THE EFFECT OF THE DISPARATE TREATMENT OF TAX REBATES UPON TRADE PATTERNS OF MANUFACTURED GOODS UNDER THE GENERAL AGREEMENT OF TARIFFS AND TRADE

Thesis for the Degree of Ph. D.
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BARBARA RALL LOWREY
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ABSTRACT

THE EFFECT OF THE DISPARATE TREATMENT OF TAX REBATES UPON TRADE PATTERNS OF MANUFACTURED GOODS UNDER THE GENERAL AGREEMENT OF TARIFFS AND TRADE

By

Barbara Rall Lowrey

This study attempts to determine whether GATT is theoretically justified in its border adjustment policies and whether any country, particularly the United States, has suffered because of these policies.

Analysis of the incidence of consumption taxes indicates that GATT is theoretically justified in currently permitting border adjustments for these taxes. The GATT is incorrect, however, in permitting border adjustments at rates equivalent to domestic taxation when the export supply and import demand elasticities are less than infinite. Under those conditions, rebates subsidize exports and border taxes restrict imports thereby disturbing pre-tax international trade flows. Mathematical formulae, illustrating that the amounts of export subsidy and import restriction depend upon the relative elasticities of supply and demand, are used to measure the distortions in OECD trade of manufactured products. The estimated results indicate that the 1967 United States balance of trade deficit is $600 million to $2.2 billion higher than it would be under pre-tax conditions.

Barbara Rall Lowrey

Analysis of the incidence of corporate income and employers' social security taxes indicates that GATT is unjustified in prohibiting border adjustments for them. Since these taxes, like consumption taxes, will cause price increases in the long run, GATT should be consistent and permit border adjustments for all business taxes. A mathematical model, employing the Cobb-Douglas production function, is developed to predict the change in quantity and value of 1967 OECD manufactured exports if border adjustments were permitted for the corporate income and employers' social security taxes. The estimated results indicate that the EEC would improve its balance of trade position by nearly 100 percent, while the United States deficit would increase by $1.1 billion.

This study reveals that distortions in international trade flows have arisen because of GATT policies; there is no indication, however, that the balance of trade of the United States or any other OECD country has suffered because of the GATT errors. The United States balance of trade difficulties arising from border adjustments for consumption taxes have been offset by benefits accruing from the lack of border adjustments for the corporate income and social security taxes.

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Finally, I dedicate this completed work to my husband, Thomas E. Lowrey, with all my love.

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CHAPTER I

INTRODUCTION

With the lowering of tariffs as a result of the Kennedy round negotiations, attention has turned to other restrictions affecting the flow of trade. Of particular interest to the United States, with its persistent balance-of-payments problems, is the impact of border taxes and export rebates on a country's competitiveness in world markets. For purposes of this analysis, a border tax is defined as a tax on imports that is theoretically equivalent to the tax borne by like domestic products. Rebates are defined as repayments to exporters of domestic taxes incurred by the exporters. Combined, the two are called "border adjustments".

The alleged objective of border adjustments is to eliminate trade distortions that may result from the use of different tax systems and rates by various countries. The need for them is grounded in assumptions made about the incidence or the impact of taxes upon product prices. It has been assumed that some taxes raise product prices by an amount equal to the tax rate. If a country employs higher tax rates than those of its competitors, the increase in the prices of its offered goods will be greater, causing a decrease in demand in world markets unless adjustments are made. Thus, the General Agreement on Tariffs and Trade (GATT) permits equalizing border taxes on imports to discourage consumers from substituting

imports for domestic consumption; and it permits tax rebates for exports so that product competitiveness is not distorted because of tax policies.

To prevent an undue constraint of imports or excess promotion of exports, the GATT limits such border adjustments to the amount of tax actually assessed on domestic products. Under the GATT regulations, border adjustments are permissible for only certain business taxes. Border adjustments are permitted for sales, turnover, excise, and value-added taxes, but not for the corporate income and social security taxes. It is the purpose of this dissertation to explore whether the GATT is justified in making a distinction, for the purpose of border adjustments, among these taxes. In addition, this dissertation examines whether border adjustments for the full amount of domestic taxes restore pre-tax trade conditions or whether they enable a country to improve its balance of trade position.

A. Regulations on Border Adjustments

Since the objective of this inquiry is to determine the validity of the GATT policies, it is important to understand the rulings before extensive assessment is made.

The GATT policies toward border adjustments are enunciated in several different places in the charter. Provisions regarding border taxes and export rebates are not requirements but serve rather as guidelines; they are simply statements of what is permissible under the GATT. Articles II:2 and III:2 specify the policy regarding border taxes on imported goods. These articles

provide that no imported products shall be subject to internal taxes in excess of those applied to domestic products. The only internal taxes that can be imposed on imports are "taxes on products"; unfortunately the GATT makes no clear definition here of which taxes qualify.

Provisions regarding export rebates are included in the articles that deal with dumping practices (Article VI) and export subsidies (Article XVI). These make clear that the dumping or subsidizing of exports is condemned, and that importing countries may impose special charges on products that have been dumped or subsidized by the exporting government. However, the remission or exemption of product taxes on exported goods is not deemed a subsidy.

Not until 1960 at the 17th session of the GATT was a more explicit statement on rebates adopted. In Article XVI, parts 4(c) and 4(d), the remission of direct taxes or social welfare charges was specifically prohibited, and the exemption of taxes now applies only to indirect taxes. The amount of taxes rebated cannot be greater than the amount "effectively levied" in the production process.[1]

Even with the 1960 amendments, no explicit statements are made as to which taxes will be considered indirect and which ones will be considered direct. The categorizing of taxes has

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[1]Helen Junz, "The Border Tax Issue Defined," Issues and Objectives of U.S. Foreign Trade Policy, Joint Economic Committee, Congress of the U.S., 90th Congress, 1st session (September, 1967), pp. 31-32.

been left to the GATT officials. They have decided that excise, turnover, sales and value-added taxes are indirect and eligible for border tax adjustments. They construe corporation income taxes as direct and thus ineligible for border adjustments. Social security and property taxes are often considered indirect by scholars, yet are not eligible for border adjustments. This thesis is not concerned with the proper economic classification of taxes as direct versus indirect, but will distinguish between taxes only on the basis of their legal rebatability.

It is important to note that the GATT document contains no statement on why taxes should be classified on the basis of their "rebatability". There is no economic reasoning presented to support such a distinction, nor is there any statement about the incidence of various taxes. The authors that defend the GATT regulations generally defer to the rationale developed by the European Economic Community which adopted policies on border adjustments identical with those of the GATT.

The EEC rationale for distinguishing between taxes is that some taxes are paid at the "origin" and others are paid at the "destination".[2] For taxes which the EEC assumes are absorbed at the origin by producers through unchanged prices, no border adjustments are permitted. For taxes which the EEC

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[2]Clara Sullivan, The Search for Tax Principles in the EEC (Cambridge, Massachusetts: Harvard Law School, International Program in Taxation, 1967).

assumes are paid at the destination by consumers through higher pricing of goods, border adjustments are permitted so that imports and domestic products bear equal amounts of tax. The EEC assumptions about the burden of taxes at the "origin" or at the "destination" are merely assumptions about the incidence of various taxes, and this study is primarily concerned with the validity of these assumptions.

