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Export Taxes on Primary Products:

A Policy Instrument in International Development

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EXPORT TAXES ON PRIMARY PRODUCTS:

A POLICY INSTRUMENT IN INTERNATIONAL DEVELOPMENT

A paper prepared by M.V.D.J.Karunasekera
of the Economic Affairs Division

Economic Affairs Division
Commonwealth Secretariat
Marlborough House, London SW1 5HX

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PREFACE

At their meeting in October 1981, Commonwealth Heads of Government noted that unstable prices and declining terms of trade were having an adverse effect on the economies of primary product exporting developing countries, and they asked the Secretariat to give priority, inter alia, to studying measures to improve the commodity export earnings of these countries. This study is part of the Secretariat's response to that request. It investigates the economic feasibility of groups of developing countries acting in concert to levy uniform export taxes on selected primary products with the aim of raising the prices of these products and thus helping to improve the terms of trade of the producing countries concerned.

The views expressed in the study are those of the author and do not necessarily reflect the position of the Commonwealth Secretariat. The study is being published in the hope that the analysis it contains and the proposals it makes will help to stimulate further constructive discussion in international fora.

Finally, I would like to express my appreciation to Professor H.W. Singer and Dr. David Evans of the Institute of Development Studies, University of Sussex, for the advice and support they gave to the author of the study throughout its preparation.

B. Persaud
Director and Head
Economic Affairs Division

February 1984

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I. INTRODUCTION

1.1 The purpose of this study is to examine the feasibility of groups of developing countries acting in concert to impose ad valorem taxes on their exports of primary products [1], with the aim of increasing their net earnings in real terms by improving their terms of trade. Under certain circumstances, such a course of action could increase the welfare not only of developing countries but also of the world [2]. The study also attempts to examine the implications for domestic processing of primary products and incomes stabilization of introducing such a policy.

1.2 Primary product exports are of great importance to many developing countries. In 75 countries (excluding members of OPEC) out of 96, for which reliable data are available, their share in total merchandise exports was over 50 per cent in 1980 [3], while in 15 developing countries (excluding OPEC members), it was over 98 per cent. In 1979, non-fuel primary product exports were almost 50 per cent of total merchandise exports from low-income, oil-importing countries and above 42 per cent [4] of those from the middle-income, oil-importing countries. Primary product prices fluctuate severely in the short-term as a result of unanticipated variations [5] in demand and supply; the instability of export receipts from developing countries increased 37 per cent during the 1970s [6] and an instability index showed their variation to be twice as high as that of industrial countries.

1.3 Much has been written on the problems experienced by primary product producers as a result of price and earnings instability and secular declines. While price fluctuations are a recognised feature, a significant body of opinion holds that their adverse effects have been exaggerated [7]. Similarly, since the enunciation of the hypothesis of deteriorating terms of trade for primary products by Prebisch (1950) and Singer (1950), there has been some debate as to whether over the long run the terms of trade have been unfavourable to commodity producers [8]. Over a very long period, there are considerable measurement problems [9]; but whatever the general situation concerning historical trends, there is 'prima facie' evidence relating to easily identifiable periods of declining relative prices for primary product exports (excluding oil and gold) of developing countries [10]. One such period has been from 1957 to 1982 (Annex Table 1), where the price index of thirty primary products exported by developing countries declined at a rate of 1 per cent per annum in real terms. Comparable data relating to major product groups - food, beverages, agricultural raw materials, and metals - also indicated a declining trend except for beverages, where the upward trend in cocoa prices outweighed the declining one in tea prices.

1.4 Furthermore, there is no denial of the considerable terms of trade losses experienced by many developing countries, over considerable periods of time. Sri Lanka, a low-income country, provides a dramatic example of the terms of trade problem, on which the World Bank had this to say:

> "Sri Lanka represents an extreme, although perhaps not unique, case of the terms of trade loss that can affect a specialised, raw-material exporting economy. It also shows the difficulty of adjusting to continuous terms of trade losses despite considerable success in reducing consumption and increasing production"[11].

1.5 Efforts to solve the twin problems of instability and decline have made little progress despite various international initiatives to set up price stabilization agreements including buffer-stock schemes. This approach is embodied in the UNCTAD Integrated Programme for Commodities (IPC) which was adopted as a framework for international commodity policy at UNCTAD IV in 1976. It includes among its objectives, the establishment of commodity prices which are remunerative to producers and take into account, inter alia, world inflation and the prices of imported manufactures (indexation)[12].

1.6 Since the inauguration of the IPC, only slow progress has been made in agreeing and implementing specific measures such as the Common Fund (CF) and new international commodity agreements (ICAs). Only one new ICA (natural rubber) has been negotiated, though four existing ones (sugar, coffee, cocoa, and tin) have been renegotiated. One of the main problems has been the reluctance of the major developed countries to support the new pattern of trading implicit in the UNCTAD programme as originally conceived[13]. In so far as ICAs are concerned, developed countries tend to support those agreements which they regard as not artificially attempting to raise prices above trend levels[14].

1.7 The Common Fund's agreed resources are in any event but a very small fraction of the developing countries' export earnings from non-fuel primary products, which amounted to US$129 billion in 1980[15]. Hence, it could not support depressed prices for more than a short period and would, therefore, be unable directly to bring about any sustained improvement in the terms of trade faced by less developed commodity exporting countries during prolonged periods of decline. The difficulties experienced in reaching agreement between commodity producers and consumers raise the possibility of a different approach involving action by producers alone. Where poor countries are concerned considerable welfare gains could result from such action and we explain in the following chapter a mechanism to obtain such gains.

1.8 Although large potential gains for producers in aggregate as a result of supply controls can be demonstrated for some primary products, international agreement has proved extremely difficult. This has been mainly because of objections to such schemes by some major consuming countries, although there have been problems of sharing the benefits and costs of such controls among producing countries. For example, a sticking point in the negotiations for an international agreement on tea has been the distribution of export quotas between producing countries. One possible alternative means of raising primary product prices is the imposition of export taxes by the producing countries at uniform ad valorem rates[16]. But an export tax will tend to lower the supply price of a taxed commodity. Consequently, the producers with high price elasticities of supply might experience a shrinkage in their export shares. One way of avoiding this is to pay compensation to those producers on the basis of initial (pre-tax year) shares in world exports. The theoretical factors which are conducive to following such a course of action are discussed in Chapter II. The subsequent chapter is concerned with the developing country experience in this area. Chapter IV assesses those commodities which appear suitable for the imposition of export taxes while the final chapter gives the conclusions that can be drawn.

II. THEORETICAL FRAMEWORK

2.1 A case for an export tax policy can be made using the concept of optimum tariff and this is shown in section (a) below. It can also be argued that for activities which generate economic rent (as described in paragraph 2.9 below) because of market imperfections and differential resource endowments, a larger share of these rents can be retained in the producing countries through the levy of export taxes. The latter approach is discussed in section (b). It is followed, in section (c), by a brief review of the literature.

(a) Export Taxes as a Form of Optimum Tariff

2.2 The argument that there is some optimum rate of tax on trade (either on imports or exports, but considered as an export tax for the purpose of this study), at which the marginal gain from improved terms of trade equals the marginal loss from reduced specialization on the basis of comparative advantage, is well established theoretically[17]. It has also been argued that an 'optimum' export tax can be levied which raises world welfare if it represents a 'second best' solution in a world in which there is government intervention with export supply of a less 'efficient' kind. However, we shall, here, be concerned with the case of a tax from the export's or exporter's standpoint alone.

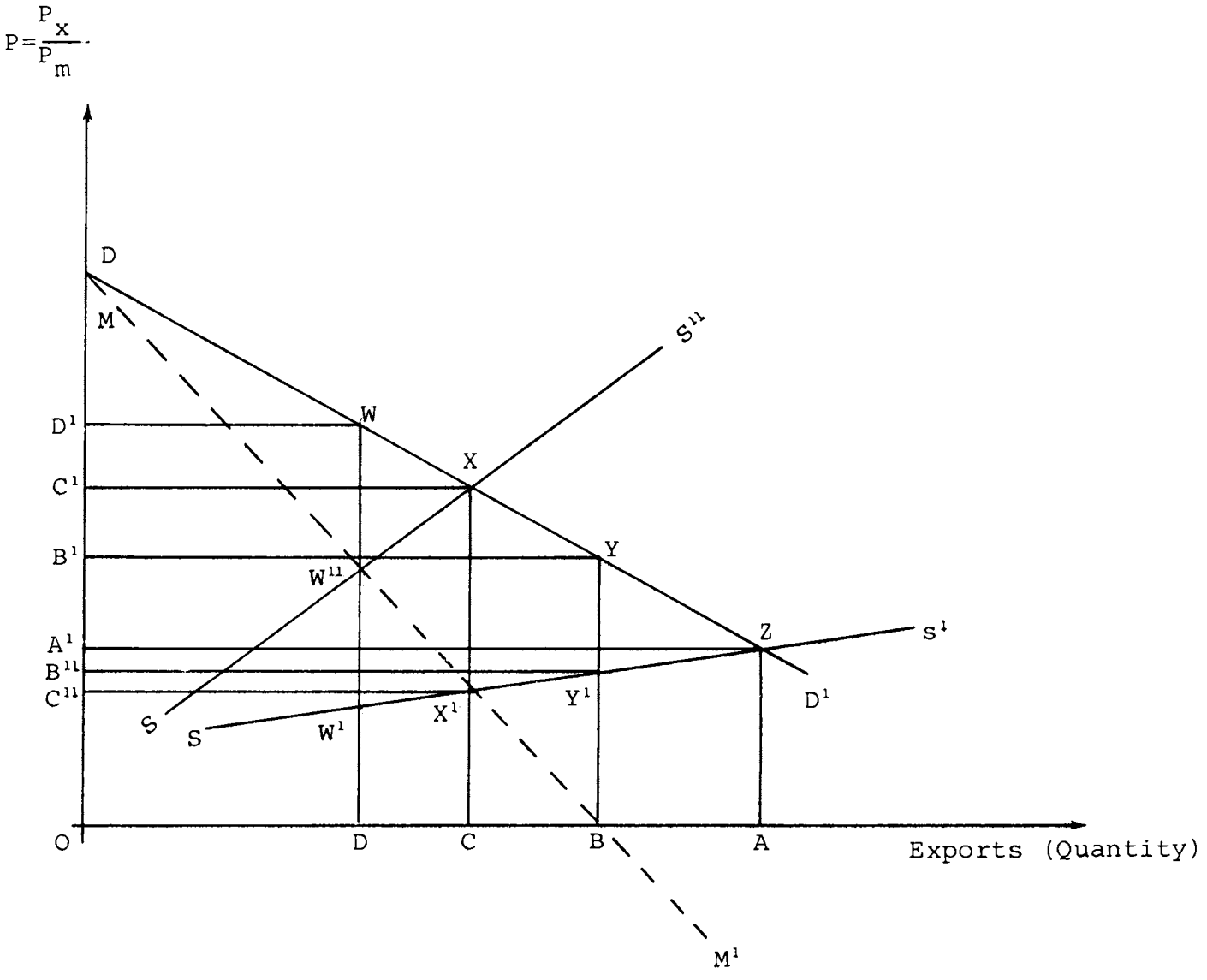
2.3 It has been shown that under partial equilibrium (neo-classical) conditions, a government imposing an export tax on a particular commodity drives a wedge between export and domestic prices[18]: the export price rises to the extent to which the exporter(s) is (are) not (a) price taker(s), while the domestic producer and consumer price fall. Because of lower domestic prices, production falls,

but domestic consumption rises, hence the volume of exports falls. As long as the foreign demand for the commodity is not perfectly elastic, there is an export tax which would maximize the real incomes of producing countries at the expense of foreign consumers. The analysis below assumes that either there is one dominant exporter or that exporters act in concert. Clearly, one small supplier among many would be a price taker rather than a price setter, and a tax unilaterally imposed by a price taker would have no impact on the selling price and lead to no gains by its exporter.

2.4 The optimum export tax argument is demonstrated in figure 1, which shows the supply and demand relationships of exports and imports. Balance-of-payments equilibrium and an unchanged exchange rate are assumed; the terms of trade are shown on the vertical axis and exports on the horizontal axis. In the figure, export demand and domestic supply are shown by DD^1 and SS^1 respectively. Under perfect competition, the terms of trade will be OA^1 and exports will be OA. The exporters, acting in concert, can maximize export revenue by restricting exports with an export tax of YY^1/YB, since for exports OB and price OB^1, marginal revenue will be zero at B where the marginal revenue curve MM^1 intersects the horizontal axis. Further restriction of exports with a tax of XX^1/XX will yield the optimum export tax from a welfare point of view, since for exports OC, marginal revenue is equal to the average supply price at X^1. An export tax of WW^1/WD will yield the optimal export tax (fiscal) revenue, since at W^11, marginal revenue will equal marginal costs.

2.5 In the estimation of the model, DD^1 and SS^1 were considered to be the relevant export demand and domestic supply schedules which are independent of all other schedules for each commodity. In effect, the import price (P_m, see model in Annex II) was considered to be fixed in domestic and foreign currency, so that the export price (P_x) is the world price in domestic or foreign currency. If the commodity concerned only constitutes a small proportion of the imports of all importers, the effect of the export tax on the balance-of-payments of the importing country will tend to be small but unfavourable. Thus, 'ceteris paribus', the balance-of-payments adjustment will tend to shift the demand curve DD^1 downwards in terms of foreign exchange; failure to take this into account will lead to an overstatement of the estimated export tax revenue. Balance-of-payments effects in the exporting country will vary according to the importance of the commodity; certainly up to the optimum rate of export tax, the balance-of-payments will improve. The resulting appreciation of the currency will shift the supply curve upwards in terms of foreign exchange, leading to an overestimation of the optimal export tax rate. The latter, however, will counter the overstatement of the optimal export tax revenue. Furthermore, it is likely that in the commodities under consideration, these effects will not be too important on the demand side; but they may be important on the supply side - an overstatement of the optimal export revenue tax rate.

Fig: 1 MECHANISM OF EXPORT TAXES



Source: Adapted from W.M.Corden, *Trade Policy and Economic Welfare*, Oxford: Oxford University Press, 1974, Chapter 7.

2.6 The benefit accruing from imposing an export tax depends on the domestic and foreign elasticities of supply and demand, for they determine the relative burden borne by foreign consumers and domestic producers. It also depends on the length of time considered, because the increase in export revenue and welfare would be lower if foreign elasticities increase in the long run. Elasticity estimates suggest that world demand is inelastic for most primary products (Annex Table 2), hence export earnings would increase following the imposition of an export tax.

2.7 To examine the ability of primary producing countries to shift the export tax to foreign consumers, estimates based on alternative export tax rates and elasticities (domestic supply and foreign demand) are presented in Table 1. It is assumed, as above, that producing countries are acting in concert. The estimates given in columns 3 to 7 indicate the proportion of tax that can be passed on to foreign consumers. For instance, in the extreme case where there are no substitutes, the price elasticity of foreign demand will be zero and the tax can be fully passed on to foreign consumers (column 3). However, for most primary commodities the price elasticity of foreign demand is greater than zero, but less than unity. On the other hand, domestic supply elasticities for most primary products generally range between 0.2 and 2.0. This implies that a substantial proportion of the export tax can be passed on to foreign consumers. Within the above range of elasticities, the proportion of tax that can be shifted to foreigners is given in the boxed section in Table 1. Considering the elasticities and the tax rates used, the burden of the tax borne by the foreign consumers ranges between 17 per cent and 83 per cent.

2.8 It should be said in conclusion that the above arguments apply in principle to supply controls in general. However, as mentioned earlier, agreement on distributing the production or supply quotas under ICAs or producer agreements can be very difficult. This is particularly the case when world market shares are changing sharply (Annex Table 3) as a result of temporary fluctuations in national supplies and long-term changes in the structure of world production. An export tax agreement avoids this problem, and since it does not artificially 'freeze' current global patterns of production, it should result in a more generally acceptable - and efficient - post-agreement situation.

(b) Economic Rent: A Case for Export Taxes

2.9 The concept of economic rent is used in this context to refer to payments to factors of production (e.g. labour, capital) over and above the minimum necessary to induce the employment or utilisation of those factors. In the contemporary world there are several different categories of economic rent, including rent from land ('resource rent'), rent from the short-run fixity of factors of production ('quasi-rent'), rent accruing to enterprises exploiting market power ('monopoly rent'), and rent resulting from entrepreneurial ability. This study is concerned principally with resource rent and monopoly rent. The former remains very important in the exploitation of mineral resources. There are substantial variations in the location, ease of mining and quality of mineral deposits, and the corresponding costs of discovering, exploiting and processing them vary considerably. Conceptually, the amount of economic rent accruing to a given-intra-marginal-deposit should equal the difference between the cost of production from the deposit and that from a marginal deposit. Commodity markets also have considerable imperfections which give rise to monopolistic or oligopolistic rents. Problems of ascertaining the level of arms-length 'competitive' market prices make it very difficult to measure such rents, which may be captured by the operating enterprise rather than accrue to the resource owner (usually the government); and there are also conceptual problems of ascertaining normal profits in high risk activities. Yet for mineral exporting countries, and particularly for the developing countries among them these rents could be used as an input into economic development. Some economists have suggested the imposition of export taxes as a means of mitigating this situation. These issues are discussed below.

