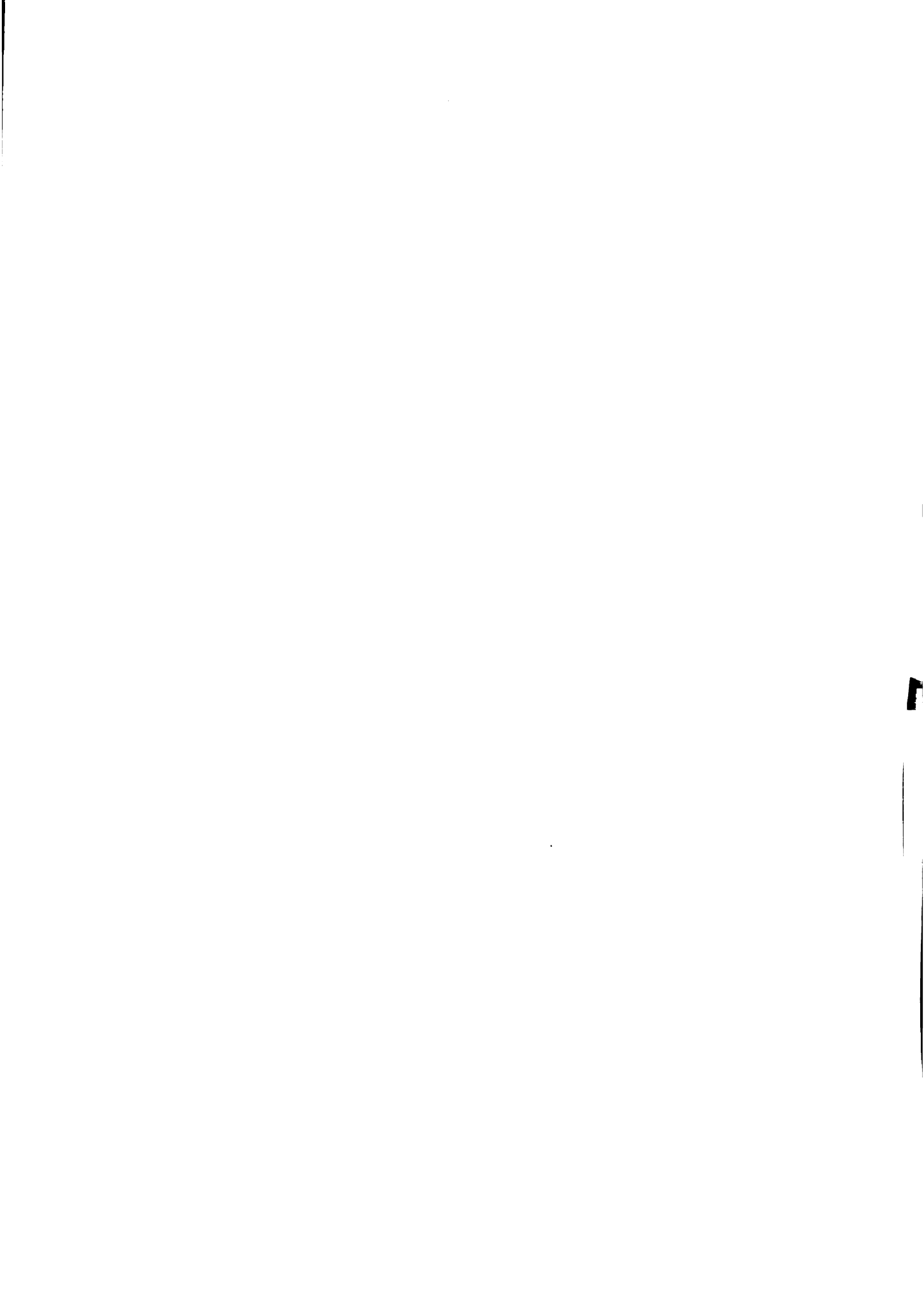
Weighted average nominal rates of protection using economic indicators approximated at world prices are calculated according to the following formula:

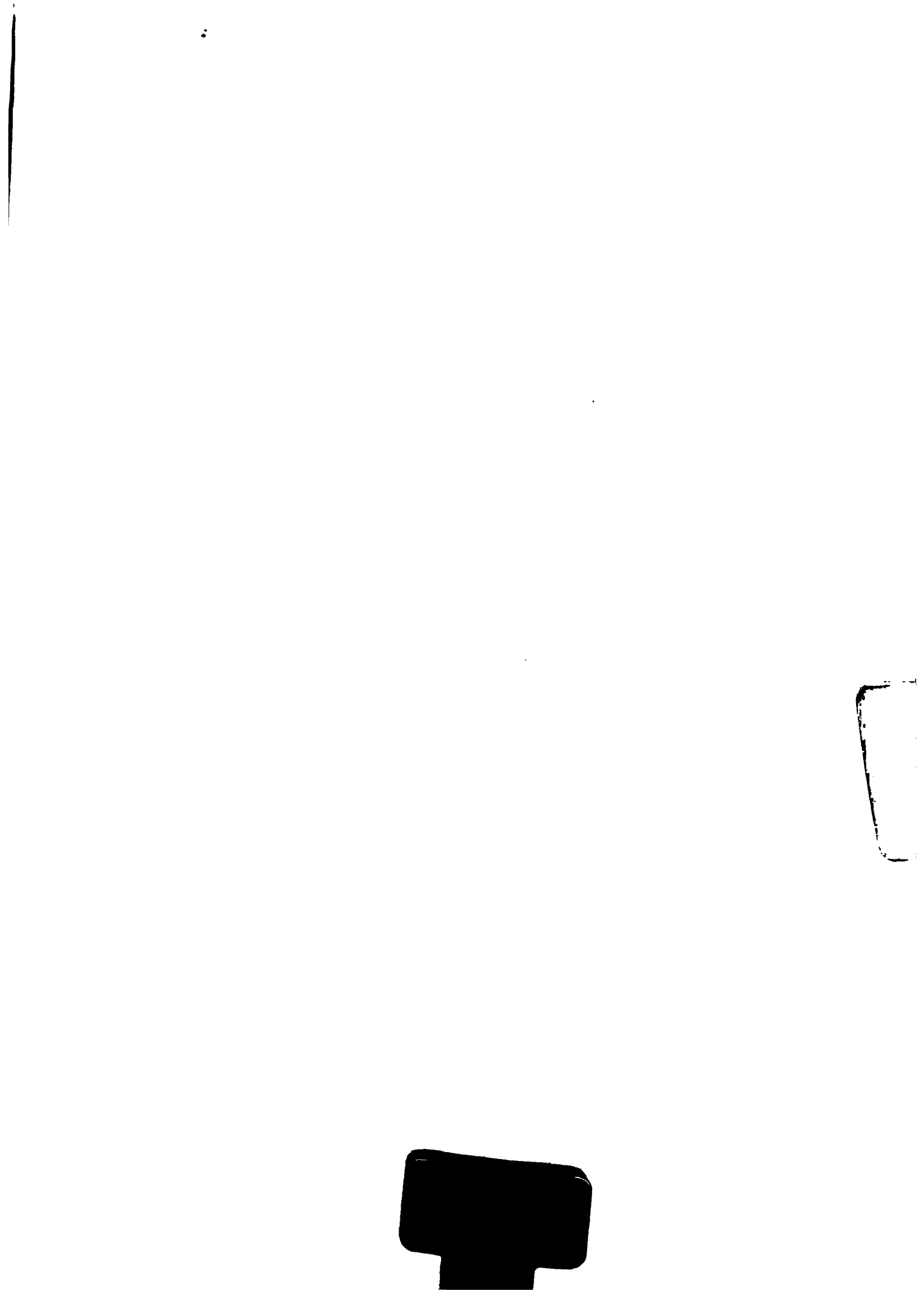
$$A_j = \sum_i T_{ij} (W_{ij} / [1 + T_{ij}/100]) / \sum_i (W_{ij} / [1 + T_{ij}/100]) \quad (25)$$

where A is the weighted average nominal rate of protection for sector j. If the weights are at the CCCN or HS level, T is the nominal rate of protection (eg., customs tariff) that corresponds to product i of sector j, and W is the value of the economic indicator that corresponds to product i. W is deflated by (1 + T) to approximate its value at world prices. If the weights are at the sub-sector level, T is a simple arithmetic mean of the nominal rates of protection that

corresponds to sub-sector i of sector j , and W is the value of the economic indicator that corresponds to sub-sector i . The overall weighted nominal rate of protection for a group of sectors is calculated according to the following formula:

$$A = \frac{\sum_j \left(\sum_i [T_{ij} W_{ij} / (1 + T_{ij}/100)] \right)}{\sum_j \left(\sum_i W_{ij} / [1 + T_{ij}/100] \right)} \quad (26)$$





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