B. Plan of Procedure

In the following chapters, this study examines the economic literature to determine whether there is general agreement that the GATT and the EEC are justified in distinguishing between taxes for border adjustments because of assumed differences in incidence. The conventional reasoning on the theory of incidence is also used to evaluate whether the policy of permitting border adjustment for the full amount of domestic product taxes achieves neutrality.

Operating under the assumption that there may be theoretical flaws in the current policy toward border adjustments, this dissertation next analyzes the tax structures and rates of the various OECD members to determine whether particular countries may have suffered or gained because of the misconceptions about the impact of the policies. Examination is made to determine whether a country may have suffered in world trade because of placing greater reliance upon non-rebatable business taxes than its competitors. Examination is also made to determine whether a country may have gained in world trade because of extensive use of rebatable business taxes. There is no a priori

reason to expect simple identification of "losers" and "winners" to emerge from such examinations, because a country's losses from high rates of non-rebatable taxes could be offset by gains from high rates of rebatable taxes.

A survey of tax structures cannot measure the extent to which a country has suffered because of the GATT's position in prohibiting border adjustments for the corporate income and social security taxes. Thus it seems logical to construct a mathematical model that will attempt to predict the value of exports and the balance of payments of OECD members if the prohibition were lifted.

There is some theoretical justification for questioning the neutrality of border adjustments for indirect taxes, and calculations are made in a separate chapter to examine whether border adjustments have improved the balance of payments position of the other OECD countries vis-a-vis the United States.

In making the calculations, trade data of 1967 manufactured products were used. The study was limited to manufactured products (SITC categories 5, 6, 7, 8) because it is for these that the current tax policies are of greatest concern.

The analysis in this dissertation will be limited primarily to consideration of the price effects of current taxation and border adjustment policies. The discussion will cover the extent to which exports and imports have been affected because of changes in pre-tax export and import prices. No assessment will be made of the income effects of current tax policies upon the international trade of manufactured products. The consideration of the impact of taxation policies upon capital flows is also beyond the scope of this dissertation.

CHAPTER II

THEORIES OF TAX INCIDENCE AND REVIEW OF THE LITERATURE

The discussions of the GATT border adjustment policies are all of recent origin; prior to 1966, because of the preoccupation of trade analysts with tariffs and quotas, little attention was paid to the impact of the GATT policies upon trade flows. Since that time, however, both popular and professional articles have appeared suggesting that the GATT policies may have a distorting effect on a country's exports and imports. At the heart of the discussion is a disagreement over the correctness of the GATT assessments of the incidence of various taxes, or of the effect of these taxes on commodity prices.

Before the discussion of articles of the border tax issue can be meaningful, it is necessary to understand the economic reasoning behind the GATT assumptions and the economic reasons for challenging those assumptions.

A. The Economics of Tax Incidence

Incidence is the term used to identify which factor actually bears the tax; in this dissertation, incidence will be determined by examining how specific taxes affect product prices.

If a tax raises the product price by the full amount of the levy, then the tax is actually paid by the consumer even if it is legally assessed on the producer. If a tax has no impact on product prices, then the tax is borne by the producer,

or his factors of production. The incidence of the tax in which the product prices rise by less than the amount of the tax is distributed among the consumer, the producer, and the factors of production, capital and labor. For those taxes which affect an industry's equilibrium price and output, the relative incidence between consumer and producer is determined by the relative elasticities of demand and supply, and by the degree of competition among suppliers. The following analysis will illuminate how these factors affect the incidence of a particular tax on products.

1. The Theoretical Views of the Incidence of a Tax on Consumption

Numerous taxes are imposed on producers when they sell their output. In accordance with OECD terminology, these taxes, which include sales, excise, turnover, and value-added taxes, will be referred to as "consumption" taxes. Since the producer must pay these taxes, his costs in supplying a particular quantity of goods are increased by the amount of the taxes. The producer is liable for the taxes only when the product is sold, however, and he may choose to view the taxes as a decrease in his per unit revenue rather than as an increase in per unit costs. In either case, the effect on the industry's equilibrium price and quantity will be the same.[1] For example,

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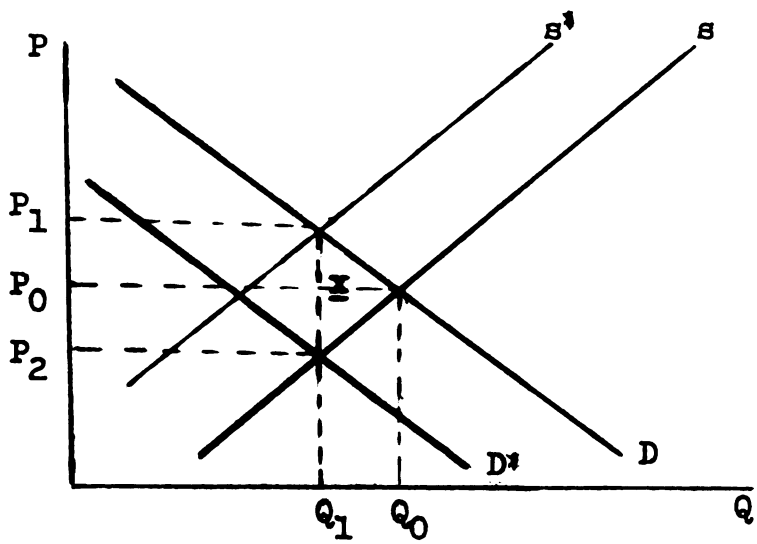
[1] R. A. Musgrave, Theory of Public Finance (New York: McGraw-Hill, 1959), pp. 288-290, 306-308.

consider the long-run, perfectly competitive case illustrated in Fig. II:A. The illustrated market supply schedule is for an increasing cost industry; however, the same relationships hold for constant cost as well.

Before any tax is levied, the market equilibrium price is P_0 and the equilibrium quantity is Q_0. A unit tax of amount $\underline{x}$ is now imposed. When the situation is viewed as an increase in costs, the supply function will shift upward by an amount equal to $\underline{x}$. The equilibrium market price becomes P_1,

Fig. II:A -- Incidence of unit tax viewed as either an increase in costs or reduction in net revenue.



with the actual return to producer P_2, since P_1-P_2 is paid to the government. Alternatively, when the situation is viewed as a decrease in net revenue, the demand function or average revenue curve shifts downwards by an amount equal to $\underline{x}$. The equilibrium market price again becomes P_1 with Q_1 sold. The producers are in long-run equilibrium when their net revenue P_2 equals their marginal and average costs. However, consumers

are willing to pay P_1 so the market price will be P_1 with P_1-P_2 paid to the government by producers. These alternative views of consumption taxes are also applicable in monopoly markets.

a. Importance of elasticities of demand and supply: The preceding analysis emphasized that the cost curve or the demand curve will shift by the amount of the tax imposed. However, the analysis did not indicate that the market price would rise by the amount of the tax.