2.10 The use of export taxes to help realise economic rent is two-fold. The first application is for specific, intra-marginal producers. Clearly, under competitive world market conditions intra-marginal producers operating at low production costs but

TABLE 1

Export Tax Incidence on Foreigners
Under Various Assumptions

Elasticity of Export Supply	Rate of Export Tax (per cent)	Elasticity of Foreign Demand				
		0	-0.5	-1.0	-2.0	-5.0
-0.5	5	100	100	0	0	0
	15	100	100	0	0	0
0.2	5	100	32	19	11	5
	15	100	30	17	10	4
0.4	5	100	49	22	19	9
	15	100	46	20	17	8
2.0	5	100	83	70	54	32
	15	100	81	68	51	30
5.0	5	100	92	86	75	54
	15	100	91	84	73	51

Source: Computed by the author.

trading at 'world' market prices will obtain an economic rent. A national government may, however, wish to ensure that this surplus accrues to itself or to the national exchequer rather than to a foreign-owned producer. The second application is where there is imperfect competition in the market - oligopoly, for example - with distorted transfer prices so that 'rents' are being earned. Katarak (1980) has demonstrated that (where the transfer price is equal to or less than the marginal revenue for host country exports) an export tax may be the most appropriate policy for an exporting country even if it is small and the tax is imposed by that country alone (so the country is a price taker). Some evidence of market imperfections is given below.

2.11 Since the Second World War, the most striking feature of the evolution of international trade has been its phenomenal growth (at a pace almost twice that of world output). Much of the expanded output and trade has been accomplished under the auspices and control of transnational corporations. The overall magnitude of this intra-firm trade is still not fully documented but much is known. A recent study has stated that in trade among OECD members intra-firm trade accounts for 25 to 50 per cent of the total, depending on the definition used[19]. If intra-firm trade accounts for a large share of any one market, prices for items moving internationally within affiliated firms may be set on the basis of the firm's own tax and other requirements rather than solely by the market - distorting resource allocation and the ensuing division of benefits. By implication, those transactions which are open and competitive will be more volatile than they otherwise would be[20].

2.12 In some commodities, the influence of large firms appears considerable (Table 2), questioning the validity of the usual theoretical assumption of effective competition among many sellers and buyers. For instance, the world bauxite industry is an oligopoly dominated by six multinational firms of which three are domiciled in the United States. These multinationals are fully integrated and occupy strategic positions in the industry, from raw material production to marketing semi-fabricated products. It appears that through a variety of consortia arrangements, they are associated with practically all new projects of international significance within the industry outside the USSR[21]. They greatly influence prices of aluminium entering into world trade, and the official quotations for aluminium ingots show a high degree of correspondence and stability. There exists in addition a 'thin' market on the London Metal Exchange (LME) in which aluminium from the USSR and minor sources is traded. Prices in this market generally fluctuate in consonance with those on LME for other non-ferrous metals, particularly copper.

2.13 There is also a high degree of concentration in the market structure for iron ore. The eight largest firms control over three-fifths of world iron ore mining, although there are a large number of small producers in the developing countries. On the demand side, iron ore purchasing appears to be even more concentrated. In Belgium, Japan, and the UK, all purchases are handled by a single entity[22]. In France and Germany (West) two companies purchase

TABLE 2

Concentration in International Supply of Selected Primary Products

Commodity	Number of Leading Firms	Market Share per cent	Observation Level	Date
1. Bauxite	4 8	48.6 68.6	Mining	1977
2. Copper	4 8	37.6 55.4	Mining	1977
3. Iron Ore	4 8	37.3 62.1	Mining	1976
4. Lead	4 8	27.7 48.2	Primary Lead refining	1976
5. Nickel	4 8	72.3 91.1	Ferro-Nickel Capacity	1976
6. Tin	4 8	68.5 88.9	Smelting	1976
7. Zinc	4 8	23.1 50.5	Mining	1976
8. Sisal	5	54.6	World trade	1980
9. Bananas	3	63.8	World trade	1980

Sources: Items (1) to (7) from United Nations Industrial Development Organisation, "Mineral Processing in Developing Countries", New York: United Nations, 1980; item (8) from United Nations Conference on Trade and Development, "The Marketing of Hard Fibres (Sisal and Henequen): Areas for International Co-operation" TD/B/C.1/Psc/21, 1981, Table 17, p.30; item (9) from Food and Agriculture Organization, "Review of the Economic Aspects of Production, Trade and Distribution of Bananas", CCP:BA 82/4, March 1982.

practically all iron ore imports, and in Italy and the Netherlands a single company performs similar operations[23]. Considered this way, there appear to be strong oligopsonistic elements.

2.14 In the case of copper, supply is also considered to possess oligopolistic features. The eight largest multinational firms still control over half the world's copper mining capacity, although their share has fallen over the years as state agencies in developing countries have increased their control by nationalisation and expansion[24]. One recent development has been the entry of major oil companies, which now control about a fifth of the market economy countries' copper mining capacity[25]. In so far as developing countries' refining capacity is concerned, the seven largest firms account for about half the total[26]. The smaller (independent) producers depend on the large integrated corporations for raw material supplies or marketing outlets or both[27]. On the demand side, concentration appears to be less.

2.15 The tin market is both oligopolisitc (few-sellers) and oligopsonistic (few buyers) (see Table 2). With a large measure of nationalisation of the tin mining industry in several major producing countries (e.g. Malaysia, Bolivia and Indonesia), the role of the multinationals appears to be limited on the supply side. State-owned producers currently account for most of the tin mined in Indonesia and Bolivia and hold a substantial stake in Malaysia and Nigeria. In Zaire and Rwanda, foreign interests are still responsible for a large share of mine production. On the demand side (smelting), the importance of multinationals appears still to be high despite the trend towards state ownership.

2.16 In nickel, there is a high degree of corporate concentration in mining and refining. The International Nickel Company (INCO) still controls about a third of world output. It operates a large number of mines and smelters in Canada and a refinery in Britain. A French company, Societe Metallurgique Le Nickel (SLN), accounts for about an eighth of world output, with mines and smelters in New Caledonia and a refinery in France. In lead, concentration is relatively less, yet twelve companies account for over three-fifths of the market economies' refining capacity, giving rise to oligopolistic elements. In zinc, eight companies control more than half the world's mine capacity, through direct ownership, subsidiaries and equity sharing.

2.17 Generally, mineral markets are considered to be imperfect, with oligopolistic characteristics. Complex patterns of horizontal and vertical integration exist, and transactions between different stages of mining and processing may not take place at arm's length. These conditions give rise to oligopolistic rents, whose very existence indicates the scope for fruitful bargaining by the producing countries in order to obtaining a share of that rent through export taxation[28].

2.18 In several agricultural commodities, para-statal organisations control supplies to varying degrees while demand also tends to have oligopolistic features. In cocoa, for instance, all beans in Ghana, Nigeria and the Ivory Coast are purchased by the state marketing boards while the processing part of the industry appears to be controlled by a handful of multinational companies [29].

2.19 In 1980, three multinationals controlled nearly two-thirds of world trade in bananas [30]. One of them, the United Fruit Company, remains the largest single banana producer and exporter in Central America, and in 1980 its share in world banana trade amounted to over a third. Moreover, all three multinationals are vertically integrated, with the result that trade does not take place at arm's length but contains the possibility of transfer pricing.

2.20 In commodities such as tea and tobacco, on the other hand, most trading takes place under an auction system. This may give the semblance of free competition, but auction prices can still be influenced by the actions of a small number of large-scale buyers. Partly for that reason, the governments of tea producing countries appear distrustful of auctions [31], and there has been a tendency to move to sales through forward contracts directly with importers. A recent UNCTAD study has shown that eight British companies account for a large proportion of world tea trade, and the corporate concentration may be even higher when interlocking shareholdings and directorates are considered [32]. In the case of tobacco, there seems to be a tendency towards vertical integration, whereby a few firms or their subsidiaries perform many functions, including leaf buying, marketing, shipping and storage, and product manufacture, marketing and distribution. Leaf production is the only area into which they have not expanded. The oligopolistic structure of the tobacco market is characterised by several factors including inter-changeable trademarks, which allow companies to produce each other's brands in specific markets. Such an industry structure facilitates the use of administered prices.

2.21 Another marketing development for some commodities has been the emergence of 'futures' trading. Trading on futures markets, though usually considered competitive, often reflects speculative activity which becomes pronounced during periods of world economic instability when large amounts of mobile capital surge into and out of commodity markets as the values of alternative assets ebb and flow. This speculation affects the process by which expectations of future prices are formed in the commodity markets.

(c) Recent Literature on Export Tax Policy

2.22 Several authors have argued strongly in favour of export taxes as a means of improving the terms on which primary commodities are traded.

2.23 The possibility of using a combined measure of export quotas and export taxes was first shown by Kaldor (1963). He argued that export taxes could be used to modify efficiently the relative size of national export quotas imposed under an international agreement.

2.24 The use of export taxes as a means of achieving higher export prices for tropical foods and beverages was first raised at international level at UNCTAD III (1972). UNCTAD (1974) argued, with reference to tea, that if an export tax were levied on an ad valorem basis it would not affect the relative competitive position of the different exporting countries in the world market; therefore, the imposition by all exporting coutries of an ad valorem tax on exports of tea could be envisaged as a possible policy measure to achieve an immediate improvement in tea prices while avoiding the negotiating problems which would inevitably arise in the elaboration of an export regulation agreement.

2.25 Henderson and Lall (1976) made a strong case in favour of export taxes as a means of improving the terms on which primary products are traded. They based their case on the fact that export taxes might lead to a gradual shift in production and exports to countries which have a comparative advantage in the product in question.

2.26 Maizels (1976) argued in favour of export taxes on primary products (satisfying elasticity conditions) on the ground that they are a simple technique which would, at least overtly, avoid the market-sharing problem.

2.27 Lewis (1977) noted that commodity producers could avoid the problems of supply control (in commodities with an inelastic demand) if they all agreed to levy an export tax, thus gaining more revenue without giving an incentive to farmers/firms to increase output.

2.28 Wong (1978) argued that in the international rice market, Thailand faced a downward sloping demand curve. He calculated the static welfare effect of the export tax imposed by Thailand and found it to be substantial.

2.29 In addition, there are several commodity studies which have empirically estimated the gains from price-raising action by producers. Pincus (1965) considered the possibility of increasing export earnings through international commodity agreements on sugar, coffee, tea, cocoa, and bananas. He estimated that monopoly pricing of these commodities would have raised earnings in 1961 by 16 per cent to US $5 billion. Johnson (1967) modified Pincus' estimating procedure in deriving monopoly profits that could have been extracted by international commodity agreements with respect to the same commodities. His results indicated that producers could have extracted US $2.6 billion in monopoly profits.

2.30 The implications of charging a monopolistic price in the world cocoa market were examined by Behrman (1968) for 1964. He calculated total revenue changes for the cocoa exporting countries under different price and quantity scenarios. The revenue increase was found to be marginal and Behrman suggested that the costs of implementing such an arrangement could possibly outweigh the benefits.

2.31 Eckbo (1975) reviewed the operation of fifty-one cartels and found that nineteen of them were 'successful' in raising prices 200 per cent above costs of production and distribution. He noticed the following common characteristics among the 'efficient' cartels: concentration of production (over 50 per cent), inelastic demand, few short-term substitutes, operating cost advantages (one or two producers with lower cost than others), and the presence of only a few outside suppliers.

2.32 Pindyck (1978) empirically estimated the gains to producers from cartelization of three exhaustible resources: bauxite, copper and petroleum. To serve as a base from which to measure the potential cartel gains, he drew on a model on exhaustible resource pricing. He pointed out that given elasticity estimates, a simple static computation of potential monopoly profits might be quite realistic and sufficient for markets where supply and demand can adjust quickly to price and where resource exhaustion is not a problem.

2.33 More recently, Schmitz et al.(1981) have estimated the economic effects of the formation of a producers' wheat cartel and the consequent imposition of an optimal export tax. They concluded that producers, as a group, would have gained approximately US $6.9 billion in 1980.

2.34 Emmanuel (1972) suggested the imposition of an export tax to compensate for the adverse terms of trade of developing countries[33]. The unequal exchange implied in his proposition can be stated succinctly as a situation of unequal wages between the centre and the periphery, with the former commanding higher values. The wage differential, as estimated by Emmanuel, is roughly equivalent to 15:1, and the implied annual transfer of resources from the developing to the developed countries, according to Evans, amounts to US $240 billion[34].

2.35 Gibson (1980) found that under the condition of equal efficiency wages there would be a 40 per cent improvement for Peru in its terms of trade with the United States. When translated to nominal dollars this would amount to an annual transfer of US$16 billion, which dwarfs the US$6 billion requested in the original version of the Common Fund.

III. DEVELOPING COUNTRY EXPERIENCE

3.1 We now turn to practical experience. Most export taxes have been based implicitly on one or other of the arguments set out above. There are, however, other reasons which apply in particular to individual countries acting in isolation.

3.2 The first is the use of export taxes as a revenue raising device. As we have already seen, governments can, in principle, tax the 'producer surplus' of intra-marginal producers' exports without distorting patterns of production. Further, export taxes are a

convenient means of taxing producers of export crops, being administratively easy to levy and collect. While export taxes can be evaded (e.g. through smuggling or under-invoicing), most other taxes have far more serious enforcement problems. Export taxes have sometimes been used as a crude substitute for an income tax on small and medium-sized farmers, and in some countries a 'de facto' income tax exemption is granted to producers of dutiable export crops.

3.3 Second, export taxes can serve to promote the processing of raw materials. This was a declared objective of export taxes in the eighteenth century - in the UK, for example, in relation to wool. And today in the developing countries export taxes on raw materials have also become an important device to promote local processing for export. Policies directed towards that end have been propounded by international agencies as well. For instance, in the case of the forestry sector of some developing countries, the staff of International Monetary Fund have sometimes recommended exchange rate differentiation in favour of forest product exports with higher value added locally, in order to encourage more employment and better utilization of transport capacity, while leaving the producing country less exposed to log price fluctuations[35].

3.4 Third, export taxes can serve as a counter-cyclical device. They can be used to mitigate some of the negative effects on development of a sudden, unplanned windfall in commodity export earnings and also offset corresponding periods of slump (see section (d)). The belief that large windfall gains falling to private exporters are damaging to longer-term development has several aspects, and these are discussed in section (d) below.

3.5 The experience of developing countries in levying export taxes is highly varied and often such taxes have been imposed unilaterally although bananas constitute one important exception. The early history of export taxes, the forms and uses of these taxes in developing countries, and trends in their application are presented below in sections (a), (b) and (c). In the two subsequent sections the importance of these taxes as a counter-cyclical device and as an incentive for greater domestic processing is examined. The attempt by Jamaica to obtain a greater share of 'rent' by means of a production levy on bauxite is analysed in section (f). The experience of banana producers is discussed in the final section.

(a) Early History

3.6 Before the nineteenth century, export duties were widely used in Europe to raise revenue and ensure raw materials for domestic processing. The latter purpose was stressed in countries following mercantilist policies, such as England[36]. The liberalization of trade in the nineteenth centure largely eliminated export taxes in Europe but they were extended to and maintained in colonial areas of Africa and Asia and in Latin America.

To some degree, these taxes were designed to discriminate in favour of the shipment of raw materials to the colonial power or other destinations in its empire, but their main purpose was to raise revenue.

3.7 The early history shows export taxes in developing countries to have been applied chiefly by entrepot centres such as Singapore and Zanzibar, by dominant suppliers such as Sri Lanka in the case of cinnamon and quinine (which approximated the theoretical conditions given in Chapter II, section (a) for an export tax), and generally by developing countries whose revenue requirements were modest and whose collection procedures and capabilities were rudimentary.

3.8 By the late 1930s, there were few countries where export taxes occupied an important place in the fiscal structure. The principal exceptions were to be found in Latin America, where in 1939 export taxes, chiefly on sugar, coffee, bananas and cotton, provided 12 to 19 per cent of the total tax receipts of the central governments of Guatemala, Haiti, Mexico and Peru (Annex Table 4). Subsequently, however, the use of this type of levy expanded markedly, particularly during the scarcity conditions of the Second World War and the raw material boom which accompanied the Korean War.

3.9 In the 1940s and 1950s, the fiscal policies of developing countries (which were mostly still colonies) were fashioned in the styles of advanced economies - development programmes generally involved minimal expenditures confined to balanced budgets. With independence (from the 1950s), it was recognised that the special conditions of the newly emerging nations would call for special treatment by way of taxation, government expenditures, budget construction and national debt. Meanwhile, many governments, facing urgent demands for social reform and economic progress, as well as the problems of income stabilization, desirous of economic diversification through raw material processing, and dissatisfied with private monopolies in trade, devised or extended various measures of an ad hoc and often experimental type. Outstanding among these measures was the taxation of primary product exports.

3.10 The need and the opportunity for fiscal action is nowhere greater than in the primary-producing type of country, heavily dependent on exports of a few staple products. For in such a country, the common developmental handicap of capital shortage is compounded by the vicissitudes of foreign trade. The export tax was seen as a device to cope with both these handicaps. Within its limits, and if rates are varied appropriately, it also serves as a compensatory device against the cyclical fluctuations of trading income; and it is also a means of obtaining developmental resources from trade, which is the principal dynamic element in these countries.

(b) Forms and Uses of Export Taxes

3.11 Export taxes have several forms and a country may apply any one or a combination of them. The most explicit is the export tax levied on an ad valorem or specific basis. During the early years,

export taxes were specific, expressing a governmental preference for a simple tax with a minimum of paper work and investigation. However, with the growing awareness of the dangers of export price fluctuations, the principle of ad valorem taxation of exports gained ground. Most countries have now shifted to such a basis in order to increase the elasticity of export duties, which otherwise would have to be kept under constant review if export tax receipts are to remain buoyant.

3.12 One of the more sophisticated forms of export tax levied by these countries' governments is the sliding scale of duties, whereby exports are taxed according to a schedule of progressive rates - sometimes in specific terms, sometimes in percentages - linked to the export price. Through such means, the governments of Sri Lanka and Pakistan, for example, captured about a fifth of the price rise during the Korean War boom.

3.13 A second form of export tax involves the surpluses generated by marketing boards when their buying prices lag behind market prices - an implicit impost on agriculture. In some countries such surpluses have been sought to stabilize the incomes of producers, while in others they have been employed as a source of government revenue for general use.

3.14 Another more sophisticated form of export tax is the use of differential exchange rates, in which the proceeds of selected exports are converted into local currency at a different rate from that charged on imports. For instance, in Colombia all proceeds from the export of coffee must be surrendered to the Central Bank within twenty days of registration for export. The bank exchanges these proceeds for currency exchange certificates which can be converted to pesos (domestic currency) immediately at a discount of between 6 and 15 per cent or after 120 days at their full face value. This gives rise to a differential exchange rate, since in practice an exporter who surrenders a certificate before 120 days have elapsed is subject to a discount and will in effect receive fewer Colombian pesos per US dollar than an exporter of commodities other than coffee. In 1977, Colombia exacted US $69 million through differential exchange rates from coffee exports.

3.15 In many developing countries the domestic currency appears to be overvalued. This is tantamount to a tax on exports and a subsidy on imports, transferring income from exporters to importers [37]. The IMF and the World Bank discourage implicit taxation through exchange rates, since it is thought that this discourages exports and the development of a country's export potential while encouraging smuggling.

3.16 Export taxes have also been used to support the devaluation of a country's currency. Theoretically, by increasing the local currency proceeds of exporters, devaluation stimulates exports and thus helps to correct disequilibrium in the balance-of-payments. However, for commodities with low short-term elasticities of supply, the immediate increase in export receipts may not make a significant contribution to the payments deficit. In fact, the rise in exporters' incomes may generate additional demand for imported goods, militat-

ing against the restraint required; export taxes may be used to curtail any such additional demand.

3.17 In so far as high export taxes are levied for limited periods, either to reduce the profits of exporters during devaluations or to reduce their gains during export booms associated with sharply higher export prices - for example, the coffee boom in the mid-1970s - their disincentive effects are likely to be limited while their stabilization effects may be substantial. This is because individually, the developing country producers concerned are price-takers in the international market, so there is limited opportunity for permanent rather than counter-cyclical taxation.

(c) Export Tax Trends

3.18 Table 3 summarises the relative importance of export taxes in 39 developing countries. Data are presented for 1972 and 1978, and in order to permit an easier inter-country comparison, export tax revenues are expressed as proportions of GDP, total tax revenue and export values. The data indicate that export taxes have been quite significant in at least a few countries. For instance, in 1978 they accounted for over 7 per cent of GDP in Uganda and Sri Lanka, over 4 per cent in Malaysia and Rwanda, and between 3 and 4 per cent in Zaire, Sierra Leone and Swaziland, while in 16 other countries the proportion was at least 2 per cent. Unlike the conclusion reached by much of the literature on the change in tax structure that accompanies economic development, there is no clear-cut evidence to show that export taxes became significantly less important between 1972 and 1978. In only nine countries (Chad, Ghana, Ivory Coast, Seychelles, Sudan, Zaire, India, Pakistan and Philippines) did the proportion fall rapidly. This may be thought rather disturbing in view of the negative effects that these taxes can have on the allocation of resources, and on production and exports when done unilaterally (see paragraph 3.22). But it can be argued that export taxes have been considered largely as a substitute for income taxes and in some cases have been levied to prevent exporters from obtaining unusually high profits.

3.19 The table also shows the dependence on export taxes for a large share of tax revenue in several countries at different stages of development. In Burundi, Ethiopia, Ghana, Sao Tome and Principe, El Salvador and Guatemala, export taxes in 1978 accounted for at least 20 per cent of total tax revenue while in Uganda, for special reasons, the proportion was over 70 per cent. Reliance on this tax made it possible for these countries to raise the total level of taxation substantially, but they may have paid a significant price in terms of efficiency of resource allocation.

3.20 Table 3 also gives export taxes as a proportion of export values. In 1978, these proportions ranged from under two per cent for some countries - e.g. Seychelles, Togo, and Pakistan to over 20 per cent for several others - e.g. Burundi 43 per cent, Ethiopia 33 per cent, Uganda 30 per cent, Sri Lanka 27 per cent, Ghana 25 per cent and Rwanda 25 per cent.

TABLE 3

Composition of Export Taxes in Selected Countries

Selected Countries	Per Capita Income	Export Taxes as a Percentage of					
		Gross Domestic Product		Total Tax Revenue		Exports (values)	
	US$,1980	1972	1978	1972	1978	1972	1978
Burundi	200	1.9	..	17.9	31.5	18.7	42.9
Central Afr.Rep.	300	0.6	0.7	3.7	9.4	2.1	10.5
Chad	120	1.8	1.6	8.0	10.0	9.4	8.6
Comoros	300	n.a.	n.a.	20.2	14.0	n.a.	n.a.
Ethiopia	140	1.3	2.7	8.1	26.1	9.2	33.1
Gambia,The	250	2.4	2.7	17.0	10.2	7.0	6.9
Ghana	420	3.9	2.9	29.8	23.7	19.5	25.0
Ivory Coast,The	1,150	4.3	2.3	19.4	12.3	12.7	7.7
Madagascar	350	n.a.	n.a.	6.8	9.0	5.8	n.a.
Mauritius	1,060	1.6	2.5	9.6	12.6	4.0	7.0
Rwanda	200	2.0	4.4	22.1	19.8	17.6	25.0
Sao Tome & Principe	490	n.a.	n.a.	18.0	35.6	n.a.	n.a.
Seychelles	1,770	0.4	0.1	2.1	0.4	3.5	0.3
Sierra Leone	280	1.8	3.1	10.5	17.4	7.1	15.7
Sudan	410	0.9	0.7	6.2	4.0	6.2	6.6
Swaziland	680	0.02	3.0	0.1	11.1	0.03	5.3
Tanzania	280	0.4	1.2	3.1	7.8	2.0	14.9
Togo	410	1.7	2.5	6.9	9.8	6.3	1.8
Uganda	300	2.4	7.1	19.3	70.4	13.5	30.0
Upper Volta	210	0.3	0.5	2.9	3.7	5.5	10.3
Zaire	220	7.7	3.3	21.8	11.6	24.2	15.7
India	240	1.4	0.2	19.2	1.1	36.8	2.9
Indonesia	430	n.a.	0.9	2.9	6.0	n.a.	3.4
Malaysia	1,620	2.0	4.4	13.2	21.8	5.2	8.5
Papua New Guinea	780	n.a.	n.a.	0.3	3.4	n.a.	n.a.
Pakistan	300	2.0	0.1	10.0	1.2	17.6	1.5
Philippines	690	0.8	0.3	10.1	2.9	5.2	2.2
Solomon Islands	460	n.a.	n.a.	12.9	23.1	n.a.	n.a.
Sri Lanka	270	2.2	7.6	13.0	37.5	14.1	26.5
Thailand	670	0.2	0.4	1.7	3.9	1.3	2.4
Brazil	2,050	n.a.	0.3	0.7	1.9	n.a.	4.6
Colombia	1,180	0.8	1.6	8.0	17.3	8.2	18.5
Costa Rica	1,730	0.2	1.6	1.1	9.3	0.7	6.4
Ecuador	1,270	2.1	0.8	18.8	7.6	7.0	3.7
El Salvador	660	1.8	2.6	18.3	33.6	7.2	14.4
Guatemala	1,080	0.5	2.4	14.5	25.3	3.1	12.3
Guyana	690	0.5	0.5	2.3	0.6	1.0	0.8
Mexico	2,090	0.2	1.0	2.2	8.2	4.9	15.9
Peru	930	0.3	2.7	2.2	17.7	2.0	12.1

n.a. not available.

Source: Tax data are from IMF, "Taxation in Sub-Saharan Africa", Occasional Paper No.8, Washington, D.C. October 1981; per capita incomes are from The World Bank, "1981 World Bank Atlas", Washington D.C.

3.21 The breakdown of export taxes by commodities (Table 4) shows that in all the countries analysed, the revenue is derived from a small number of products, and is generally heaviest in the most dynamic primary sector of the economy: coffee in Burundi, Tanzania and Guatemala; sugar in Guyana; phosphate rock in Morocco; tea in Sri Lanka, and rubber in Malaysia. In the case of Colombia, export taxes are limited to the leading primary sector, coffee.

3.22 A comprehensive analysis of shifting the incidence of export taxes is not attempted here. It is determined by such factors as the nature and organisation of production, the country's share in the world market and the options open for the market participants. The developing countries reviewed in this study usually command individually only a small proportion of world supplies of primary products; thus, their market position normally approximates to that of price takers. It is likely, therefore, that if each country were to act individually, the burden of an export tax would be borne largely by domestic producers. But if they acted in concert (e.g. as in bananas), it would be possible in some cases for them to make substantial revenue gains. These instances are assessed in the following chapter.

(d) A Counter-cyclical Device

3.23 We have noted above that export taxes can be, and sometimes have been, used for counter-cyclical purposes. This role arises because of the frequently destabilizing effects of fluctuations in commodity earnings which produce large shortfalls or windfalls of foreign exchange. A counter-cyclical tax which is graduated can help to stabilize windfall earnings (by increasing the rate of tax) and dampen the effect on producers of shortfalls (by lowering the tax rate).

3.24 The macro-economic impact of commodity earnings fluctuations will partly depend on how much of the instability is passed back to producers and then on how specific groups dispose of their earnings. In situations which involve a few large traders dealing with a multitude of small producers, or large plantations or mining companies - domestic or foreign-owned - dealing with unorganised workers, only a portion of the price rises in the international market may be transmitted to the domestic producer or worker. The secondary effects then depend on the various marginal propensities for disposing of additional earnings between consumption and saving, between domestic goods and imports and between hoarding and productive investment.

3.25 If, however, there is a decline in export prices it is plausible to suggest that the exporters will try to shift most of the impact to the domestic producers in an effort to maintain their profit margins. This

TABLE 4

Breakdown of Export Taxes by Main Primary Products in Selected Countries

	Commodity Export Tax as a Percentage of Total Tax Revenue						Commodity Export Taxes as a Percentage of Total Export Taxes					
	1974	1975	1976	1977	1978	1979	1974	1975	1976	1977	1978	1979
1. Burundi												
Coffee	10.1	5.1	28.0	30.5	n.a.	n.a.	90.3	86.5	96.4	97.0	n.a.	n.a.
Minerals	0.2	0.3	0.4	0.7	n.a.	n.a.	2.1	4.5	1.2	2.1	n.a.	n.a.
2. Morocco												
Minerals	3.7	2.3	1.4	1.0	0.9	0.7	88.3	88.7	77.9	82.7	81.0	74.4
3. Sierra Leone												
Cocoa	0.4	3.1	3.9	5.9	5.9	5.0	3.4	30.5	34.4	30.1	33.9	43.9
Coffee	1.7	0.4	3.9	10.7	8.7	4.6	16.1	3.7	34.4	54.2	50.0	40.6
Palm kernals	6.9	4.9	1.0	0.9	0.7	0.5	65.5	50.0	8.6	4.6	3.9	4.4
4. Tanzania												
Cashew nuts	0.2	0.3	0.2	0.3	0.2	0.2	2.3	4.9	3.8	1.7	2.0	2.4
Coffee	4.4	1.5	3.1	16.0	15.4	6.4	53.2	21.4	66.9	84.9	87.9	83.0
Cotton	0.5	0.3	0.4	2.0	0.6	0.8	5.6	4.0	9.6	10.5	6.4	10.4
Sisal	3.0	4.5	0.5	0.5	0.3	0.3	36.6	66.0	10.2	2.5	3.1	3.3
5. Colombia												
Coffee	6.4	8.0	9.4	11.6	11.1	17.3	100.0	100.0	100.0	100.0	100.0	100.0
6. Costa Rica												
Bananas	3.1	7.0	6.2	5.1	3.9	3.8	30.5	55.0	57.1	43.7	42.9	40.7
Sugar	0.5	0.7	0.7	0.3	0.3	0.1	4.5	5.5	6.1	2.4	2.9	0.6
7. Dominican Republic												
Cocoa & Coffee	n.a.	0.1	2.0	11.7	4.9	6.4	n.a.	0.5	16.2	77.0	70.1	75.3
Sugar & Honey	14.5	25.4	9.2	3.3	1.9	1.9	98.3	98.8	73.9	21.8	27.1	22.5
8. Guatamala												
Bananas	0.1	0.1	1.7	1.2	1.2	1.0	1.3	1.4	12.7	4.4	4.8	5.2
Coffee	7.8	2.6	10.4	25.1	23.5	18.3	95.9	24.8	78.7	92.6	93.0	91.4
Cotton	0.2	0.5	0.4	0.8	0.5	0.6	2.4	5.0	3.2	2.8	2.0	3.0
Sugar	n.a.	7.0	0.7	0.1	0.01	0.01	n.a.	68.5	5.1	0.2	0.01	0.2
9. Guyana												
Sugar	30.9	47.8	18.8	3.7	n.a.	n.a.	95.7	99.0	98.0	88.2	n.a.	n.a.
10. Malaysia												
Palm oil	5.3	6.2	3.0	4.9	2.6	2.5	24.2	45.0	16.4	25.0	14.2	17.0
Rubber	8.9	2.7	9.5	7.9	9.0	12.0	40.8	19.3	51.4	40.0	48.2	54.8
Tin	6.3	4.3	5.3	6.2	6.3	5.8	28.7	31.3	28.8	31.7	34.2	26.0
11. Sri Lanka												
Coconut	4.0	1.5	0.1	0.5	3.3	3.0	23.9	14.2	1.0	3.7	7.8	8.0
Rubber	7.0	3.3	4.1	4.6	9.5	11.1	41.9	30.6	39.8	36.0	22.7	29.7
Tea	4.3	4.8	5.0	6.6	27.9	22.4	25.4	44.9	48.7	51.3	67.0	60.0
12. Thailand												
Rice	7.8	2.3	0.1	n.a.	n.a.	n.a.	62.9	37.8	23.3	n.a.	n.a.	n.a.

n.a. not available

Source: International Monetary Fund, Government Finance Statistics Yearbook Vol. v, 1981.

sequence means that the decline in real income will be accompanied by domestic deflation as well as foreign exchange difficulties.

3.26 These broad responses of a developing country to fluctuations in export prices are sometimes aggravated by monetary phenomena. During a boom period the banking system is likely to show a tendency toward expansion of commercial credit, based on a short period of increment of foreign exchange and hence of bank reserves. When later the induced imports begin to rise, the banks lose reserves and tend to contract credit, thus putting a brake on economic activity.

3.27 The ability of a government to cope with the problems of stabilization as well as to promote economic development depends partly on the fiscal and monetary treatment of export price fluctuations. Where governments have already instituted export taxes, differential exchange rates, or other devices bearing directly on primary product exports, a rise of export prices can be expected to bring automatically an increment in government revenue. This effect will be enhanced if in addition the authorities act promptly to raise the rates in question, or have already established a sliding scale of rates.

3.28 Where governments rely largely or wholly on general taxation, the revenue effects of an export price boom are more uncertain, depending on the diffusion of income increases through the economy and on the scope and effectiveness of the whole taxation network. In a developing country, where increases in income are often concentrated and sometimes concealed, the progressive income tax is limited in its effects, and those effects are belated. Stepped-up excise taxes are more enforceable but are undesirably regressive, and sometimes are perverse in extending the inflation they were designed to prevent. Other widely-used levies, like the land tax, are clumsy and inappropriate for counter-cyclical purposes. The export tax can by comparison, be both automatically stabilizing and efficient.

(e) Processing

3.29 The ability of export taxes to fulfil one of their declared objectives - to promote the processing of products before export - is illustrated below with a few examples.

3.30 In Indonesia, the government policy of promoting more domestic processing of timber can be seen as an attempt to maximize the long-term benefits from forestry-related activities by ensuring the capture of the resource rent which arises[38]. In pursuit of that policy, the government, in 1978, increased the export tax on logs from 10 per cent to 20 per cent of the government-determined 'check prices' and in the following year imposed a tax of 5 per cent on exports of roughly sawn timber (hardly processed) in an attempt to overcome efforts by exporters to evade the tax and other charges imposed on log exports. There are currently almost a dozen separate government charges on the latter, and they amount to 42-45 per cent of the f.o.b. price of logs (see Annex Table 5).

3.31 There are no reliable data on price elasticities to evaluate whether Indonesia has shifted its export taxes on to foreign consumers. However, the impact of its policies has been remarkable. For instance, the volume of log exports declined in 1980 and 1981, while log prices increased sharply in 1979 and remained high till the end of 1980. Moreover, a 50 per cent differential was created between the prices of logs for export and those for local processing, providing a strong incentive for the latter so long as export taxes on forestry products remain nil or negligible. In fact, Indonesia's exports of sawn wood and plywood rose rapidly, the annual growth being 28.7 per cent (1961-79), and 186.6 per cent (1975-79) respectively. Moreover, the number of plywood factories reached 22 in 1980, with an aggregate annual capacity of 1.1 million cubic metres, compared with 16 at the end of 1978.