The amount of price increase depends upon the share of the total tax which is borne by consumers. This share (s) is a function of the relative elasticities of demand (η) and supply (ε). A mathematical formula for estimating (s), for both unit and ad valorem taxes, can be developed by observing the following relationships:[2]

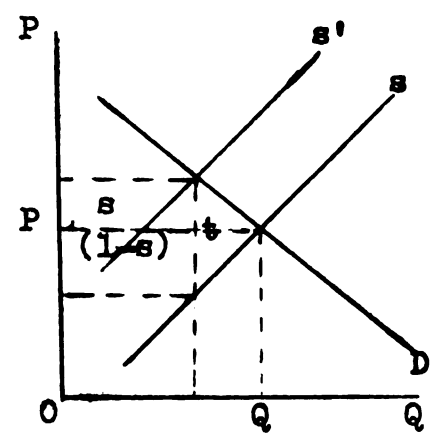
1. $|\eta| = \frac{\Delta Q}{Q} \cdot \frac{P}{\Delta P} = \frac{\Delta Q}{Q} \cdot \frac{OP}{st}$

2. $\frac{\Delta Q}{Q} = |\eta| \cdot \frac{st}{OP}$

3. $\varepsilon = \frac{\Delta Q}{Q} \cdot \frac{P}{\Delta P} = \frac{\Delta Q}{Q} \cdot \frac{OP}{(1-s)t}$

4. $\varepsilon = \frac{st}{OP} \cdot |\eta| \cdot \frac{OP}{(1-s)t}$

5. $s = \frac{\varepsilon}{|\eta| + \varepsilon} = \frac{1}{1 + \frac{|\eta|}{\varepsilon}}$



[2]This mathematical proof was supplied privately by M. E. Kreinin, Department of Economics, Michigan State University. The producers' share of the tax is (1-s) and equal to $|\eta| / |\eta| + \varepsilon$.

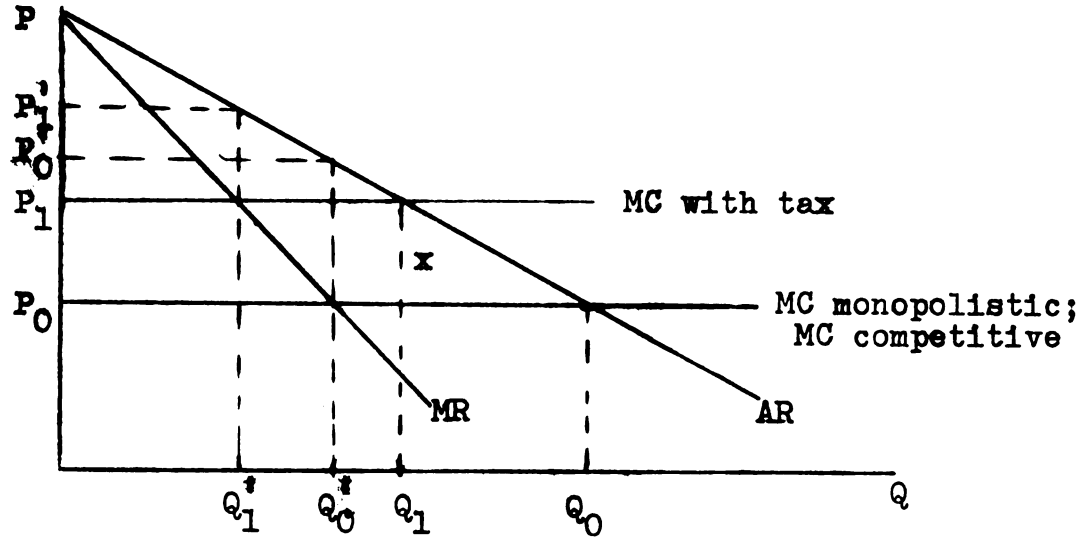
It can be seen from this formula that the share of the tax borne by consumers is determined by the relative elasticities of the two functions, and not by their absolute values. When both $|\eta|$ and ε are very large, the proportion s may be the same as when $|\eta|$ and ε are small. When the supply elasticity is infinite, s becomes equal to one, and the amount of market price increase will equal the amount of tax.

b. Incidence as influenced by degree of competition among suppliers: The degree of competition among suppliers also influences the incidence of a consumption tax. The greater the competition among producers, the more the tax will be borne by consumers. If the marginal cost curve of a monopolist is the same as the sum of the marginal cost curves of producers in perfect competition, the tax will raise a monopolist's price by only one-half that of a perfect competitor's price increase. The reason for this disparity is that any change in the monopolist's profit-maximizing marginal revenue implies a price change of only half that amount. For the perfect competitor, however, the change in price is identical with the change in marginal revenue.

This point is illustrated below by using a linear demand function which represents the market demand for either a monopolistic or a competitive market. The illustrated marginal revenue curves applies only to the monopolist, since a perfect competitor can sell all his output without affecting market price. The slope of the monopolist's marginal revenue curve

is twice that of the demand curve.[3] For purposes of this analysis, the marginal cost curve of the monopolist is considered to be identical with the sum of the marginal cost curves of the competitors.

Fig. II:B -- Impact of degree of competition upon tax incidence.



Before a tax is imposed, the equilibrium level of output is a Q_0 with price P_0 for the perfectly competitive market, while the monopolist sells Q_0' because MR = MC at that quantity. The monopolist sells his output at price P_0'. If a tax of amount x is imposed, the MC cost curve shifts upward by the same amount for both the monopolist and the competitor. The change in marginal revenue must be the same for both sets of producers if the profit maximizing condition of MR = MC is to

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[3] R. A. Musgrave, op. cit., p. 292
demand function = $a + bx$;
monopolist's total revenue schedule is $TR = ax + bx^2$;
monopolist's marginal revenue schedule is $MR = a + 2bx$
∴ slope of MR schedule is twice that of demand function.

be met; i.e. the change in marginal revenue for both producers is P_1-P_0. For the perfectly competitive producer the change in market price equals the change in marginal revenue, and equilibrium is restored when Q_1 is sold at P_1. For the monopolist the market price changes by one-half the change in marginal revenue ($P_1'-P_0'$ equals $\frac{1}{2}$ P_1-P_0) and equilibrium is restored where Q_1' is sold at P_1'.

For markets whose degree of competition lies between the extremes of perfect competition and monopoly, the change in price from taxation is less certain. In monopolistic competition, prices will rise by the amount of tax if constant costs and parallel shifts in the demand schedule occur. For conditions of variable costs, the increase in price may exceed or fall short of the tax. In oligopolistic industries, the awareness of interdependence plays a determining role in the price response to taxation. For oligopolists confronted with a kinked demand curve, taxes may cause no increase in price because each firm fears drastic losses if competitors do not follow suit. On the other hand, oligopolists may use the imposition of a tax as a signal to raise prices because they know that all firms have been subject to the same increase in costs.[4]

c. Implications of the preceding analysis for the GATT assumptions: The preceding analysis indicates that the

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[4]John F. Due, Government Finance: An Economic Analysis 3rd ed. (Homewood, Illinois: Irwin Bros., 1963), pp. 267-271.