3.32 In Brazil, several government policies have been used to encourage the domestic processing of cocoa. The government levies an export tax on cocoa beans of 10 per cent whereas on semi-processed products it is only 6 per cent. In addition, during the early 1970s, when stringent foreign currency restrictions had been in force, the government paid more domestic currency per dollar to exporters of semi-processed cocoa. This differential exchange rate amounted to an implicit export tax on cocoa beans. Due to these and other incentives the expansion of cocoa processing in Brazil has been remarkable, and it processed about half of its cocoa beans in 1980. This development has had its effects on the world market and Brazil's exports of cocoa liquor as a proportion of the world total rose from under one per cent in the late 1960s to 38 per cent in 1980[39].

3.33 In the Philippines, there are long-standing differential export duties on copra and coconut oil, 7.5 per cent and 4 per cent respectively, which encourage local processing[40]. In addition to the basic export duty, 'premium' duties are levied on the difference between the customs valuation price and a basic price established by the authorities. The premium duty is levied at 20 per cent on coconut oil (a processed product) and 30 per cent on copra. It is not payable when the customs valuation is below the basic price. During the 1970s, exports of coconut oil grew at a phenomenal rate while those of copra declined rapidly.

(f) Bauxite Taxation in Jamaica

3.34 One good contemporary example of export taxation is that of bauxite. Its use by Jamaica was inspired by several of the considerations discussed above: an attempt to lead the way in concerted action by producers; an attempt to extract 'rent' from mining companies; and to promote processing. In 1974 the Jamaican government imposed a production levy on all bauxite "deemed to have been exported", equivalent to 7.5 per cent of the arithmetic average of the price realised for primary aluminium by the three major US producers (Aluminum Company of America, Reynolds Metal Company, and Kaiser Aluminum and Chemical Corporation) for every 4.3 long dry tons (the amount required to produce one short ton of aluminium). The impact of the levy on the cost of

producing aluminium metal was equivalent to about US ¢2.5 per pound in 1974.

3.35 Jamaica was the major producer of bauxite until 1970 when it accounted for almost a quarter of the world total (outside the centrally planned economies). It also supplied two-fifths of US aluminium production. Its production rose steadily in response to the growth in demand for aluminium, the relatively low cost of mining and processing in Jamaica and of transportation to North America. By 1970 there were five alumina plants and three bauxite exporting operations, all owned wholly or partly by subsidiaries of four of the six major aluminium multinationals (Alcoa, Kaiser, Reynolds and Alcan). The capital investments of these companies in Jamaica had reached US $800 million (gross) in 1974.

3.36 Successive Jamaican governments had attempted in different ways to improve the contribution of the bauxite industry to the local economy. Mining had expanded and there had been investment in alumina refineries but government revenue per tonne of bauxite had remained modest. After rising from US ¢70 in 1950 to US $2.24 in 1957, it reached US $3.08 in 1966 but declined to US $2.01 in 1973[41]. The aluminium multinationals were subject to the 'normal' company tax on income. But since bauxite and alumina were traded within vertically integrated concerns, 'notional profits', based on the 'negotiated' price of bauxite, were used for tax purposes. However, there was a wide gap between the negotiated price and the declared f.o.b. unit value of Jamaican bauxite imported into the USA, broadly illustrative of the extent of the rent accruing to the aluminium companies by means of transfer pricing.

3.37 The government entered into negotiations with the aluminium companies in early 1974 with a view, primarily, to increasing tax revenue. These negotiations broke down and the government imposed a bauxite production levy. Its immediate effect was to raise government revenue from about US $2.00 per tonne in 1973 to US $12.00 in 1974, when it totalled almost US $175 million.

3.38 However, the Jamaican government began to face considerable pressures from the multinationals and in order to avoid external constraints on its fiscal and other measures, it withdrew from the international centre for the settlement of investment disputes, thus preventing the US companies from resorting to the centre for arbitration. The companies cut back production - between 1974 and 1976 bauxite and alumina production declined by over 30 per cent and 75 per cent respectively - and started laying-off workers. In that period there was considerable industrial unrest in the Jamaican industry, culminating in the closure of an alumina plant.

3.39 The government's attempts to get a common pricing policy by the International Bauxite Association (IBA) members failed. In fact, Australia and Guinea, two IBA members, increased their bauxite output. Moreover, the market economies were facing recession and world bauxite supplies were outstripping demand. These factors enabled the companies to apply pressure on the government and it agreed to a remission of the levy.

3.40 It is paradoxical that in spite of falling demand in the US, that country's aluminium prices rose sharply from 1973 to 1975. An investigation by the Executive Office of the US President into the pricing policies of the aluminium industry revealed, among other things, that the profitability of the major US aluminium companies had improved since the imposition of the bauxite levy (see Table 5).

3.41 The Jamaican experience suggests the need for concerted action on the part of producers if they are to obtain a large share of rent in the mineral industries. For an example of such action, we turn to bananas.

(g) Case Study on Bananas

3.42 As we have argued and shall further demonstrate in the following chapter, under plausible elasticity assumptions it is feasible to consider effective concerted action on price by producers of several commodities including bananas. Using bananas as an example, an attempt is made here to relate the theoretical conditions given in Chapter II to the practical problems exporters face in imposing an export tax.

3.43 At a meeting in April 1974 between all major Latin American exporters, a preliminary decision was taken to establish the Union de Paises Exportadores de Banano (UPEB). Its three principal advocates - Panama, Costa Rica and Honduras - also decided to link the creation of UPEB with an export tax of US ¢2.5 per pound - $1.00 per box of 40 pounds effective April 15, 1974. Though the UPEB was formally established in September 1974, it took over one and half years to gain ratification by the governments of Colombia, Costa Rica, Guatemala, Honduras and Panama. Subsequently, Dominican Republic, Nicaragua and Venezuela acceded to the agreement.

3.44 The initial steps to create UPEB were taken in response to a particular set of historical circumstances. Before the Second World War, Costa Rica, Guatemala, Honduras and Panama were the principal producers of bananas exported to the developed countries. Since then in each of the four countries, bananas have represented as much as 70 per cent of their total export earnings. Though in recent years the traditional predominance of the sector has been eroded by diversification, it still remains the largest employer. Between 1971 and 1975, the four countries on average accounted for 38 per cent of world banana exports, and they are expected to maintain this share in 1983 in spite of export taxes.

3.45 The evolution of the banana industry in the four countries shows the dominance of three multinational companies which in 1973 accounted for almost three-fifths of the banana exports. All three companies are vertically integrated from production and purchase in the exporting country to sales at the free-on-rail stage in the importing country.

3.46 Price formation in the world banana market is considered to be a classic example of transfer pricing by multinational companies[42]. 'World' banana prices remained virtually static in nominal terms from

TABLE 5

Average Rates of Return on
Invested Capital of Major US Aluminium Companies

Selected Aluminium Companies	Returns		
	1965-74	1970-74	1973-77
	----------	per cent	----------
Alcoa	6.98	6.73	7.3
Kaiser	7.35	6.74	8.1
Reynolds	5.88	5.53	7.4
Alcan	7.78	8.25	9.1

Source: Aluminium Prices 1974-75, Staff Report - Executive Office of the President, Council on Wage and Price Stability, Washington, D.C., September 1978, p. 202.

1950 to 1974 while the terms of trade of the four banana exporting countries fell 60 per cent; the terms of trade problem became particularly acute following the oil price increase in 1974.

3.47 The export tax decided upon by Panama, Costa Rica and Honduras at the inception of UPEB would have generated US $130 million in government revenue and even if the tax had been fully passed on to consumers it would have increased the retail price by a mere US ¢2.5 per pound (0.8 per cent of the average retail unit value). By contrast, import duties in developed countries averaged 6.9 per cent.

3.48 This decision was strongly contested by the multinational companies and led to a series of actions including curtailment of export volumes, and alleged bribery of government officials. Consequently, in 1974 the tax rates were lowered from US $1.00 to 25 cents per box in Costa Rica, Honduras and Panama and to 35 cents in Guatemala. The 1982 banana export taxes in the main UPEB countries were Costa Rica US $1.00 per box, Guatemala, Honduras and Nicaragua 50 cents and Panama 60 cents. It is estimated that the UPEB members have earned over US $600 million from export taxes levied up to 1982. A recent study has concluded that the multinational companies have increased their selling prices considerably more than the export tax applied.

3.49 Several economic arguments were used against the imposition of the tax. Unlike oil, bananas were not considered an essential commodity in the developed countries and it was suggested that the price increase would result in a fall in consumption and hence in export earnings. This argument implied a price elasticity of demand for bananas greater than unity; but according to some estimates, it ranges between -0.5 and -0.8 (Annex Table 2) which satisfies the theoretical criteria on the demand side (Chapter III). Another argument was that the competitive position of non-members, particularly Ecuador (which accounts for a fifth of world exports), would be improved, causing a diversion of trade. This implies a price elasticity of supply of more than unity. However, it is estimated to be well below unity (Annex Table 2), satisfying the theoretical criteria on the supply side (Chapter III).

3.50 Though the UPEB countries reduced the export tax rate under pressure from the multinational companies, the economic arguments advanced against the tax proved to be inaccurate. After the imposition of the tax, retail prices increased considerably in the developed countries and in the US they rose on average by 50 per cent. Though the UPEB countries experienced a marginal (4 per cent) decrease in their exports (volume) in 1975, their exports in 1981 were one-fifth greater than the 1974 level. On the other hand, contrary to expectations, Ecuador's exports declined by 10 per cent and its production by one-third in the corresponding period, though according to some sources its production costs are estimated to be lower (see Table 9).

3.51 The paradox of Ecuador is due to several factors including lower producer prices, a greater incidence of sigatoka disease (whose effects were compounded by intermittent strikes by crop sprayers), and a highly over-valued currency (whose 'free rate' in 1982 was almost 80 per cent higher than the official rate).

3.52 Overall, it appears that the UPEB experience can be represented as an example of the successful implementation of a flexible export tax regime by a group of countries acting in concert. It has enabled the UPEB members' governments to earn considerable revenues without a decline in export volume, their share of world exports rising from 43 per cent in 1974 to 52 per cent in 1981. There may be still more scope for such revenue raising activities, and the estimates of this study indicate that the optimal export tax rate for bananas ranges from 20 to 80 per cent (Table 12) above existing rates. If the banana exporters levied a 20 per cent tax, it is estimated that their annual export earnings would increase by 7 per cent and yield US $255 million in tax revenue.

IV. ASSESSMENT OF COMMODITIES SUITABLE FOR EXPORT TAXES

4.1 To the extent that developing countries remain the major suppliers, they have an incentive as well as an opportunity to exercise market leverage and gain economic advantage through cartel action and, in particular, through export taxation. The dependence of the developed market economy countries on the developing countries for supplies of primary products, including minerals, is highlighted by the fact that as a proportion of their apparent consumption, imports of primary products from developing countries were 20 per cent as against 3 per cent in the case of manufactures. Imports of fuel (coal, petroleum and gas) from the developing countries in 1979/80 constituted on average 51 per cent of apparent consumption in the developed countries (ranging from 77 per cent in Japan to 20 per cent in the US); those of other minerals averaged 25 per cent (ranging from 37 per cent in Japan to 14 per cent in the US).

(a) Production and Trade Concentration

4.2 Several methods can be used to measure the degree of market power of sellers. The Lerner index, which is the difference between price and marginal cost, purports to measure the deviations from competitive marginal cost pricing[43]. Long-run net profit is another indicator. Cross-price elasticity of demand, which reflects a firm's capacity to exploit price advantage, is a third. The number of sellers in an industry also seems a relevant indicator, since it is inversely related to the degree of monopoly power. However, all these indicators suffer from severe problems relating to data requirements. The most widely-used measure is the concentration ratio, i.e. the share of an industry's total sales (or output/employment/value-added/assets) accounted for by the largest firms. The existence of cases in which sales or purchases are controlled nationally and the increasing interest in forming international agreements by co-operation among governments make the distribution of national shares in production and trade quite pertinent to examing the market power.

4.3 The data set out in Table 6 show developing country shares in world production and exports of 29 selected primary products. (The shares of developing countries in developed countries' markets for selected primary products are given in Annex Table 6.) The share in world exports of the six leading developing country exporters of each commodity is also given as an indicator of the potential control of the market by a small group of suppliers. There are sixteen commodities - cocoa, coffee, tea, bananas, citrus fruits, coconut, palm oil, abaca, sisal, jute, tropical hardwood, rubber, bauxite, cobalt, tin, and manganese ore - in which developing countries supply more than 70 per cent of world exports; four commodities - phosphate rock, copper, tobacco, and rice - in which they account for 50-70 per cent of world exports, and another four - beef, groundnuts, cotton, and iron ore - in which they supply 40-50 per cent of world exports. Moreover, six countries supply more than 70 per cent of world exports of eleven commodities - cocoa, coconut, groundnut, palm oil, jute, abaca, sisal, rubber, bauxite, cobalt and tin, and over 50 per cent of sixteen commodities (coffee, tea, bananas, copper and phosphate rock, in addition to the eleven stated above).

4.4 In some commodities such as lead, zinc and nickel, successful price-raising action may require collaboration between developing and developed countries though the political and economic objectives of this group of countries may be different. However, successful price-raising actions relating to diamonds and uranium demonstrate that realising economic advantage can outweigh other considerations[44]. The availability of large reserves acts as a deterrent against inordinate price increases. The geographical distribution of reserves and the level of investment costs are briefly examined in the next section.

(b) Reserves

4.5 The size of recoverable reserves of minerals and the number of years they are likely to last at present extraction rates (their "reserve life") will vary with price assumptions. But data for selected minerals set out in Table 7, show diverse positions. The reserve life of bauxite and copper appears to be less than 40 years. In so far as bauxite is concerned, aluminium can be produced from widely abundant clays, hence its supply can be considered ample. Copper reserves can be extended through the exploitation of lower grade ore, but its supply price will tend to be higher. The reserve life of lead, zinc and tin appears to be critical, though workable deposits can be extended through higher prices.

4.6 The geographical distribution of reserves is such that for several minerals - bauxite, copper, cobalt, tin and phosphate rock - developing countries account for more than 60 per cent of the world total; however, developed country reserves appear critical (under 5 per cent of world reserves) only for cobalt and tin, which are important to them for strategic reasons. Tin has several competitors including, in some uses, aluminium (see section (e)), while in the case of cobalt, the price increases recorded in the late 1970s have generated considerable R & D into cobalt-free alloys in the US[45].

TABLE 6

The Share of Developing Countries in World Production and Trade of Major Primary Products

Commodity	Share in World Production 1980	Share in World Gross Exports 1980	Six largest LDC Exporters' Share of World Exports (Average 77-79)
	per cent		
Coffee	99.1	94.9	51.9
Cocoa	99.9	83.0	80.2
Tea	84.2	88.9	68.2
Sugar	57.2	45.4	19.2
Beef	35.1	47.7	13.2
Bananas	97.0	97.1	64.4
Citrus Fruits	58.1	73.2	..
Rice	89.8	57.5	33.7
Soybean	37.9	..	..
Coconut	100.0	100.0	92.1/81.6a
Groundnut	76.0	45.0	92.1
Palm oil	100.0	97.1	81.9
Cotton	59.0	42.9	25.7
Jute	97.5	100.0	93.3
Abaca	..	96.2	95.8
Sisal	..	98.2	96.7
Rubber	97.4	100.0	94.8
Tobacco	61.1	57.1	28.3
Tropical Hardwood	100.0	..	..
Bauxite	52.5	71.5	77.8
Cobalt	77.0	87.0	..
Copper	50.0	62.8	55.8
Iron Ore	36.4	46.3	35.1
Lead	30.6	30.0	20.7
Manganese Ore	69.4	74.5	45.4
Nickel	28.6	33.3	..
Tin	86.0	85.5	81.2
Zinc	27.4	23.7	35.1
Phosphate Rock	40.8	63.7	54.1

Notes: .. not available; a copra 92.1 and coconut oil 81.6.

Sources: The World Bank, "Price Prospects for Major Primary Commodities", July 1982; The World Bank "Commoditiy Trade and Price Trends", August 1981; Metal Bulletin PLC, Metal Bulletin Handbook, 1981.

TABLE 7

World Reserves of Selected Minerals by Major Groups of Countries

(per cent)

	Bauxite (1)	Copper (2)	Lead (3)	Nickel (4)	Zinc (5)
Developed Countries	24	27	52	23	51
Developing Countries	71	61	29	56	40
Centrally Planned Countries	5	12	19	21	9
Reserve Life (years)	30-40	35-40	15-20	50-60	15-20

	Cobalt (6)	Iron Ore (7)	Manganese (8)	Phosphate Rock (9)	Tin (10)
Developed Countries	4	35	47	8[a/]	4
Developing Countries	79	30	31	67[b/]	80
Centrally Planned Countries	17	35	22	5[c/]	16
Reserve Life (years)	50-60	90-100	40-50	Over 100	15-20

a/ In the US only
b/ In Morocco only
c/ In the USSR only

Sources: Data for minerals (1) to (5) and (9) are from World Bank "Price Prospects for Major Primary Commodities", Vols. II and IV, July 1982; Cobalt from Congressional Budget Office, "Cobalt: Policy Options for a Strategic Mineral", Washington, D.C., September 1982; others from Rex Bosson and Bension Varon, The Mining Industry and the Developing Countries, New York: Oxford University Press, 1977, Tables G.1 and G. 2.

4.7 Several minerals, including copper, lead, zinc, silver, cobalt, tin, and bauxite, are known to exist under the sea but up-to-date estimates of the quantities and values involved are not available. The value of offshore production of oil and gas was estimated in 1976 at around US $40,000 million per year[46]. Costs and physical difficulties are significant deterrents even to identifying and measuring ocean-bed mineral deposits, let alone mining them, and such activities to date have been restricted to areas of limited depth near land.

4.8 An important source of sea-bed minerals is nodules ranging in size from a pea to a football. These contain such minerals as cobalt, copper, manganese, and nickel, and are found scattered over the ocean floor. It has been reported that several major companies in the United States, Western Europe and Japan are in the process of perfecting the technology to mine nodules; but major legal and political problems in exploiting them remain, particularly in view of the current US attitude towards the deep sea-bed mining provisions of the Convention on the Law of the Sea.

4.9 Data on investment cost requirements for exploiting sea-based resources are not readily available but information relating to land-based minerals is given in Table 8. This shows investment costs per ton (metal content) of creating additional capacity for selected minerals in both developing and industrial countries, in 1981 US dollars. According to the source of information used, the term 'investment cost' includes the direct costs of exploration, mine construction and provision of infrastructure[47]. For copper, manganese and tin these costs are lower in developing countries but it is generally considered that the need to construct infrastructural facilities tends to inflate costs more in developing countries than in developed ones. However, supply lead times in most minerals range between 10 and 15 years, and hence there is no immediate threat to any price-raising arrangements by producers in developing countries.

(c) Production Costs

4.10 The issue of production costs is relevant to the extent to which there are low marginal cost (short-run and long-run) alternative suppliers outside the group of producers taking concerted action; individual producers can more easily bear the cost of export taxation without loss of market share if their costs are well below the 'world' price.

4.11 A comparison of production costs in the major countries producing bauxite, copper, iron ore, lead, nickel, tin, zinc, phosphate rock, bananas, cocoa, coffee, tea, sugar, and rubber is given in Table 9. It should, however, be emphasized that such comparisons present several difficulties: aggregates hide inter-firm variations within countries and differences in production methods; there is a lack of homogeneity in the output of some commodities (e.g. arabica and robusta varieties of coffee); and there is unavoidable diversity in the assumptions and methods used in the estimation of costs. Nevertheless, the data do illustrate considerable variations, from which it can be concluded that costs are significantly lower in the developing than the developed countries in the case of bauxite, iron ore, and sugar, and are lower in some developing countries for many of the other commodities reviewed.

TABLE 8

Estimated Investment Cost per Ton
Metal Content of Annual Capacity in Mining

Mineral	Activity	For Additional Capacity	
		Developing Countries	Industrial Countries
		---------1981 Constant US$ per Ton---------	
Copper	Mining	6,000	7,000
Tin	Mining	4,500	5,000
Nickel	Mining/ Processing	37,000	36,000
Lead	Mining	2,040	1,540
Zinc	Mining	2,040	1,540
Bauxite a	Mining	75	60
Iron Ore a	Mining	63	53
Manganese Ore	Mining	158	160

a The investment cost figures are estimated for a "Gross" ton on annual capacity rather than for a ton of metal content. Metal content averages about 23 per cent and 55 per cent for bauxite and iron ore respectively.

Source : World Bank, "Price Prospects for Major Primary Commodities", Vol. 1, July 1982, p.94.

TABLE 9

Comparative Operating Costs of Selected Primary Products in Major Producing Countries

Bauxite		Copper		Iron ore		Lead		Nickel	
Country (1974 $, US $/mt.)	Cost	Country (1978)	Cost (US $/lb. Cu)	Country	Production and Inland Transportation cost (US $/ton)	Country (1977)	Cost (US $/ tonne ore)	Country (1980)	Cost (Index of Unit cost)
Australia	9.22	Australia	43	Africa (1972)	9.6	Australia	50.2	Australia	115
Brazil	6.57	Canada	52	Australia (1972)	11.7	Canada	19.4	Canada	112
Guinea	7.91	Peru	40	Africa (1973)	11.4			Dominican Rep.,	131
Guyana	7.04	Philippines	47	Australia (1973)	13.6			Indonesia	69
Hungary	8.06	Zambia	59	Africa (1976)	16.0			Philippines	121
Jamaica	7.63			Australia (1976)	17.0			New Caledonia	158
Surinam	7.18								

Tin		Phosphate Rock a		Zinc		Bananas		Cocoa	
Country (1977)	Cost (US ¢/ lb.)	Country	Cost (US $/tonne) 1978	Country (1978)	Cost (Index of unit cost)	Country	Production cost b FOB, US $/mt. (mid 1981)	Country (1977)	DRC/SER c ratio
Australia	246	Jordan	17.0	Australia	56	Costa Rica	225	Brazil	0.9
Bolivia	319	Morocco	18.0	Canada	100	Guatemala	232	Ghana	0.7
Indonesia	280	Senegal	23.0	Japan	137	Honduras	217	Ivory Coast	1.1
Malaysia	218	Togo	16.0	Mexico	63	Panama	232	Nigeria	1.5
Thailand	208	Tunisia	27.0	Peru	30	Ecuador	190	Togo	0.4
				Sweden	175	Colombia	209		
				USA	38				
				West Germany	175				

Tea		Sugar		Rubber			Coffee		
Country	Cost d (US ¢/ lb.)	Country (1977)	Cost (US ¢/lb. raw sugar)	Country	Cost e (US ¢/kg.) 1973	1975	Country	Cost (US ¢/lb.)	
India (North, 1968)	28.50	Argentina	11.5	NR			India	(1975/76)	21-32
India (South, 1968)	24.00	Australia	11-23	Malaysia			"	(76/77)	22-32
Kenya (1970)	24.77	Brazil	7-9	Estate	23.8	39.4	"	(77/78)	22-33
Malawi (1970)	22.50	Central America	9.5-13	Smallholders	18.5	31.0	Indonesia	(1980)	29-34
Sri Lanka (1968)	25.38	EEC	14-16	Sri Lanka	29.0	39.0	Kenya	(75/76)	21-44
Tanzania (1970)	28.32	Philippines	9	SR (SBR-1,500)			Philippines	(78/79)	34-36
Uganda (1970)	27.37	Thailand	11	Japan	37.6	64.7	"	(81/82)	53-56
		USA	14.3	USA	33.9	59.4	Brazil	(79/80)	43-67
				Western Europe	36.1	65.6			

a Direct production costs including transportation and handling charges to the post of loading and depreciation. b Excluding export taxes. c Domestic Resource cost (DRC)/Shadow Exchange Rate (SER) ratio measures the international co-operative advantage of an economic activity. For methodology see Singh (1977). d Malaysian data are for years 1971 and 1974.

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Rubber: Data for Malaysia and synthetic rubber are from Enzo R. Grilli, et.al., "The World Rubber Economy:Structure Changes and Prospects", World Bank Staff Occasional Papers, No.30, 1980; data for Sri Lanka are from the Central Bank of Ceylon, "Annual Report of the Monetary Board to the Hon. Minister of Finance and Planning 1981, Table 10.

4.12 There are exceptions, however, and for some minerals production costs are relatively lower in Canada and Australia. In the case of copper, they are much lower in Australia than in the developing country producers shown except for Peru, which, because of its competitiveness is keen to expand output.

4.13 Reliable data on lead production costs are available only for Australia and Canada, and they are much lower in the latter. Though several factors determine the level of exports, higher costs partly explain the dramatic decline in Australian lead exports from 72,000 tonnes in 1978 to 22,000 tonnes in 1981[48]. The wide difference in costs between Australia and Canada indicates the degree of rent accruing to Canadian lead mines.

4.14 Nickel production costs are much lower in Canada and Australia than in some developing countries, but in Indonesia they are even lower as a result of cheaper energy and labour costs. Expensive energy is the main contributor to high costs in New Caledonia, Dominican Republic and Philippines, where conversion from oil to hydro or coal could help make future operations more competitive.

4.15 The operating costs of the three largest South East Asian tin producers - Malaysia, Thailand and Indonesia - are much lower than those of Bolivia, which are even higher than in Australia. Bolivian tin is from underground mines which are much more costly to operate than the alluvial mines of South East Asia; its labour and smelting costs are also much higher. Indonesian costs are above those of its neighbours (including Australia) because of the intensive use of labour and energy to exploit marginal alluvial deposits by gravel pump methods[49].

4.16 Zinc production costs are lower in Peru, the United States, Australia and Mexico than in other countries, mainly as a result of the occurrence of the metal with others from which it is recovered as a co-product (in Peru, for example, zinc is obtained from copper mines).

4.17 Production costs for phosphate rock differ widely. Among the major developing country producers, Tunisia has the highest costs, and Morocco and Togo the lowest. High costs arise principally from the poor grade of deposits which require additional equipment for mining and benefication. Costs are lower in the United States than in some developing countries but its exports are considered to be of inferior quality[50].

4.18 Though Ecuador is the lowest cost producer of bananas, its share in world exports has fallen while that of the Central American countries, who forged a marketing arrangement with an export tax, has increased (see section (g), Chapter III for details).

4.19 Cost data on coffee production show considerable differences within and between countries. India is the lowest cost producer, and Brazil the highest. Differences in labour costs are one of the main reasons for the wide divergencies, which are accentuated by the variability of labour utilization rates between varieties of coffee grown. Labour inputes are lower for robusta than for arabica

coffee because the pruning and spraying required are less[51]. The high production costs in Brazil, which produces mainly arabicas, can be attributed to this factor.

4.20 Tea production costs also differ considerably. They are lowest in Malawi and highest in North India and Tanzania. Higher labour requirements have reduced the competitive position of India and Sri Lanka, where 3.0 to 3.7 labourers are used on average per hectare, compared with 1.9 to 2.0 in East Africa[52]. The physical output per worker also appears to be lower in India and Sri Lanka, a plucking average of 15 kilograms per worker/day compared with one of about 25 kilograms in Kenya[53]. The cost estimates in the table do not include export taxes and duties. When these are included, teas from India (which has recently abolished its export taxes) and Sri Lanka are less competitive and their share in the world market has fallen (see Annex Table 3). Cost differences could be the dominant factor that is preventing consensus on export quotas under the proposed international tea agreement.

4.21 Data on rubber production in Malaysia and Sri Lanka show that smallholders' costs are lowest. Also noteworthy is the competitive position of producers of natural rubber compared to those of synthetic rubber (see discussion in section (e)).

(d) Demand for Primary Products

4.22 If demand for primary products is growing, it is possible to envisage supply controls operating with still rising output, which calls for somewhat less discipline and creates fewer adjustment problems in exporting countries.

4.23 An important consideration in evaluating price-raising action by producers is thus the buoyancy of demand for their commodities. One international agency has projected the annual growth in world consumption of coffee, cocoa, tea, cotton, rice, coconut, rubber, and tobacco for the period 1980-1995 at a rate which is marginally greater than that for 1961-1980[63]. Comparable data on world imports show a higher import demand projected for these commodities and for sugar, tin and lead. However, in the case of tin, the annual growth rates of both world consumption and imports are projected to be less than one per cent; those for jute are even lower. For cocoa, tea, sugar, citrus fruits, rubber, tobacco, copper, nickel, bauxite (aluminium), iron ore, manganese ore, lead and zinc, world consumption is expected to rise by more than two per cent per year. However, all these rates are much lower than the 5.9 per cent registered for liquid fuels during 1961-80, one of the factors that favoured the OPEC price-raising action.

4.24 Supply is also of importance. World output of coffee, bauxite, lead, manganese, nickel, phosphate, tea and tin is projected to rise at a lower rate than consumption for the period 1980-1995, whereas the opposite is the case for cocoa, copper, sugar and zinc. In some other primary products - iron ore, rice and rubber, output and consumption are projected to grow at the same rate. In this context, of the eight commodities selected as potentially suitable for export taxes, supply adjustment would need to be greatest for cocoa and copper.

(e) Substitution and Economies in Use

4.25 A full exploration of the potential for substitution and economies in use would require examination of the end-uses, costs, technology, and relative quantities in which primary products are currently consumed. Substitution is a strong possibility in several product groups - beverages, edible oils, timber, fibres and some minerals. Functional substitution is another possibility[54]. In so far as the proposed export taxation policy is concerned, product substitution problems can be minimized by adopting an integrated approach, e.g. concerted action by all producers of edible oils (coconut, palm oil, groundnut, etc.). However, the substitution issue remains important and is briefly explored below for several commodities - copper, tin, jute, and rubber.

4.26 Over 50 per cent of copper consumption is in the electrical and electronics industry, while other important end-uses are in building construction, transportation and industrial equipment. Demand is affected by several factors, including subsitution (e.g. by aluminium and plastics) and innovations leading to economies in usage. In the communications industry, several innovations, including thinner gauge copper cables, electronic exchanges which miniaturize circuits and equipment, use of optical fibre (glass) cables, and microwave communication that do away with cables, have resulted in such savings. However, development of new markets, including use of solar energy for heating and air conditioning, expansion in the use of electrical vehicles in the transport sector, and increasing use of desalination technology, could mitigate these effects. Although statistical data on these effects are not readily available, the main determinant of copper consumption will continue to be the GDP growth of the industrial countries.

4.27 Tinplate, which accounts for about two-fifths of world tin consumption, faces competition from several materials including aluminium, electrolytic chrome-coated steel (or TFS), plastics and glass. Many mills are equipped to produce both tinplate and TFS, according to the cost differential between tin and chrome. In addition, technological progress has not only enabled the production of thinner steel sheets which require thinner tinplating, but has also (through an electrolytic process) reduced the amount of tin required per unit of tinplate. It has been estimated that growth in demand for tin has been reduced by about one per cent a year through such substitution[55].

4.28 Nevertheless, tin is the only metal whose price in real terms has increased more or less continuously for the last three decades. Its producers have been able to capture the resource rent element in the price as a result of the international tin agreement and taxation policies of the major producing countries.

4.29 The major synthetic substitute for jute (as well as other hard fibres) is polypropylene, which is derived from crude oil refining. But because increases in the price of crude oil affect the price of prolypropylene only marginally[56], it has been supplied for extended periods at relatively low prices. The problems for producers have been compounded by that fact that the market for jute bags (which accounts for about half the total) has declined where bulk handling of agricultural and industrial products - e.g. grains, cement, and fertilizers - have become predominant.

4.30 The choice between natural rubber (NR) and synthetic rubber (SR) depends on several considerations including technical (end-use requirements), economic (relative prices) and marketing (degree of industry integration)[57]. During 1950 to 1970, world consumption of rubber increased on average at 6 per cent per annum, while production of NR increased at only 3 per cent. The widening gap was met by SR whose basic feedstock is a by-product of the petro-chemical industry. Synthetic rubber monomers accounted on average for 45 per cent of the total production cost of SR[58], while other energy-based inputs (electricity, steam and chemicals) accounted for 20 to 25 per cent. An increase in the price of energy, therefore, will certainly contribute to a higher supply price of SR (Table 10). Comparative cost data on NR and SR given in Table 9 show that the competitiveness of NR has improved since the 1973-74 oil price increase.

4.31 The prices of NR and the two largest forms of SR are set out in Table 10. This shows that since 1978, SR prices have been generally higher than NR, which suggests scope for price-raising action by NR producers.

(f) Foreign Exchange Reserves

4.32 It has been argued that exporting countries are better able to participate in price-raising action when they have substantial foreign exchange reserves or when the commodity in question accounts for only a small part of the country's total export earnings. However, the examples of OPEC and the International Bauxite Association (IBA) do not support this view. The reserve position of some OPEC members before the oil price hike in 1973-74 was not very different from that of a typical primary exporting country[59]. Moreover, most were more dependent on oil earnings than were IBA members on bauxite earnings.

(g) Forward Shifting of the Tax Burden

4.33 The proportion of an export tax that can be shifted to foreigners, on the basis of foreign and domestic supply elasticities, was shown in Chapter III. An index which takes into account not only price elasticities but also other factors (production and export concentration, presence of vertically integrated multinationals, product homogeneity, financial strength of producers, inventory situation, the existence of a scrap market in the case of minerals, and relative dispersion of major buyers) is presented for 23 primary products in Annex Table 7.

4.34 This index provides a feasibility score which purports to show the likelihood of an export tax being passed on, in full or in part, to foreign consumers and thus its success in raising export revenue. Petroleum (72), bauxite(70), cocoa (70), and bananas (69), products which have been subject to price-raising action by producers, registered high values. However, rice (53), phosphate rock (53) and uranium (45), which were also subject to price-raising action by producers in the mid-1970s, registered much lower values, below those of tea (64), rubber (64), edible oils (62), sisal (58), coffee (57), jute (56), copper (56), and tin (55); cotton (52) and tropical timber (47), also registered scores higher than that of uranium.

TABLE 10

Rubber Prices in Selected Markets a

(US$/mt.)

Period	NR Prices, RSS 1		SR Prices			
			SBR - 1,500		BR	
	New York b	London c	London	Germany	London	Germany
1971	399	368	425	387	459	458
1972	402	373	442	408	478	470
1973	785	776	483	479	524	561
1974	868	776	812	521	868	579
1975	659	671	858	793	919	793
1976	872	876	758	794	812	794
1977	917	905	866	866	975	866
1978	1,108	1,044	1,046	971	1,257	1,001
1979	1,423	1,288	1,311	1,196	1,628	1,217
1980	1,625	1,488	1,621	1,408	1,868	1,480
1981	1,252	1,140	1,519	1,283	1,747	1,416

a The source has indicated London and German prices in national currencies. These were converted to US$ using exchange rates given in IMF, "International Financial Statistics", Various Issues.

b New York quotations refer to sellers' asking prices for delivery the current month.

c London prices are buyers prices (spot).