GATT is rarely correct in its assumption that the consumer bears the full burden of consumption taxes. Only if production occurs under constant-cost conditions (infinitely elastic supply) and under conditions of perfect competition, will the full incidence fall upon the consumer. In all other situations the tax will be borne partly by producers because the long-run equilibrium market price will not rise by the full amount of the tax.

When a tax is borne by both producers and consumers, rebating the full amount of collected tax permits producers to sell their new equilibrium quantity of output at a lower price than was possible before the government taxing policy was imposed. Of course, the equilibrium output when taxes are imposed only on domestic and not on export sales will be different from the output illustrated in this chapter which results from taxing all sales. The fact remains, however, that if the supply function is not perfectly elastic, domestic taxation releases sufficient resources from domestic use to enable producers to sell their exports at a lower price than would be possible before any taxes or rebates were employed. Exports sales can be expanded and the balance of payments can be improved unless exchange rates are adjusted to account for the discrepancy.

Similarly, when the domestic supply function is less than perfectly elastic, border taxes on imports for the full amount of domestic taxation will discourage import consumption and further benefit the balance of payments. When domestic producers absorb part of the tax levied on their sales, domestic

prices rise by less than the amount of the tax, thereby preventing the substitution of imports for domestic goods. In this situation, full border taxes lower the demand for imports below pre-tax levels and cause the volume of trade to decrease.

In Chapter VII, the degree of export subsidy and import reduction from full border adjustments is extensively analyzed. The extent to which particular countries may have improved their balance of payments from the use of rebatable taxes is also measured.

2. Theoretical and Empirical Views on the Incidence of the Tax on Corporate Income

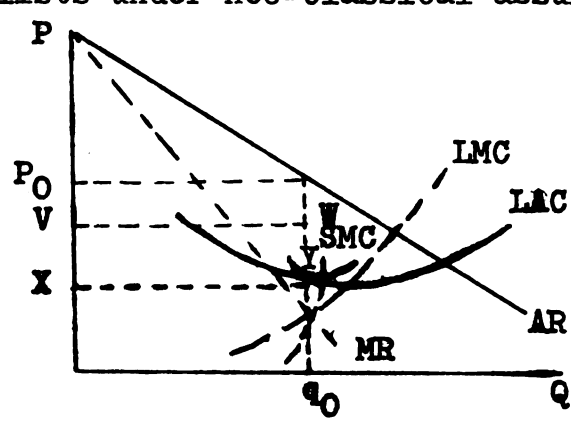
a. Theories and empirical studies that support the current GATT position: At present, the GATT does not permit border adjustment for the corporate net income tax, commonly called the profits tax. Corporate net income and economic profit, however, are not identical concepts. Corporate net income is gross income minus expenses such as interest on bonds, depreciation, and amortization. Economic profit is corporate net income minus the additional expense of average dividends to stockholders. While in practice, tax is collected on corporate net income, theorists often employ the concept of "economic" profit for demonstrating the incidence of this tax. For the sake of simplicity, "corporate net income" will be called "corporate income" while net income minus average dividends will be called "economic profit".

The GATT does not permit border adjustment for the corporate income tax because it implicitly assumes that the incidence of

this tax is completely upon the producer. In other words, it is assumed that a corporate income tax does not raise product prices. The theoretical justification of this assumption is derived from the neo-classical analysis of the profit-maximizing firm and from use of the concept of "economic profit".

The traditional approach is to examine a firm which equates marginal cost with marginal revenue to maximize profits. The per unit economic profits are defined as the difference between average revenue and average costs for that level of output. Since a tax on economic profits is levied upon neither the revenue nor the cost, but only upon the differences between them, there is nothing which affects the position of either curve or induces the producer to change his prices or level of output.[5] Assuming that the particular pre-tax level of output was the profit-maximizing one, no producer can improve his profit position by changing to another level, if neither his cost nor revenue has been altered. The producer simply has smaller amounts of after-tax economic profits. For the monopolistic firm, this can be illustrated as follows:

Fig. II:C -- Incidence of a economic profits tax upon monopolists under neo-classical assumptions.



[5] R. A. Musgrave, op. cit., pp. 277-278.

The profit-maximizing firm before taxes equates MR with MC and produces q_0 of output which he sells for P_0. The economic profits are P_0XYZ. Since tax on economic profits affects neither the MR nor MC curve, the tax will have no effect on output; a reduction in nets profits to XYWV will be the only occurrence.

Given the theoretical definition of economic profits, there will be no tax collected from producers in perfect competition in the long run since average revenue will equal average cost. In practice, however, taxes are collected because the tax is assessed on corporate net income and not on economic profits.

Some of the empirical evidence appears to substantiate the position that the corporate income tax is borne by producers and not by the consumer. One such study was published by M. A. Adelman in 1957.[6] Adelman's argument was that if the corporate income tax is to be shifted onto consumers at all, corporate income before taxes must be increased. Observing that the fraction of total income accruing to the corporate sector has not changed with the increase in corporate taxes, Adelman concluded that the tax had been absorbed by producers.

Robert Gordon's model to examine the shifting of the corporate income tax in eleven industries assumes that companies use capacity-average-cost plus markup pricing policies.[7]

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[6]M. A. Adelman, "The Corporation Income Tax in the Long Run," Journal of Political Economy, LXV (April, 1957), pp. 151-158.

[7]R. Gordon, "The Incidence of Corporation Income Tax," American Economic Review, LVII (September, 1967), pp. 731-758.

His results indicate that the shifting of the corporate income tax for the eleven industries as a whole was zero, even though the more highly concentrated industries such as the chemical and rubber industries did indicate some shifting.

b. Theoretical and empirical studies supporting the assumption that the corporate income tax affects prices: Recently, both A. C. Harberger and Challis Hall have developed a different approach to the analysis of incidence. Rather than considering the incidence of a tax between the producer and the consumer (which has been the approach used thus far), they have chosen to examine the incidence of the corporate income tax between capital and labor. They have looked at the economy in terms of an aggregate production function and have considered the impact of the corporate income tax upon the distribution of income between capital and labor. This approach does not give immediate identification of the impact of the corporate income tax upon product prices, but it does suggest that the tax may be viewed as a tax on an input of production.

In 1962, A. C. Harberger[8] developed a two-sector (corporate and non-corporate) theoretical model, in which the corporate income tax was viewed as a tax on the use of capital in the corporate sector. Given a plausible range for the elasticity of substitution between factors and products in the two sectors,

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[8]A. Harberger, "The Incidence of the Corporation Income Tax," Journal of Political Economy, LXX (June, 1962), pp. 210-230.