Source: The International Rubber Study Group, "Rubber Statistical Bulletin", Vol. 36, No.8/9, May/June 1982.

The scores registered by manganese (44), sugar (43), lead (42), zinc (42), nickel (40) and iron ore (39), appear to indicate a relatively low feasibility of shifting the tax burden to foreigners.

(h) Revenue Gains

4.35 The revenue gains under an agreed system of export taxes levied by exporting developing countries on 17 primary products - coffee, cocoa, tea, bananas, sugar, rubber, cotton, tropical timber, palm oil, phosphate rock, bauxite, copper, iron ore, zinc, nickel, manganese ore, and tin - are presented in Table 11. The method employed in estimating the gains was taken from an UNCTAD study on tea (see FAO 1974).

4.36 The UNCTAD model made several assumptions. First, that all developing countries which are significant producers of the primary product concerned would levy a uniform ad valorem tax on exports of the product to all destinations. Second, that the tax would be additional to existing export taxes and would not, therefore, affect the relative competitive position of the countries. Third, that price elasticity is constant at any point on the demand schedule.

4.37 The supply and demand elasticity estimates used in the calculations (see Annex Table 2) show differences for the same product within and between countries. This could be due to several factors, including differences in the type of product used in estimation (e.g. most elasticity estimates for coffee are made on the basis of robustas but occasionally use arabicas) and differences in methodologies adopted by different authors. Westlake (1977) has pointed out that supply elasticities vary between countries due to differences in production functions. This can happen when there are considerable differences in technologies and factor prices, but primary production technologies are not usually dissimilar between developing countries (e.g. tea production in India and Sri Lanka). Smallholders' production functions may not be very different either, since their main input is labour. Though factor prices differ between countries, there is a tendency for these to move towards equality in the long run. In the short run, a small price increase by members of a producers' association acting in concert may not lead to a considerable increase in output in non-members. Several factors are relevant, including institutional constraints, (e.g. distribution of land, credit facilities, etc.), relative prices (which might favour a movement of resources to non-taxed commodity), high marginal propensities to consume and over-valued exchange rates. However, to take account of the disparities in elasticities, two sets of calculations were performed: scenario I, which used low elasticity values, and scenario II, which used high ones. In addition, both scenarios used separate sets of demand elasticities for developed and developing countries; such a distinction could not, however, be made between demand elasticities in exporting and importing developing countries, due to data limitations. In the case of supply elasticities, the same sets (low and high elasticities) were used for both developed and developing countries, due to paucity of data.

TABLE 11

Export Volume, Earnings and Tax Income Under Various Rates of Ad Valorem Taxes[a]

	Export Volume (% decline)	Export Earnings [b] (% increase)	Tax Revenue (mn. US$)	Export Volume (% decline)	Export Earnings [b] (% increase)	Tax Revenue (mn. US$)	Export Volume (% decline)	Export Earnings [b] (% increase)	Tax Revenue (mn. US$)
	10% Rate of Tax			20% Rate of Tax			25% Rate of Tax		
SCENARIO. I									
Coffee	0.67	7.80	214	1.30	15.30	458	1.61	18.94	591
Cocoa	0.91	6.62	409	1.78	12.82	865	2.20	15.78	1,110
Tea	1.67	4.94	243	2.50	9.41	508	3.33	11.49	646
Sugar	0.24	9.59	2,748	0.48	19.12	5,974	0.59	23.85	7,765
Bananas	4.33	3.95	124	8.55	7.09	255	10.63	8.37	323
Palm Oil	2.19	4.84	185	4.38	9.14	386	5.63	11.11	490
Cotton	0.96	5.06	1,455	1.81	9.68	3,039	2.17	11.80	3,875
Rubber	1.82	2.24	442	3.33	4.09	901	3.94	5.17	1,137
Tropical Timber	1.77	7.18	503	3.51	13.94	1,070	4.38	17.16	1,375
Phosphate Rock	2.49	4.52	555	4.84	8.48	1,153	5.98	10.27	1,464
Bauxite	1.55	6.07	307	3.04	11.66	646	3.77	14.30	827
Copper	1.26	5.45	1,840	2.53	10.43	3,853	3.10	12.76	4,918
Iron Ore	2.37	5.05	1,578	4.65	9.54	3,291	5.75	11.60	4,192
Manganese Ore	2.78	2.66	82	5.44	4.83	168	6.58	5.80	212
Nickel	2.86	1.50	479	4.30	2.69	977	5.70	3.20	1,222
Tin	1.08	7.46	327	2.14	14.55	697	6.04	4.84	897
Zinc	2.64	2.24	412	4.91	4.06	839	2.66	17.97	1,057
SCENARIO. II									
Coffee	2.55	5.70	211	5.02	10.83	404	6.24	13.19	562
Cocoa	2.19	5.68	405	4.29	10.82	850	5.32	13.21	1,085
Tea	3.33	4.01	241	6.67	7.38	498	7.50	8.85	635
Sugar	0.55	9.18	2,738	1.09	7.29	5,930	1.37	22.68	7,692
Bananas	7.69	0.93	120	15.28	0.43	240	19.05	(0.33)	297
Palm Oil	5.94	(0.01)	177	11.53	(0.72)	351	14.38	(1.30)	436
Cotton	3.86	3.93	1,440	7.47	7.14	2,971	9.28	8.49	3,761
Rubber	4.85	0.51	435	9.39	0.50	870	11.52	0.33	1,086
Tropical Timber	6.25	1.54	476	12.32	2.03	958	15.30	1.92	1,196
Phosphate Rock	7.64	(0.33)	529	4.47	(1.78)	1,044	18.57	(2.90)	1,290
Bauxite	2.77	6.18	307	5.50	11.77	647	6.84	14.36	828
Copper	2.64	5.65	1,842	5.17	10.72	3,861	6.44	13.05	4,927
Iron Ore	9.25	(2.38)	1,467	18.09	(5.97)	2,826	22.38	(8.16)	3,450
Manganese Ore	9.37	(2.31)	78	18.48	(5.91)	151	22.91	(8.11)	184
Nickel	5.70	(1.24)	469	11.43	(0.97)	918	12.86	(3.75)	1,150
Tin	4.64	3.06	314	9.11	5.31	640	11.29	6.16	807
Zinc	6.98	(1.09)	399	13.77	(2.94)	782	16.79	(4.11)	967

a Model used in estimation is given in Annexure I;

b Negative values given in parenthesis.

Source: Computed by the author.

4.38 Three ad valorem tax rates - 10 per cent, 20 per cent, and 25 per cent - were used in the computations. Estimates can be made on the basis of higher rates, but because the elasticities may change at higher absolute prices, since consumers and producers are likely to react differently to very steep changes, no firm conclusions can be drawn from such estimates.

4.39 The estimates illustrate the potential revenue that can accrue to developing countries by levying a uniform ad valorem tax on their exports of the 17 primary products cited. Had the countries employed a 10 per cent tax in 1980 on eight selected products - coffee, cocoa, tea, bananas, bauxite, copper, tin and tropical timber - it is estimated that under the low elasticities of scenario I they would have received as tax revenue an amount equivalent to US $4.0 billion; at 20 per cent the amount would have been US $8.4 billion, and at 25 per cent, US $10.7 billion. These amounts were found to be only marginally less when recalculated using the high elasticities of scenario II, when the corresponding figures would be US $3.9 billion, US $8.1 billion and US $10.3 billion.

4.40 Since it is assumed that the tax is levied on exports to all destinations, part of the potential revenue would have been raised at the expense of the developing countries themselves. But as over 85 per cent (weighted average) of the exports of the eight products selected went to the developed countries, this burden would not have been very great, although it would have varied between products (from near zero for bauxite to about 20 per cent for tea).

4.41 Estimates of export earnings show that under the low elasticity scenario I they increased even at a 25 per cent rate of tax, which suggests that the optimum rate may be even higher.

4.42 However, corresponding estimates under the high elasticity scenario II show that even with a 10 per cent rate, export earnings would decline in six cases - palm oil, phosphate rock, iron ore, zinc, nickel, and manganese ore, although in no case was the decline more than 2 per cent. These products would require careful attention if such tax policies were to be implemented. At a 25 per cent tax rate, increases in export earnings for the remaining products were as follows: sugar (23 per cent), bauxite (14 per cent), cocoa (13 per cent), coffee (13 per cent), copper (13 per cent), tea (9 per cent), cotton (8 per cent), and tin (6 per cent). Comparable estimates for these products are marginally higher under the low elasticity scenario I.

4.43 Turning to the effects of export taxes on the quantities exported, it was found that under the low elasticity scenario I, the declines caused by a 10 per cent tax rate would be less than 3 per cent in all 17 products except bananas (which would fall 4 per cent); at a 20 per cent tax rate, declines of 3 per cent or more would occur in ten products - bananas (9 per cent), manganese ore (5 per cent), zinc (5 per cent), iron ore (5 per cent), phosphate rock (5 per cent), nickel (4 per cent), palm oil (4 per cent), tropical timber (4 per cent), rubber (3 per cent), and bauxite (3 per cent). Even at a 25 per cent rate, quantity declines in five products - coffee, cocoa, sugar, cotton, and tin - were less than 3 per cent.

4.44 Comparable estimates under the high elasticity scenario II show far steeper quantity declines: at a 10 per cent rate there would be a decline of more than 3 per cent in twelve products, while at a 20 per cent rate, there would be one of more than 4 per cent in sixteen products. At a rate of 25 per cent, quantity declines of more than 5 per cent would occur in all products except sugar.

4.45 These estimates suggest that the imposition of a uniform export tax, by reducing exports, and therefore output, might induce further price increases, on account of an inventory build-up due to uncertainty over supplies. But the consequences of reduced output on domestic employment could be considerable in labour-intensive activities such as bananas and rubber, especially if alternative employment was not to be found elsewhere in the economy. These effects could, however, be counteracted by increased government expenditure from the export tax revenues, which could be used to facilitate structural adjustment through encouraging investment in alternative activities.

4.46 It has to be recognised, however, that for some products the lower quantities exported as a result of imposing an export tax will cause negotiating problems in certain cases. One way to resolve these problems is to pay compensation to those countries experiencing such reductions in relation to a base year (pre-agreement). Estimates of such compensation were made for eight products (selected by the previous analysis) on the basis of export supply shifts generated by the model (scenario I in export tax calculations). They show that it would be necessary to keep aside on average 10 per cent of the total export tax revenue generated in the case of coffee and cocoa, 18 per cent for tea, 26 per cent for bananas, 32 per cent for bauxite, copper and tin, and 24 per cent for tropical timber.

4.47 An export tax will have other effects too. After its imposition and to the extent that domestic producers receive a lower price for the taxed product, domestic consumers will gain. Those using the product as an input will experience lower costs of production, encouraging further processing before export, increasing industrial employment and possibly also raising export earnings.

4.48 The UNCTAD method to estimate revenue gains was modified (see Annex II) in order to calculate the optimum export tax rate and the rates which would maximize export revenues and export tax revenues. Fourteen primary products from the UNCTAD model were used, tropical timber, zinc and nickel being excluded due to data limitations. Again, the estimates were based on two sets of elasticities: scenario I using low elasticities and scenario II using high ones. The results are summarised in Table 12. This shows that iron ore, manganese ore and phosphate rock are not suitable for an export tax arrangement (between developing country exporters) of the type considered in this study. Though the results generally agree with the findings of the UNCTAD model, the optimum rates of export tax in the case of sugar, cotton and rubber appear to be considerably lower.

TABLE 12

The Estimated Optimal Export Tax Rates for Selected Primary Products

	Scenario I			Scenario II		
	Optimal Tax Rate	Tax Rate at which Export Earnings Start Declining	Tax Rate at which Tax Revenue Start Declining	Optimal Tax Rate	Tax Rate at which Export Earnings Start Declining	Tax Rate at which Tax Revenue Start Declining
	per cent					
Coffee	over 100	over 100	over 100	over 100	over 100	over 100
Cocoa	over 100	over 100	over 100	over 100	over 100	over 100
Tea	over 100	over 100	over 100	over 100	over 100	over 100
Sugar	20	10	40	10	10	20
Bananas	over 80	over 80	over 80	20	10	over 20
Palm Oil	over 100	over 100	over 100	60	10	over 60
Cotton	over 100	10	over 100	10	10	10
Rubber	over 100	over 100	over 100	10	10	over 20
Phosphate Rock	25	10	over 30	under 10	under 10	under 10
Bauxite	over 100	10	over 100	20	10	30
Copper	over 100	80	over 100	30	10	over 30
Iron Ore	-	-	-	-	-	-
Manganese Ore	80	10	over 100	10	under 10	over 20
Tin	over 80	60	over 100	30	20	over 30

Notes: The model is described in Annexure I. Scenario I is based on a set of low elasticitics and Scenario II used high elasticity estimates as in TAble II. The elasticity estimates are given in Annex Table 2.

- negligible

V. CONCLUSIONS

5.1 The results of the two models suggest that governments of developing countries producing at least eight primary products - coffee, cocoa, tea, bananas, bauxite, copper, tin and tropical timber (not used in the modified model) - could benefit by simultaneously levying a tax on the export of the product concerned. In the case of cotton, palm oil, rubber and sugar, the optimal rate seems to be low, while five others - phosphate rock, iron ore, manganese ore, nickel and zinc - are not suitable for such an arrangement.

5.2 An export tax could be additional to any existing export taxes, and during the period of the agreement, member countries should refrain from changing the latter. In order to facilitate the collection of taxes and particularly to monitor the implementation of the agreement as well as to pay compensation as required, the member governments need to agree on a cooperative framework. Such a body could also advise members on market developments in order that the tax and the compensatory payments could be adjusted in a contra-cyclical way.

5.3 These differences and divergencies have contributed to the poor record in negotiating international commodity agreements involving export or production quotas or buffer stocks. Agreements by producers acting in concert to levy export taxes at a uniform ad valorem rate would avoid the main problems in negotiating ICAs and would not be contrary to the specific provisions of GATT. Such schemes would be administratively simple to operate although in some cases there would be certain technical problems operationally (e.g. for teas shipped abroad for auction). They also have the advantage of not freezing production patterns (as do quota arrangements), and trends in output would continue to be based on comparative costs.

5.4 A rigid scheme may have adverse effects upon exporters or producers, and if they are to benefit sufficiently to ensure their allegiance to it, a sliding scale of export taxes may be required. Such a scheme has several other advantages including its operation as a contra-cyclical device, as a balance-of-payments corrective, a means of promoting processing (a corrective for tariff escalation), an instrument to capture resource rent, a countervailing device to correct market imperfections, and generally as a means to improve the terms of trade of producing countries.

5.5 The argument for export taxes to appropriate 'rents' earned as a result of imperfect competition is strongest in the case of some minerals. The existing industry structure in selected minerals - bauxite, copper, iron ore, nickel, tin and zinc - shows the dominance of multinational companies (Table 2). This, together with low short-run marginal costs (Table 9), and lack of bargaining skills and technical know-how in developing countries, may have given rise to 'rents'. A large proportion of these seems to be accruing to the multinational companies, and though it should be recognised that relatively high profit can include a risk premium, the case for export taxes in such situations is to ensure the producer country obtains the 'rent' element where possible. The Jamaican experience on bauxite shows the resolution of

multinational companies to maintain their share of the 'rent'; it also shows the need for producing countries to strengthen their bargaining power through concerted action.

5.6 Finally, it has to be admitted that though a programme of concerted export taxes on primary products would help to increase the real income of developing countries in the short run, other measures are required to solve the longer-run problems of supply[60]. One way is to discourage new investment in expanding the production of commodities which are likely to remain in over-supply at remunerative prices. In fashioning their future lending policies, international agencies might take more explicit account of a project's impact on other producing countries as well as of its feasibility in isolation.

NOTES

1. There is no universally accepted definition of primary products, but in this paper they are taken as those products extracted from the earth or grown or raised on the land, or harvested from the water, which enter international trade in an unprocessed or semi-processed state.

2. Corden (1974, Chapter 7) has argued that there will be an optimum trade tax structure which trades off adverse efficiency effects against favourable equity effects, hence maximizes world welfare.

3. Summarised from World Bank (1982 (a)), p.126.

4. World Bank (1982 (b)), p.109.

5. Ibid, p.47.

6. Ibid, p.106.

7. For instance, Knudsen and Parnes (1975) even find a positive relation between export instability and growth instability apparently generating more investment and growth. Since export growth nowhere appears explicitly as an explanatory variable for GNP growth, savings and investment in the Knudsen and Parnes analysis, one may wonder whether it is instability or merely its correlation with export growth that produces the authors' result. Also see MacBean (1966).

8. Many neo-classical authors have objected to the postulation of deteriorating terms of trade espoused by Prebisch (1950) and Singer (1950). For an excellent exposition, see Meier (1968).

9. Spraos (1980) has stated that a deteriorating trend in the relative price of primary products cannot be decisively refuted for 70 years prior to the Second World War. Also see Evans (1979).

10. Persaud (1978) and Singer (1982).

11. World Bank (1982 (b)), p.28.

12. The earliest expressions of the objectives of an integrated programme for commodities are contained in UNCTAD (1974).

13. For a discussion on the theoretical impasse, see Evans (1979). Recently two new ICAs (jute and tropical timber) without price provisions have been negotiated.

14. An evaluation of ICAs has shown that they have failed to achieve their goals of price stabilization; price fluctuations in some commodities have been greater during agreement years. See Behrman (1978). There are several other reasons for the slow progress made on establishing new ICAs, including differences

among developing countries on price ranges, market shares, etc.