Harberger concluded that it was reasonable to assume that capital had borne at least 90 percent of the corporate income tax. As part of his theoretical analysis, Harberger demonstrated that in the long run the tax would cause at least some increase in product prices even though capital does not shift the burden of the tax onto labor. He indicated that the price increase would depend upon the elasticity of consumer demand and upon the factor ratios in the two sectors.

In a 1964 article, Challis Hall[9] also used an aggregate production function to determine the incidence of the corporate income tax upon capital and labor. While Hall's empirical results substantiate Harberger's argument that capital bears the burden of the corporate income tax, there was no statement about the impact on product prices.

The idea that the corporate income tax can be viewed as a tax on capital has been employed by several other authors. Leif Johansen views the corporate income tax as raising the price of using capital and thereby raising the firm's cost of production.[10] With this assumption the corporate income tax will affect the firm's marginal cost curve, and cause a change in price and quantity of output in the long run.

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[9]C. Hall, "Direct Shifting of the Corporation Income Tax," American Economic Association's Papers and Proceedings, LIV (1964), pp. 258-271.

[10]Leif Johansen, Public Economics (Chicago, Illinois: North Holland Publishing Co., 1965), p. 288.

Arthur Bayer, in his 1968 dissertation, used the same assumptions, and argued that capital would attempt to maintain net returns at their pre-tax levels.[11] Bayer's empirical results indicated that the corporate income tax in certain industries had been shifted by 100 percent.

The classic empirical study which indicates that the corporate income tax was borne by the consumer was published by Krzyzaniak and Musgrave in 1963.[12] To substantiate their assertion about the incidence of the corporate income tax in the short run, the authors presented econometric results which showed that the tax rate is an important variable in determining the gross rate of return on capital. In other words, as tax rates are increased, gross profits rates are also increased to preserve pre-tax net profits. To explain the gross rate of return on capital (Y_{gt}) Musgrave-Krzyzaniak used, in addition to Z_t (the tax variable), ΔC_{t-1} (the change in the ratio of consumption to GNP lagged one period), ΔV_{t-1} (the inventory/sales ratio lagged one period), J_t (the ratio of all other taxes to GNP), and G_t (the ratio of government expenditure to GNP). However, they failed to include any measure of the general prosperity of the economy.

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[11]Arthur Bayer, "A Disaggregated Analysis of the Shifting of the Corporation Income Tax," (unpublished Ph.D. dissertation, Department of Economics, Michigan State University, 1968).

[12]M. Krzyzaniak and R. Musgrave, The Shifting of the Corporation Income Tax (Baltimore: Johns Hopkins Press, 1963), chaps. 1-3.

Craig, Harberger, and Mieszkowski thought that in light of the economic history of the United States this omission might give a spurious correlation between the gross profits rates and the tax rates.[13] Since the periods of low profits rates in the United States during the depression were also times of low tax rates, and the periods of high profits during prosperity were times of high tax rates, the gross profit rates would naturally appear to be correlated with tax rates. The three authors employed Krzyzaniak and Musgrave's method, but included an employment variable as a measure of prosperity, and a dummy variable for the war years. They found nearly zero shifting of the tax to consumers. Rather than taking this result as conclusive, Craig, Harberger, and Mieszkowski inferred only that Krzyzaniak and Musgrave's method had not proved or disproved shifting.

In a paper entitled, Rates of Return, Income Shares and Corporate Tax Incidence, Richard Goode[14] also critically evaluated the Musgrave and Krzyzaniak study. Goode finds too many flaws in their model to accept their conclusions that the corporate tax is shifted by over 100 percent in the short run. The most serious of these flaws according to Goode is the omission of a variable reflecting the capacity-utilization

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[13]Craig, Harberger, Mieszkowski, "Empirical Evidence on the Incidence of the Corporation Income Tax," Journal of Political Economy, LXXVII (December, 1967), pp. 811-821.

[14]Richard Goode, Rates of Return, Income Shares, and Corporate Tax Incidence (Washington, D. C.: The Brookings Institution, August, 1966), pp. 207-246.

level in the economy. Like Craig, Harberger and Mieszkowski, Goode empirically substantiates his suspicion that the gross rate of return to capital is determined more by economic conditions than by the tax rate. While rejecting the idea that the corporate income tax is shifted in the short run, he considers the possibility that shifting may occur in the long run when capital is able to move out of the corporate sector. History indicates that capital has not moved out of, but rather, into the corporate sector. This evidence, however, is not sufficient to reject the hypothesis of long-run shifting, since other forces besides corporate tax rate increases have influenced capital flows. Given the difficulties of isolating the influence of tax rates on the rate of return to capital, Goode is reluctant to make any assertions about the incidence of the corporate income tax in the long run.

This discussion of the various theoretical and empirical studies on the corporate income tax reveals that the question of incidence is still unresolved. With the recent studies by Goode and Craig, Harberger, and Mieszkowski, there appears to be strong evidence that the corporate income tax is not shifted onto consumers, at least in the short run. Unfortunately, the question of incidence in the long run is not readily verifiable because many variables can affect the rate of return to capital when it is no longer a fixed factor.

It is not inconsistent, however, to accept the conclusion that the corporate income tax while not shifted in the short run, is shifted in the long run. In economic analysis, it is customary to consider capital as a fixed factor in the short run.

Thus, a tax upon this factor should not affect a firm's short run marginal cost or cause a change in product prices. In the long run, however, capital is variable and a corporate income tax will affect the marginal cost of using it. The long-run profit-maximizing levels of output and prices should change along with fluctuations in the tax rates.

Because the corporate income tax is generally considered to be a tax on the use of capital, this dissertation will accept Harberger's argument that the corporate income tax affects prices in the long run. The acceptance of this argument leads to the conclusion that the current GATT policy prohibiting border adjustments for the corporate income tax distorts international commodity trade flows. Chaper IV attempts to measure the size of that distortion.

3. The Incidence of Employers' Social Security Taxes

The standard reference on the incidence of the employers' social security tax is the theoretical statement presented by Seymour E. Harris in the early 1940's. Harris suggests that entrepreneurs will view the tax as an increase in costs and attempt to pass the tax onto consumers in higher prices. The producers will be most successful in raising prices in imperfectly competitive markets[15] and when the money supply is sufficiently elastic to finance a greater level of total

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[15]Seymour J. Harris, The Economics of Social Security (New York: McGraw-Hill, 1941), p. 386.

expenditure.[16] Margaret S. Gordon believes[17] that employers will be able to raise prices most effectively in periods of inflationary pressure; in other times, they will attempt to lower wage payments. In an analytic study of the red shingle industry, R. P. Collier argues[18] that a payroll tax alters the direct costs of production. The incidence of this tax will be predominantly on buyers in the market, if the supply elasticity is greater than the demand elasticity. (The formula on page 10 illustrates this point.)