15. World Bank (1982) (b)), p.103.

16. References made to uniform ad valorem export taxes throughout this study mean uniformity of proposed export tax rates between the countries who are members of an international export tax system; it does not mean a fixed rate.

17. Corden (1974), Chapter 7.

18. It is assumed that adjustments are made instantly.

19. Commonwealth Secretariat (1982), p.20.

20. Helleiner (1981), pp. 31-55.

21. Radetzki (1978). Several other authors have suggested the existence of oligopolistic elements in some commodity markets (Maizels (1981); Labys (1980) and Hughes and Singh (1978)).

22. Radetzki (1978), p.117.

23. Labys (1980), p.180.

24. UNCTAD (1982 (a)).

25. Fitzgerald and Pollio (1981).

26. For information additional to Table 3.1, see World Bank (1982 (b)), p.5.

27. Ibid, p.5.

28. Streeten (1982).

29. UNCTAD (1981 (c)).

30. The share of multinationals in the world trade in bananas increased from 58 per cent in 1973 to 63 per cent in 1980. See FAO (1982).

31. Both India and Sri Lanka have appointed several commissions to ascertain whether tea prices have been depressed by operation of the auction system.

32. UNCTAD (1982 (b)).

33. For an evaluation of Emmanuel's proposition, see Evans (1981).

34. Evans (1979).

35. IMF (1981), p.24.

36. In England, for example, duties were applied to exports of raw wool and hides by statute as far back as 1275 and by 1660 had been extended to 212 articles. See Goode, et al.(1966).

37. For a theoretical exposition, see Brown(1975), pp.129-133.

38 The data on processing timber in Indonesia are drawn from Takeuchi (1982).

39. The data on cocoa processing in Brazil are drawn from the author's study (1983).

40. The data are from McNerney (1983).

41. The data are drawn from Davis (1980).

42. See Ellis (1981) for an evaluation of intra-firm transfers in the banana industry in Central America.

43. Lerner (1934).

44. Strongest evidence of the uranium cartel is given by Stewart (1980).

45. Congressional Budget Office (1982).

46. Bosson and Varon (1977), p.64.

47. World Bank (1982 (b)), p.93.

48. The statistics are from the Metal Bulletin (1981).

49. For a detailed discussion, see Thoburn (1981).

50. UNCTAD (1981 (b)).

51. In India, 558 man days were taken per hectare in farms growing arabica coffee in order to accomplish all production operations (up to the green coffee stage), while only 401 man days per hectare were taken for robusta farms. For details see International Coffee Organisation (1980).

52. World Bank (1971).

53. Ibid, p.42.

54. For the nature of substitution in minerals, see Labys (1980), p.39.

55. As quoted in Bosson and Varon (1977), p.59.

56. UNCTAD (1981 (a)), p.50.

57. Wanigatunga (1983).

58. World Bank (1978).

59. On the basis of statistics given in IMF (1976) and World Bank (1976).

60. The World Bank (1982, (b)) has adopted a 'restrictive' lending policy for tea since August 1973. Under this policy the Bank has not financed projects involving production of tea but has encouraged projects for diversification out of tea. There are two exceptions: (a) financing increased output in countries without 'investment alternatives' that would yield an acceptable rate of return, and (b) financing rehabilitation involving no increase in tea output. This involves a reduction in tea acreage and the implementation of diversification measures.

ANNEX I

LIST OF ANNEX TABLES

Annex Table 1: Price Indices and Growth Rates of Primary Products

Year	All Commodities a		Major Groups b			
	Nominal c	Deflated b	Food	Beverages	Agricultural raw materials	Metals
	1975=100					
1957	57	127	90	171	163	131
1958	53	118	84	171	137	123
1959	52	117	85	146	154	121
1960	52	115	83	133	158	121
1961	50	109	79	124	145	119
1962	49	106	80	120	138	115
1963	52	113	96	118	142	114
1964	55	118	90	133	139	139
1965	54	112	82	118	132	149
1966	56	114	81	121	132	157
1967	52	106	81	119	119	132
1968	52	105	79	120	116	137
1969	56	110	82	121	119	145
1970	58	107	82	129	103	145
1971	55	96	78	112	96	118
1972	62	100	83	113	116	109
1973	95	132	110	120	178	137
1974	122	128	144	117	141	140
1975	100	100	100	100	100	100
1976	113	112	81	189	132	105
1977	137	125	72	302	117	104
1978	130	103	71	190	109	95
1979	152	106	71	177	117	109
1980	166	104	86	140	110	108
1981	142	94	78	115	105	98
1982	125	84	63	121	92	91
Growth Rate d		-1.0	-0.25	1.2	-3.1	-2.1

a Overall index of 30 primary commodities exported by developing countries (excluding gold and crude petroleum).

b Deflated by the UN index of manufactures exported by developed countries.

c In terms of US dollars.

d Least squares trend growth rates (1957 to 1981)

Source: Price indices are from International Monetary Fund, "IMF Survey", 5 April 1982, p.110.

Annex Table 2: Estimates of Price Elasticities of Demand and Supply

Commodity	Scenario I			Scenario II		
	Price Elasticity of Demand		Price Elasticity of Supply	Price Elasticity of Demand		Price Elasticity of Supply
	Developing Countries	Developed Countries		Developing Countries	Developed Countries	
Coffee	-0.15	-0.07	0.33	-0.31	-0.30	1.28
Cocoa	-0.11	-0.12	0.34	-0.33	-0.27	1.00
Tea	-0.20	-0.20	0.16	-0.50	-0.40	0.72
Bananas	-0.50	-0.50	0.21	-1.00	-0.80	1.40
Rubber	-0.50	-0.40	0.21	-1.00	-0.80	0.94
Sugar	-0.04	-0.02	0.99	-0.08	-0.05	1.50
Cotton	-0.18	-0.14	0.07	-0.56	-0.44	1.02
Tropical Timber	-0.50	-0.10	0.70	-1.57	-0.50	0.94
Palm Oil	-0.47	-0.01	0.40	1.21	-0.43	0.70
Phosphate Rock	-0.70	-0.30	0.70	-3.00	-0.70	2.90
Bauxite	-0.30	-0.20	0.60	-0.40	-0.30	3.20
Copper	-0.20	-0.19	0.40	-0.40	-0.30	1.70
Iron Ore	-0.70	-0.30	0.80	-1.90	-1.20	3.20
Zinc	-0.52	-0.52	0.40	-1.10	-1.10	1.70
Nickel	0.00	-0.60	0.44	0.00	-1.20	1.22
Manganese Ore	-0.50	-0.50	0.45	-1.20	-1.20	3.50
Tin	-0.24	-0.11	0.70	-1.20	-0.49	2.09

Sources: The World Bank, "Price Prospects for Major Primary Commodities", Various Issues; Hossein Askari and J.T. Cummings, Agricultural Supply Response A Survey of Econometric Evidence, New York: Praeger Publishers, 1976; Jere R. Behrman, "International Commodity Agreements; an Evaluation of the UNCTAD Integrated Commodity Programme", Overseas Development Council, October 1977.

Annex Table 3 : Shares of Major Producers in World Exports of Selected Primary Products

Commodity/Country	Average 1970-72	Average 1977-79
1. Bananas		
Costa Rica	12.2	12.6
Ecuador	18.5	16.5
Honduras	15.8	14.1
Panama	11.6	6.6
Colombia	2.8	6.5
Guadeloupe	2.3	4.2
Guatemala	2.5	2.4
Jamaica	2.2	1.8
Martinique	3.1	6.4
China (Taiwan)	6.2	n.a.
Philippines	2.5	8.1
LDC Share	92.1	92.5
2. Cocoa		
Brazil	8.7	14.8
Cameroon	6.6	5.8
Ghana	31.7	23.3
Ivory Coast	11.6	17.9
Nigeria	23.7	15.5
LDC Share	100.0	95.1
3. Coffee		
Brazil	30.2	17.1
Colombia	14.4	15.4
Costa Rica	2.4	2.6
El Salvador	3.5	4.6
Guatemala	3.5	4.1
Mexico	2.6	4.0
Angola	4.8	1.9
Ethiopia	2.5	2.2
Ivory Coast	5.5	6.0
Indonesia	2.2	4.7
Kenya	2.1	3.2
LDC Share	96.8	92.0
4. Tea		
Kenya	5.7	9.7
Malawi	2.0	2.2
Tanzania	0.9	1.2
Bangladesh	4.9	2.1
India	28.8	26.7
Indonesia	3.8	5.5
Sri Lanka	27.4	22.0
LDC Share	83.1	78.7
5. Sugar		
Brazil	5.8	5.0
Cuba	26.5	n.a.
Dominican Rep.	5.0	2.5
Mexico	3.3	0.2
Peru	2.5	0.8
Mauritius	2.5	2.9
Philippines	7.3	3.9
Fiji	1.4	1.5
Guyana	1.5	1.1
LDC Share	71.2	37.9
6. Palm Oil		
Ivory Coast	3.2	3.3
Indonesia	18.7	15.8
Malaysia	52.5	59.8
Nigeria	2.9	0.0
Zaire	11.3	0.4
LDC Share	100.0	81.7
7. Cotton		
Brazil	5.7	0.5
Mexico	2.8	4.5
Egypt	14.0	6.3
Sudan	7.5	5.4
Iran	2.3	1.7
Pakistan	2.6	1.1
Syria	3.1	3.0
LDC Share	56.6	47.8
8. Rubber		
Liberia	3.5	2.2
Indonesia	22.0	23.2
Malaysia	50.0	51.4
Thailand	9.5	13.4
Sri Lanka	0.0	4.1
LDC Share	97.7	98.3
9. Sisal		
Brazil	24.7	42.4
Haiti	1.4	0.9
Mexico	13.4	0.5
Angola	11.4	5.8
Kenya	6.8	10.4
Malagasy Rep.	4.3	6.0
Mozambique	3.8	4.6
Tanzania	30.5	27.5
LDC Share	97.4	98.2
10. Phosphate Rock		
Algeria	1.0	1.4
Morocco	29.2	34.4
Senegal	3.3	3.6
Togo	3.9	5.7
Tunisia	5.0	3.3
Jordan	-	4.4
Syria	0.1	1.9
Oceania	7.5	6.8
LDC Share	53.6	65.9
11. Bauxite		
Dominican Rep.	5.5	3.1
Guyana	6.9	15.1
Haiti	2.4	2.4
Jamaica	32.2	21.6
Surinam	16.6	9.2
Guinea	0.4	24.8
Greece	n.a.	4.0
Sierra Leone	2.5	0.8
Indonesia	2.2	1.4
Malaysia	2.2	0.5
LDC Share	72.6	86.1
12. Copper		
Chile	16.3	19.3
Peru	4.6	6.9
Zaire	10.0	8.1
Zambia	17.0	12.8
Philippines	4.2	4.4
Papua N. Guinea	-	4.3
LDC Share	54.0	62.8
13. Iron Ore		
Brazil	8.5	19.0
Chile	2.3	1.6
Peru	2.4	1.4
Venezuela	5.3	2.6
Liberia	6.2	4.9
Mauritania	2.8	2.1
India	5.8	4.8
LDC Share	37.7	42.3
14. Manganese Ore		
Brazil	16.4	10.9
Mexico	2.0	2.2
Gabon	20.1	21.6
Ghana	3.9	3.2
Morocco	-	3.3
India	7.8	4.2
LDC Share	56.1	75.9
15. Tin		
Bolivia	13.7	15.1
Nigeria	4.9	1.2
Zaire	2.6	0.9
Indonesia	8.5	12.8
Malaysia	42.6	36.4
Thailand	10.3	14.5
LDC Share	85.4	84.2

- Negligible.

Source: The World Bank, "Commodity Trade and Price Trends", various issues.

Annex Table 4: Export Taxes in Selected Countries: Selected Early Years

Selected Countries	Export Tax Receipts as a Percentage of Total Tax Receipts				
	1939	1947	1948	1949	1950
	per cent				
Nigeria	..	13	9	11	19
Uganda	..	25	30	46	48
Ceylon	..	..	29	29	31
India	6	..	8	8	8
Indonesia	..	14	18	11	9
Malaya	..	..	34	30	41
Pakistan	..	..	19	10	20
Thailand	..	6	8	8	8
Brazil	3	2	2	1	1
Guatemala	17	11	9	8	7
Haiti	19	22	20	19	20
Mexico	16	12	11	21	18
Peru	12	29	22	23	33
El Salvador	9	14	17	19	20

.. not available.

Source: Edwin P. Reubens, "Commodity Trade, Export Taxes and Economic Development", Political Science Quarterly, Vol. LXXI, No. 1

Annex Table 5: Taxes levied on Indonesian Exports of Timber

Tax Item	Tax (US $ per m^3)
1. ADO (export Tax, 20 percent of check price)	30.00
2. MPO EXIM (withholding corporate tax, US$ price x Rp.40)	9.60
3. Uji Kayu (gruding fee, Rp. 200/m^3)	0.45
4. Simpanan Wajib (compulsory savings for reforestration)	3.20
5. 'Fiskal' Export (PPD - 17a, withholding personal income tax on wages)	0.32
6. OPP (transportation tax, US$1/$m^3$)	1.00
7. Bea Angkutan Langsun (Rp. 50/m^3)	0.08
8. B/veem (Rp. 20/m^3)	0.03
9. IHH (royalty, 6 per cent of check prices)	9.00
10. IHH Tambahan (additional royalty, Rp. 620/m^3)	1.00
11. Bank charges (0.25 per cent of negotiated amount)	0.38
Total[a/]	55.06

a/ Some small local taxes are not listed here. The total taxes/fees paid to the Indonesian Government appear to be around 42 - 43 per cent of the FOB price of log exports.

Source: Kenji Takeuchi, "Mechanical Processing of Tropical Hardwood in Developing Countries: Issues and Prospects of Plywood Industry Development in the Asia - Pacific Region", The World Bank, Division Working Paper No. 1982 - 1, January 1982.

Annex Table 6: Market Shares of Developing Countries in Developed Countries for Selected Primary Products [a]

Product	CCCN Number	Market Share of Developing Countries (Average 1970-72)	(Average 1978-80)
		per cent	
1. Cocoa	0721	98.2	97.5
2. Coffee	0711	97.9	95.3
3. Copra	2112	98.3	99.5
4. Coconut oil	4223	82.5	91.8
5. Fish(simply preserved)	031	29.3	37.1
6. Fruit(Fresh)	051	41.1	39.3
7. Groundnuts	2211	68.8	27.6
8. Groundnut oil	4214	82.6	75.1
9. Meat(fresh, frozen)	011	20.7	9.8
10.Palm Kernel	2213	100.0	98.3
11.Palm Kernel oil	4224	63.5	85.3
12.Raw beet & cane sugar	0611	64.2	59.5
13.Tobacco(Unmanufactured)	121	33.7	44.5
14.Vegetables (fresh)	054	27.9	29.3
15.Raw Cotton	2631	69.7	52.0
16 Raw Jute	264	92.0	87.2
17.Hides & Skins	211	24.3	15.6
18.Natural Rubber	2311	96.4	97.9
19.Sisal/Henequen (Fibres)	2654	97.1	97.5
20.Wood in the rough	242-2421	52.8	52.7
21.Bauxite	2833	73.3	71.8
22.Copper(Ores, concentrates)	2831	55.4	68.2
23.Iron(ores, concentrates)	281	46.6	44.7
24.Lead(Ores, concentrates)	2834	40.4	44.4
25.Manganese(ores, concentrates)	2837	56.6	46.7
26.Phosphates (rock)	2713	61.1	63.2
27.Tin(ores, concentrates)	2836	84.5	77.9
28.Zinc(ores, concentrates)	2835	34.7	31.2

a Market shares are calculated on the basis of value.

Source : United Nations Commodity Trade Statistics, series D, as quoted in UNCTAD, "The Processing and Marketing of Primary Commodities: Approach to a framework of International Co-operation, TD/B/C.1/PSC/23, 24 November 1981.

Annex Table 7: Feasibility Score of Price Raising Action by Developing Country Producers: Selected Primary Products

Criteria	Weights	Petroleum	Bauxite	Phosphate rock	Copper	Tin	Iron Ore	Zinc	Lead	Uranium	Nickel	Manganese
1. Concentration of production and exports in developing countries	25	17	21	12	13	21	4	4	4	4	4	8
2. Price elasticity of demand (long-run)	25	18	19	13	19	13	13	9	9	10	6	6
3. Price elasticity of supply (long-run)	20	14	12	10	14	10	10	14	14	15	14	14
4. Presence of vertically integrated multinationals	10	8	10	5	2	2	6	8	8	5	7	8
5. Product homogeneity	5	2	3	2	3	2	2	1	1	2	1	2
6. Financial strength of producers	5	4	1	3	2	3	2	4	4	3	4	3
7. Stocks/scrap/recyclability	5	5	1	5	1	1	0	0	0	5	2	1
8. Relative dispersion of major buyers	5	4	3	3	2	3	2	2	2	1	2	2
Total Score	100	72	70	53	56	55	39	42	42	45	40	44

Notes: (1) Score is calculated by (i) taking 20 per cent of producers market share; (ii) and modifying on the basis of concentration among developing country exporters. High score indicates concentration.

(2) The price elasticity of demand was translated into a score using the following conversion scale.

Score	2.5	5.0	7.5	10.0	12.5	15.0	17.5	20.0	22.5	25.0
Price Elasticity over	1.5	1.5 - 1.19	1.2 - 0.96	0.95 - 0.81	0.8 - 0.66	0.65 - 0.51	0.5 - 0.36	0.35 - 0.21	0.2 - 0.11	0.1 & less

(3) Scoring Conversion scale is as follows.