Direct empirical evidence of the incidence of the employers' social security tax is exceedingly sparse. The only recent study was written by Elizabeth Deran on the incidence of the Puerto Rican social security tax.[19] Because isolating the tax influence on price is so difficult, she argued that an empirical test could be made by comparing the change in prices of labor intensive industries with those of capital intensive. A social security tax, if shifted to consumers, would raise the prices of labor intensive products more than those of

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[16] Ibid., p. 330.

[17] Margaret S. Gordon, The Economics of Welfare Policies (New York: Columbia University Press, 1963), p. 69.

[18] R. P. Collier, "Some Empirical Evidence of Tax Shifting," National Tax Journal, XI (March, 1968), pp. 41, 44.

[19] Elizabeth Deran, "Changes in Factor Income Shares Under the Social Security Tax," The Review of Economics and Statistics, XLIX (November, 1967), pp. 627-630.

capital intensive. On the basis of data from nine industries, she concluded that prices did not rise significantly more in the labor intensive industries, and that therefore the tax was not shifted. Because of the low number of industries considered and the small difference in factor intensity (labor costs in labor intensive industry were defined as only ten percent more of total costs than in capital intensive industry), it is difficult to accept Deran's results as conclusive. This dissertation accepts the traditional argument that producers will raise prices in response to social security taxation during times of economic prosperity.

4. The Incidence of Property Taxes

It has traditionally been assumed that the property tax on businesses is not shifted in the short run because the levy is upon fixed factors such as land and physical improvements. A tax on fixed factors does not affect the marginal conditions of profit-maximization or cause any change in price or output. In the long run, however, the amounts of land and physical assets are variable and a tax raises marginal costs of using them. Increases in marginal costs will cause prices to rise and output to contract.

Property taxes can be assessed on either the capitalized value of property or upon its annual rental value. In his discussion of incidence, F. Y. Edgeworth directed his attention towards the determinants of rental values. Edgeworth argued that the rental value upon which taxes are levied is determined more by "differences in the productivity of capital

applied to different sites than to differences in accessibility."[20] Since the rental value of property reflects the value of reproducible (i.e. variable) factors, the property tax is in essence imposed upon variable inputs and shifted onto the final user of the property.

Richard Netzer argues[21] that property taxes on improvements and producer durables will be shifted forward to final consumers in the form of higher prices. This shifting may require a long period of time because physical plants are not changed often. R. A. Musgrave also takes the view[22] that most of the tax on business property is shifted to consumers. Thus countries with high property tax rates could be at a competitive disadvantage since border adjustments are not permitted.

5. Conclusion of Theoretical Analysis of Incidence

In summarizing the theoretical analysis of incidence, it becomes apparent that economists agree that consumption taxes raise the price of products to some extent, and that the price increase does not necessarily correspond to the amount of the tax. It is also clear that while theorists disagree on the incidence of the corporate income tax, there is a general

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[20]See Dick Netzer, Economics of the Property Tax (Washington, D. C.: The Brookings Institution, 1966), p. 35.

[21]Ibid., p. 36.

[22]R. A. Musgrave, The Incidence of the Tax Structure and its Effects on Consumption (Paper submitted to the Joint Committee on the Economic Report, Washington, 1955).

consensus that social security and business property taxes raise producers' costs and thereby encourage price increases. This discussion of the theories of incidence should provide sufficient information to make the arguments about the border tax issue understandable.

B. Discussions in the Literature of the Border Tax Issue

Most of the comments on the border tax issue have not appeared in academic journals, but in testimony before Congress or in the monthly bulletins of organizations with an interest in international trade.

1. Discussion by U.S. Businessmen and Officials

The testimony before the Congress has generally been presented by United States businessmen or their trade association representatives, and Congress has appeared to accept their views as accurate.[23] Businessmen are unanimous in their denunciation of the current GATT border tax policies because they see the use of border adjustments as a way of improving a country's competitive position rather than a way of restoring it to pre-tax levels. Thus they maintain that the United States is at a considerable disadvantage in world marketing because the percentage of U.S. government revenue eligible for rebates is smaller than the percentage received by other governments.

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[23] The Report of the Subcommittee on Foreign Economic Policy of the Joint Economic Committee, 90th Congress, 1st session, p. 5. The report indicates that the use of border adjustments are a "conspicuous form of discrimination against U.S. exports".

Just as American businessmen consider themselves to be at a disadvantage because they have comparatively few taxes eligible for border adjustment, they also feel handicapped when it comes to non-rebatable taxes. They attempt to prove their position by demonstrating that U.S. government obtains more of its revenue from the non-rebatable corporate income tax than do other countries. However, they seldom note that European countries obtain a large percentage of their revenues from non-rebatable social security taxes.

The following chapter, Chapter III, will offer a detailed analysis of the comparative tax structures and tax rates to see whether the United States tax structure is indeed as unfavorable as businessmen insist. The comparison of tax structures is relevant only if the GATT policies are not as neutral as claimed. Since there has been evidence presented in this chapter that the GATT may be incorrect in its assessments of the incidence of consumption taxes and corporate income taxes, it is relevant to explore which countries are likely to be at an advantage or disadvantage because of their tax policies.

2. The Discussion by International Trade Theorists and Officials

Much of the current discussion of the GATT border adjustment policies has been prompted by the EEC's decision to adopt a tax on value-added. There are various ways of employing a tax on value-added,[24] but the method adopted in the EEC is

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[24] E. R. Rolph, "Economic Effects of a Federal Value-Added Tax," Public Finance and Fiscal Policy: Selected Readings (Boston, Massachusetts: Houghton Mifflin Co., 1966), p. 44, considers a general income value-added tax.

that the seller will pay a tax on the total value of his sales minus the taxes on the total value of his purchases. Therefore the tax is in essence imposed upon a firm's wages, salaries, and profits. The EEC treats the value-added tax similarly to a sales tax but with deductions permitted for the tax levied on material inputs. By authorizing deductions for taxes paid on capital equipment, the EEC considers its tax as a consumption-type value-added tax.[25] These deductions are permissible in order to avoid the double taxation of capital equipment. Although the value-added tax is levied at all stages in the production and distribution chain, it is generally thought that the final product price should be no different from that resulting from the imposition of a retail sales tax of the same rate. As long as supply and demand elasticities remain unchanged, the incidence of a consumption-type value-added tax should be the same as that of a sales tax. Because of these similarities, the value-added tax is also eligible for border adjustments. Its continuing adoption by Europeans is of growing concern to United States businessmen and officials who are worried about its impact on United States trade.

The discussions of the tax on value-added have focussed on two particular topics: one is the question of the incidence

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[25]When deductions for capital equipment are not permitted, the tax is categorized as an income-type value added tax. See Organization for Economic Co-operation and Development, Border Tax Adjustments and Tax Structure in OECD Member Countries (Paris: OECD, 1968), p. 29.

of the tax on value-added as compared to the incidence of the corporate income tax; the other is the analysis of the consequence of the change from turnover and cascade taxes to the tax on value-added.

a. The incidence of the tax on value-added and on corporate income: Critics of the current border adjustment policy have argued that it is inconsistent to permit border adjustments for the tax on value-added and not for the corporate income tax because the incidence of the two taxes should be similar. Since a firm's value-added includes its profits, it doesn't appear reasonable to assume that a firm raises its price to cover the value-added tax but simply leaves price unchanged when a corporate income tax is imposed. The critics thus feel that the GATT should permit border adjustments for the corporate income tax, or that it should only permit a border adjustment for the tax on value-added when it excludes profits.

Rather than suggesting that the GATT change its policy, the United States Committee for Economic Development (CED) has suggested that the United States adopt the value-added tax in place of the corporate income tax.[26] The CED prefers the tax on value-added mainly because it eliminates the incentive for manipulating expense accounts to reduce profits eligible for taxes since the value-added tax does not distinguish

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[26] Committee on Economic Development, A Better Balance in Federal Taxes on Business (New York: Research and Policy Committee of the CED, 1968).

between profits and expenses. At the same time, the CED calls attention to the balance-of-payments benefits that will derive when a rebatable value-added tax replaces a corporate income tax of similar incidence.

Both Richard Musgrave and Henry Aaron have considered the implications for United States trade if the United States were to use a value-added tax in place of the corporate income tax. They both take the position that the impact of changing from the corporate income to the value-added tax depends upon the current incidence of the corporate income tax; however, neither author commits himself to a particular view on the incidence question. In the book The Role of Direct and Indirect Taxes in the Federal Revenue System,[27] Musgrave states that if the corporate income tax does not affect current prices, then United States exports will not be hurt by the use of the corporate income tax. Thus a switch to a rebatable tax on value-added should not affect commodity exports. On the other hand, if the corporate income tax does affect prices, then exports are hurt by use of a non-rebatable corporate income tax and a switch to the value-added tax should ameliorate matters. Musgrave also considers the impact of the two different taxes upon international capital flows. He believes that if the corporate income tax is not passed on to consumers, capital will flow to countries where corporate taxes are lower or

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[27]R. Musgrave, "Allocation Aspects, Domestic and International," The Role of Direct and Indirect Taxes in the Federal Revenue System: A Conference, National Bureau of Economic Research (Princeton, New Jersey: Princeton University Press, 1964), pp. 81-144.

non-existent. While a switch to a value-added tax should eliminate these capital flows, the amount to be eliminated should be negligible since the U.S. already taxes foreign investment at the same rate as domestic investment unless the earnings are retained in the subsidiary abroad. Musgrave also makes the point that if the corporate income tax is already passed onto the consumer, a change to the value-added tax should have no impact on international capital flows.

In his consideration of a United States change to a value-added tax, Henry Aaron makes no prediction of the specific impact on international trade but rather focusses on the possible price effects in 32 different industries under various assumptions about the incidence of the corporate income tax.[28] In using input-output tables and tax returns to make his estimates, Aaron found that the switch to a value-added tax would raise the general United States price index by 6.2 percent if the corporate tax has not been shifted, while it would leave prices unchanged if the tax had been shifted.

The discussions of Musgrave and Aaron are very interesting from a theoretical point of view, but they are not particularly relevant for the current situation since no country is substituting the value-added tax for its corporate income tax. The tax on value-added that is being introduced in various

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[28]Henry Aaron, "The Differential Price Effects of a Value-Added Tax," National Tax Journal, XXI (June, 1968), pp. 162-175.

European countries replaces a turnover, or a cascade tax, not a corporate income tax. Unlike the corporate income-value-added tax arguments, there is little disagreement over the comparative incidence of the turnover and value-added taxes. Most authors assume that both taxes are shifted to consumers in higher prices.[29] The EEC reason for adopting a value-added is primarily an administrative goal of permitting precise accounting, rather than a desire to change the burden of taxation.

b. The change from turnover taxes to the value-added tax: In the past few years, there have been numerous articles[30] defending the adoption of the value-added tax on the grounds that it will permit exact calculation of the amount of tax borne by a product. If border rebates or taxes are to be levied fairly, the administrators must know the precise amount of tax involved. Under the turnover tax system, no one

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[29] E. R. Rolph, op. cit., p. 147 argues that a general income value-added tax will not raise prices.

[30] Recent articles on the adoption of TVA:
a. K. Messere, "The Problems Created by Border Tax Adjustments," OECD Observer (October, 1967), No. 30, p. 5.
b. "Border Taxes' Five Misconceptions," European Community (July, 1969), No. 125, pp. 6-8.
c. "GATT Studies Place of Border Taxes," International Commerce (July, 1969), No. 125, pp. 6-8.
d. Committee for a National Trade Policy, Trade Talk, XV (November 3, 1968), pp. 2-3.
e. Johannes Jansen, "TVA: 1970 & Beyond," European Community (April, 1968), No. 111, pp. 12-13.
f. "What the Value-Added Tax Means," EFTA Reporter (September 9, 1968), p. 3.

TABLE II:1 -- A comparison of the price and tax effects of a cascade tax and value-added tax

Pre-Tax Value of Production	
price of material	= 20¢
value-added by producer	= 15¢
value-added by wholesaler	= 10¢
value-added by retailer	= 25¢
price of product	70¢

Impact of 10% Cascade and Value-Added Taxes with no Vertical Integration among Processors

	Cascade Tax			Value-Added Tax		
	cost*	value-added	tax	cost*	value-added	tax
production:						
cost of material	20¢		+2¢	20¢		+2¢
value of good sold	22¢	+15¢		22¢	+15¢	
wholesale:						
cost of good	37¢		+3.7¢	37¢		+1.5¢
value of good sold	40.7¢	+10¢		38.5¢	+10¢	
retailer:						
cost to retail	50.7¢		+5.0¢	48.5¢		+1.0¢
value of good sold	55.7¢	+25¢		49.5¢	+25¢	
price to consumer	80.7¢		+8.0¢	74.5¢		+2.5¢
	88.7¢			77.0¢		

Impact of a 10% Cascade or Value-Added Tax with Vertical Integration: Production and Wholesale Stages Combined

	Cascade Tax			Value-Added Tax		
	cost*	value-added	tax	cost*	value-added	tax
production:						
cost of material	20¢		+2.0¢	20¢		+2.0¢
value of good	22¢	+25¢		22¢	+25¢	
retailer:						
cost of good	47¢		+4.7¢	47¢		+2.5¢
value of good	51.7¢	+25¢		49.5¢	+25¢	
price to consumer	76.6¢		+7.6¢	74.5¢		+2.5¢
	84.3¢			77.0¢		

*The cost item is a horizontal summation of the information appearing in the previous line.

can know the amount of tax included in a product's price because the amount depends on the number of times a product has been sold. Since no processing system exists which records the number of transactions, there is no precise way to determine the amount to rebate. These difficulties are illustrated by Table II:1 which shows that with turnover taxes, the total tax bill and the product price vary with the number of times the product is sold; whereas with a tax on value-added, taxes and prices remain the same.