Score	2	4	6	8	10	12	14	16	18	20
Supply Elasticity over	1.5	1.5 - 1.19	1.2 - 0.96	0.95 - 0.81	0.8 - 0.66	0.65 - 0.51	0.5 - 0.36	0.35 - 0.21	0.2 - 0.11	0.1 & less

(4) Estimates based on knowledge of international commodity markets. High scores indicates oligopolistic market structure.
(5) Estimates based on knowledge of producing exporting countries.
(6) Estimates based on knowledge of major LDC exporters.
(7) Estimates based upon knowledge of the commodity and scrap markets. Low scores indicate the presence of scrap markets; high scores indicate that the product is destroyed in the act of consumption.
(8) Estimates of concentration and dispersion of importers. High scores indicate broad dispersion; low scores concentration.

Source: Computed by the author.

Annex Table 7 (contd.)

Feasibility Score of Price Raising Action by Developing Country Producers: Selected Primary Products

Criteria	Weights	Cocoa	Coffee	Tea	Sugar	Bananas	Cotton	Jute	Sisal	Rubber	Rice	Edible Oils	Tropical Timber
1. Concentration of production and exports in developing countries.	25	21	11	18	1	16	2	22	24	23	4	22	13
2. Price elasticity of demand (long-run)	25	20	19	18	24	16	18	10	10	11	20	18	13
3. Price elasticity of supply (long - run)	20	16	16	18	6	16	19	14	14	16	16	14	10
4. Presence of vertically integrated multinationals	10	4	3	3	2	8	3	2	2	4	3	2	4
5. Product homogeneity	5	2	2	1	3	2	3	3	3	3	3	0	1
6. Financial strength of producers	5	2	2	1	2	1	2	1	1	3	2	2	1
7. Stocks/scrap/recyclability	5	2	1	2	2	4	3	2	2	1	2	1	2
8. Relative dispersion of major buyers	5	3	3	3	3	3	2	2	2	3	3	3	3
Total Score	100	70	57	64	43	66	52	56	58	64	53	62	47

ANNEX II

METHOD OF ESTIMATING OPTIMAL EXPORT TAXES

1. Introduction

The rationale of this exercise stems from the wide-spread evidence and belief that inspite of protectionism in most parts of the world, demand elasticities are sufficiently low and production concentration in the developing countries sufficiently high for there to be a prima facie case for the application of the classical export tax argument (see chapter II section (a)).

The methodology followed is similar to that used in UNCTAD(1974), modified to allow for the calculation of commodity export taxes which maximise export revenue, welfare and export tax revenue. Some exploration is made of the consequences of shifts in the supply or demand schedules and of the payment of compensation as a means of inducing compliance with a uniform system of taxes.

To make this illustrative exercise tractable, two main simplifying assumptions are made. First, the world is classified according to four categories for each of the commodities analysed: the net exporters and net importers among the developing countries of the South, and the net exporters and net importers among the developed countries of the North. Second, the exercise is based on commodities and not countries. Thus, a number of strong partial equilibrium assumptions are made, and income, revenue and balance-of-payments effects are not allowed for in the model.

2. Definitions

The superscripts N and S are for North and South. The e and m subscripts are for net exporters and importers. The subscripts p,c and w are for producer, consumer and world prices. The definitions of symbols used are summarized in the following table.

	Developing Countries		Developed Countries		World
Apparent Consumption	D_e^s	D_m^s	D_e^N	D_m^N	D
Production	S_e^s	S_m^s	S_e^N	S_m^N	S
Exports, Imports	E^s	M^s	E^N	M^N	E,M
Prices, Producers	$p_{p,e}^s$	$p_{p,m}^s$	$p_{p,e}^N$	$p_{p,m}^N$	
Prices, Consumers	$p_{c,e}^s$	$p_{c,m}^s$	$p_{c,e}^N$	$p_{c,m}^N$	
World Price	p_w	p_w	p_w	p_w	
Export Revenue	E_r^s		E_r^N		E_r
Export Tax and Revenue	t^s, T^s	-	t^N, T^N	-	T
Demand Elasticities	$e_{d,e}^s$	$e_{d,m}^s$	$e_{d,e}^N$	$e_{d,m}^N$	
Supply Elasticities	$e_{s,e}^s$	$e_{s,m}^s$	$e_{s,e}^N$	$e_{s,m}^N$	
Shift in Demand Function(%)		Δ_d			
Shift in Supply Function (%)		Δ_s			

3. Elasticity and Price Relations

Defining export taxes as a fraction of producer prices, and introducing a set of constants, $K_{c,e}^s$, $K_{c,m}^s$... etc. to specify proportional relationships between world, producer and consumer prices to allow for transport costs and margins, the following price equations will apply:

$$p_w = (1 + t^s)\ K_{p,e}^s\ p_{p,e}^s$$

$$p_w = (1+t^N)\ K_{p,e}^N\ p_{p,e}^N$$

$$p_{c,e}^s = K_{c,e}^s\ p_{p,e}^s$$

$$p_{c,m}^s = K_{c,m}^s\ p_w$$

$$p^N_{c,e} = K^N_{c,e}\ p^N_{p,e}$$

$$P^N_{c,m} = K^N_{c,m}\ p_w$$

Defining $\dot{p}^s_{p,e} = \frac{dp^s_{p,e}}{dt} / p^s_{p,e}$, etc.

and $\dot{t}^s = \frac{dt^s}{dt} / (1 + t^s)$

$$\dot{t}^N = \frac{dt^N}{dt} / (1 + t^N)$$

where $\frac{d}{dt}$ indicates the total deviate with respect to time,

we find

$$\dot{p}_w = \dot{p}^s_{p,e} + \dot{t}^s \qquad (1)$$

$$\dot{p}_w = \dot{p}^N_{p,e} + \dot{t}^N \qquad (2)$$

and hence

$$\dot{p}^s_{c,e} = \dot{p}^s_{p,e} = p_w - \dot{t}^s \qquad (3)$$

$$\dot{p}^s_{c,m} = \dot{p}_w \qquad (4)$$

$$\dot{p}^N_{c,e} = \dot{p}^N_{p,e} = \dot{p}_w - \dot{t}^N \qquad (5)$$

$$\dot{p}^N_{c,m} = \dot{p}_w \qquad (6)$$

From which we derive the following elasticity relationships:

$$\dot{D}^s_e = e^s_{d,e}\ \dot{p}^s_{c,e} = e^s_{d,e}\ (\dot{p}_w - \dot{t}^s) \qquad (7)$$

$$\dot{D}^s_m = e^s_{d,m}\ \dot{p}^s_{c,m} = e^s_{d,m}\ \dot{p}_w \qquad (8)$$

$$\dot{D}^N_e = e^N_{d,e}\ \dot{p}^N_{c,e} = e^N_{d,e}\ (\dot{p}_w - \dot{t}^N) \qquad (9)$$

$$\dot{D}^N_m = e^N_{d,m}\ \dot{p}^N_{c,m} = e^N_{d,m}\ \dot{p}_w \qquad (10)$$

$$\dot{S}^s_e = e^s_{s,e}\ \dot{p}^s_{p,e} = e^s_{s,e}\ (\dot{p}_w - \dot{t}^s) \qquad (11)$$

$$\dot{S}^s_m = e^s_{s,m}\ \dot{p}^s_{p,m} = e^s_{s,m}\ \dot{p}_w \qquad (12)$$

$$\dot{S}^N_e = e^N_{s,e}\ \dot{p}^N_{p,e} = e^N_{s,e}\ (\dot{p}_w - \dot{t}^N) \qquad (13)$$

$$\dot{S}^N_m = e^N_{s,m}\ \dot{p}^N_{p,m} = e^N_{s,m}\ \dot{p}_w \qquad (14)$$

where $\dot{D}^s_e = \frac{dD^s_e}{dt} / D^s_e$ ..... etc.

4. Effects of change in taxes or exogeneous shift of demand or supply schedules on prices

If it is assumed that no country changes its position as a net exporter or importer of the commodity under consideration, then the following supply and demand balance relationship must hold after an exogeneous change in t or Δ :

$$\dot{D}^s_e\ \gamma^s_e + \dot{D}^s_m\ \gamma^s_m + \dot{D}^N_e\ \gamma^N_e + \dot{D}^N_m\ \gamma^N_m + \Delta_d$$

$$-\dot{S}^s_e\ \alpha^s_e - \dot{S}^s_m\ \alpha^s_m - \dot{S}^N_e\ \alpha^N_e - \dot{S}^N_m\ \alpha^N_m - \Delta_s = 0 \qquad (15)$$

where γ^s_e, γ^s_m ..... are the shares in demand

and α^s_e, α^s_m ..... are the shares in supply,

and it is assumed that D = S in the initial situation.

Substituting (7) - (14) into (15), we find

$$e^s_{d,e}\ (\dot{p}_w - \dot{t}^s)\ \gamma^s_e + e^s_{d,m}\ \dot{p}_w\ \gamma^s_m + e^N_{d,e}\ (\dot{p}_w - \dot{t}^N)\ \gamma^N_e$$

$$+e^N_{d,m}\ \dot{p}_w\ \gamma^N_m + \Delta_d - e^s_{s,e}\ (\dot{p}_w - \dot{t}^s)\alpha^s_e - e^s_{s,m}\ \dot{p}_w\ \alpha^s_m$$

$$-e^N_{s,e}\ (\dot{p}_w - \dot{t}^N)\alpha^N_e - e^N_{s,e}\ \dot{p}_w\ \alpha^N_m - \Delta_s = 0 \qquad (16)$$

Collecting terms in $\dot{p}_w$, we find

$$\dot{p}_w = \frac{(e^S_{d,e}\gamma^S_e - e^S_{s,e}\ \varepsilon^S_e)\dot{t}^S + (e^N_{d,e}\gamma^N_e - e^N_{s,e}\alpha^N_e)\dot{t}^N - \Delta_d + \Delta_s}{e^S_{d,e}\ \gamma^S_e + e^S_{d,m}\ \gamma^S_m + e^N_{d,e}\ \gamma^N_e + e^N_{d,m}\ \gamma^N_m - (e^S_{s,e}\ \alpha^S_e + e^S_{s,m}\alpha^S_m + e^N_{s,e}\alpha^N_e + e^N_{s,m}\alpha^N_m)} \quad (17)$$

$$= \frac{A^S\ \dot{t}^S + A^N\ \dot{t}^N - \Delta_d + \Delta_s}{B} \quad (17)$$

where the definition of A^S, A^N are given above. By substitution for $\dot{p}_w$ in (7) - (14), all the desired changes in demand and supply can be calculated. Note that A, B ≤ 0 as $e_d \longrightarrow \infty$, $\dot{p}_w \longrightarrow o$ for any of the demand elasticities. Also, the higher the elasticities of demand and supply in the exporting countries, the higher will be the impact of any given change of t^S or t^N, given other parameters. Conversely, the lower the demand and supply elasticities in the importing countries, the higher the price response, given other parameters.

5. Maximum Export Revenue

Total export revenue is given by

$$E_r = p_w\ (E^S + E^N)$$

$$\text{or} \quad \dot{E}_r = \dot{p}_w + \dot{E}^S\ \varepsilon + \dot{E}^N\ (1 - \varepsilon) \quad (18)$$

where ε is the export share of the South. Using the definition of E^S and E^N and substituting from (7) - (14), we find:

$$\dot{E}^S = \dot{S}^S_e\ \varepsilon^S_s - \dot{D}^S_e\ \varepsilon^S_d = e^S_{s,e}(\dot{p}_w - \dot{t}^S)\varepsilon^S_s - e^S_{d,e}(\dot{p}_w - \dot{t}^S)\varepsilon^S_d \quad (19)$$

$$\dot{E}^N = \dot{S}^N_e\ \varepsilon^N_s - \dot{D}^N_e\ \varepsilon^N_d = e^N_{s,e}(\dot{p}_w - \dot{t}^N)\varepsilon^N_S - e^N_{d,e}(\dot{p}_w - \dot{t}^N)\ {}^N_d \quad (20)$$

where $\varepsilon^S_s = S^S_e / (S^S_e - D^S_e)$

$$\varepsilon^S_d = D^S_e / (S^S_e - D^S_e)$$

and ε^N_s, ε^N_d follow in a similar fashion. Thus,

$$\dot{E}_r = \dot{p}_w + (e^S_{s,e}\varepsilon^S_s - e^S_{d,e}\ \varepsilon^S_d)\ (\dot{p}_w - \dot{t}^S)$$

$$+ (1 - \varepsilon)\ (e^N_{s,e}\ \varepsilon^N_s - e^N_{d,e}\ \varepsilon^S_d\ )\ (\dot{p}_w - \dot{t}^N)$$

$$= \dot{p}_w + C^S\ (\dot{p}_w - \dot{t}^S) + C^N(\dot{p}_w - \dot{t}^N)$$

where C^S and C^N are defined as above.

Collecting terms in $\dot{p}_w$ and substituting from (17^1):

$$\dot{E}_r = \frac{A^S\ \dot{t}^S\ + A^N\dot{t}^N - \Delta_d\ + \Delta_s}{B}\ (1 + C^S\ + C^N)\ + C^S\dot{t}^S + C^N\dot{t}^N$$

Collecting terms in $\dot{t}^S$, $\dot{t}^N$, Δ_d and Δ_s ,

$$\dot{E}_r = \left[\frac{A^S}{B}(\ 1\ + C^S + C^N)\ + C^S\right]\ \dot{t}^S + \left[\frac{A^N}{B}(1\ + C^S + C^N) + C^N\right]\ \dot{t}^N$$

$$= \frac{\Delta_d}{B}\ +\ \frac{\Delta_s}{B}$$

$$= F^S\ \dot{t}^S + F^N\dot{t}^N\ -\ \frac{\Delta_d}{B}\ +\ \frac{\Delta_s}{B}, \qquad (21)$$

where F^S, F^N are defined as above.

Thus for export revenue maximization $E_r = 0$

6. Optimal Export Tax

Case I: Tax on all exports, and $\dot{t}^S = \dot{t}^N = t$.

By definition, $E_r = E_p$, (where $E = E^N + E^S$), thus

$$E_r = \dot{p}_w + \dot{E}. \qquad (22)$$

Marginal revenue from exports is given by

$$\frac{dE_r}{dE} = \frac{\dot{E}_r}{\dot{E}} = p_w$$

$$= p_w\left(1 + \frac{1}{\eta_d}\right) \qquad (23)$$

using (22), where $\eta_d = \frac{\dot{E}}{\dot{p}_w}$, the elasticity of demands for exports. Now the optimal export tax reqires that marginal revenue and supply price are equated. Here it is preferable to define $t^* = \frac{t}{1+t}$ where t^* is measured as a fraction of world price. Setting the k's equal to 1 for simplicity, we require

$$p_w(1 - t^*) = p_w(1+\frac{1}{\eta_d})$$

or

$$t^* = \frac{1}{\eta_d} \qquad (24)$$

which is the same as Corden (1974, p.160). For the purposes of calculation, we can estimate η_d at every step as t (or t^*) is increased, until we reach the optimum designed by (24).

Case II: Tax on South exports only.

This is the same as 1, except that $\dot{t}^N = 0$. Equations (22)-(24) can be rewritten as

$$\dot{E}_r^s = \dot{p}_w + \dot{E}^s \qquad (22^1)$$

$$\frac{dE_r^s}{dE^s} = p_w(1 + \frac{1}{\eta_d^s}) \qquad (23^1)$$

where $\eta_d^s = \frac{\dot{E}^s}{p^w}$,

and the optimal export tax will be

$$t^{*s} = -\frac{1}{\eta_d^s}$$

Note, of course, that this is only the optimum tax from the point of view of the producing countries of the commodities in question, either all producers or the South producers. For this to be beneficial from the world point of view, we need to explicitly note that the welfare weight of all other producers and consumers is zero.

7. Maximum Export Tax Revenue

The export tax revenue for $\dot{t}^S = \dot{t}^N = t$ and for $\dot{t}^N = 0$ are given by

$$T = p_w E t^* \tag{25}$$

$$T^S = p_w E^S t^{*S} \tag{26}$$

The condition for maximum export tax revenue is simply

$$\dot{T} = \dot{p}_w + \dot{E} + \dot{t}^* = 0 \tag{27}$$

$$\dot{T}^S = \dot{p}_w + \dot{E}^S + \dot{t}^S = 0 \tag{28}$$

This can be easily calculated in the iterative procedure proposed below.

8. Iterative Calculation

Given the estimates of supply and demand for each commodity in a base year, the estimates of the supply and demand elasticities, and an initial set of share parameters can be calculated. Then, for changes in $\dot{t}^S$, $\dot{t}^N$ as desired, and for Δ_d, $\Delta_s = 0$, the changes in all variables and a new set of values can be calculated. This, in turn, enables the re-estimation of the share parameters and a new iteration can begin for any specified $\dot{t}$. Setting $\dot{t} = .01$ seemed to work well. At any desired level of export taxes, by setting Δ_d or Δ_s equal to + or - .01, estimates of the effects of such a change in a demand or supply function can easily be made. These calculations form the basis of estimating either the consequences of shifts in supply and demand for some effect not captured in the shifts along the functions (a major substitution effect at some threshold price) or of the expansion of supply outside the taxed area. The latter calculations form the basis of estimating possible compensation which could be paid to induce new suppliers not to operate outside the tax system under analysis.

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