The border adjustments that have been made for the turnover tax have simply been estimates of the average amount of tax that certain products bear. In general, countries have thought that their border adjustments were less than the total amount of tax actually included in the product. This means that exporters have not been receiving a full rebate, and that the tax imposed on imports has been less than the tax borne by like domestic products. One use for the tax on value-added is to eliminate the need to estimate the amount of tax which would permit border adjustments equivalent to domestic taxation. With the tax on value-added, border taxes assessed on United States products sold in the EEC will be higher than they were under the turnover tax system. This, of course, will discourage United States exports, but it should be remembered that the EEC countries have been at some disadvantage because those OECD countries which use sales taxes have employed full border adjustments. While the United States may now suffer new difficulties with its balance of payments, there is no theoretical reason for the United States to oppose the adoption of the value-added tax by the EEC countries.

CHAPTER III

ASSESSMENT OF INJURIES UNDER GATT POLICIES

Since this dissertation has already established that the GATT's border policies are probably not neutral, the next step must be to measure whether any actual injury has occurred to a particular country. Precise numerical assessment is left to Chapters IV, V, VI, VII. This chapter provides a comparison of various countries' tax structures and rates to obtain a general impression of whether a particular government's tax policies have benefitted or hurt its balance of trade under current GATT border policies. The chapter concludes by considering the long-run implications of a government's tax and expenditures policies for manufacturing productivity and export potential.

A. Relevance of Tax Structures

1. Comparison of Percentages of Rebatable and Non-Rebatable Taxes in Government Revenue

One of the procedures used to determine which countries have suffered under the current border tax policy is a comparison of the percentages of rebatable and non-rebatable business taxes in total government revenue. The inference drawn from such a comparison has been that a country with a large percentage of rebatable taxes and a low percentage of non-rebatable business taxes is in the best competitive position at the present time.

An actual comparison of the percentages indicates that the results are inconclusive at best (see Table III:1). A simple evaluation of the percentage of rebatable taxes in the total government revenue for 1965 indicates that the U.S. (with 20 percent) falls into the least favorable competitive position. Most other major countries received nearly 30 percent of their government revenues in the form of rebatable consumption taxes.

But when the analysis is extended to include the comparison of non-rebatable taxes, it is no longer clear that the United States has the least favorable tax structure. In 1965 the United States government received a smaller percentage of its revenue from non-rebatable taxes than any of the EEC countries or Japan. Of the major exporting countries (United States, Japan, Canada, the EEC, and the United Kingdom) only Canada and the United Kingdom had smaller percentages of non-rebatable taxes. Thus, the benefits that the EEC countries appear to gain through their higher percentage of rebatable taxes seem to be largely offset by a heavy reliance on non-rebatable taxes.

The EEC countries are able to demonstrate such large percentages of both rebatable and non-rebatable taxes because they rely less on non-business taxes such as personal income taxes and taxes on the transfer of wealth. In 1965, for instance, the French government received only 8.9 percent of its total revenue from the personal income tax; whereas in

TABLE III:1 — Percentage shares of rebatable, non-rebatable, and non-business taxes in total government revenue in 1965

	Col. 1 Rebatable	Col. 2 Non-Rebatable Corporate Income	Col. 3 Non-Rebatable Social Security	Col. 4 2+3	Col. 5 Non-Business
U.S.	20.0	16.5	7.1	23.6	56.4
Canada	33.9	15.5	2.2	17.7	58.4
Japan	27.0	21.0	11.7	32.7	40.3
EFTA					
Austria	38.0	5.6	21.1	26.7	35.3
Denmark	42.7	4.4	2.5	6.9	49.4
Norway	39.8	4.5	10.7	15.2	45.0
Portugal	28.3	21.3	14.6	35.9	35.8
Sweden	30.8	6.2	9.0	15.2	54.0
Switzerland	32.9	12.1	6.2	18.3	48.8
U.K.	34.8	5.4	7.7	13.1	52.1
EEC					
Belgium	35.6	6.7	29.8	36.5	27.9
France	33.2	4.9	26.9	31.8	35.0
Germany	29.4	10.7	15.3	26.0	44.6
Italy	33.0	2.0	33.7	35.7	31.3
Luxembourg	22.8	9.4	19.4	28.8	48.4
Netherlands	24.1	--	22.9	--	--

Source: OECD, Border Tax Adjustments and Tax Structures (Paris: OECD, 1968), compiled from data throughout book.

the same year, 30 percent of total government revenue in the United States came from this source.[1]

American businessmen who compare the percentages of rebatable and non-rebatable taxes in total government revenue to demonstrate that their country has suffered under the current border policies have examined only the non-rebatable corporate income tax percentage, not the total non-rebatable percentage. In so doing, they have failed to consider the employers' contribution to social welfare payments and business property taxes. The comparison of only the corporate income tax can lead to the conclusion that the United States is at a competitive disadvantage because the percentage of government revenue generated by the corporate income tax has been higher in the United States than in all other major exporting countries except Japan. It must be remembered that the relevant comparison is the total of non-rebatable business taxes, and on this basis the United States does not have the largest percentage, but rather has one of the smallest. The comparison for the OECD countries of the percentages of rebatable and non-rebatable tax in government revenue does not give a clear indication that any particular country has suffered under the current border adjustment policies.

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[1]OECD, Border Tax Adjustments and Tax Structures in OECD Member Countries (Paris: OECD, 1968), pp. 223, 255.

2. A Comparison of the Percentage of Rebatable and Non-Rebatable Taxes in the GNP

Many authors believe that a comparison of the shares of various taxes in a government's total revenue gives a misleading impression of the impact of taxes on producers in different countries. (For example, see Vito Tanzi's article in the National Tax Journal in March, 1967.)[2] They believe that a better estimate of the tax burden can be obtained by comparing the shares of rebatable and non-rebatable business taxes in the GNP for the various OECD countries.

These authors maintain that one may be misled by the comparison of shares of different taxes in government revenue alone, because the impact of the non-rebatable taxes on a businessman's competitive position may be negligible if the total tax burden is small. The real burden of such taxation, they contend, may be appreciated better by studying the shares of different taxes relative to the GNP. This information is compiled in Table III:2.

Column 1 of the table shows that the United States has one of the lowest overall tax burdens among the industrialized nations. This means that it is possible for both the percentages of non-rebatable and rebatable taxes in the GNP to be lower in the United States than in any other country.

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[2]Vito Tanzi, "Tax Systems and the Balance of Payments: An Alternative Analysis," National Tax Journal, XX (March, 1967), pp. 39-45.

Column 4 shows the percentages of non-rebatable business taxes, and includes the percentages of the corporate income tax, the employers' contributions to social welfare, and one-fourth of the percentages of total property tax as the share attributable to business.[3] Column 4 indicates that the United States indeed has one of the lowest percentages of non-rebatable business taxes, with 6.5 percent of GNP attributable to that source. Of the major exporting countries (United States, Japan, Canada, United Kingdom and EEC countries), only Canada and the United Kingdom show a lower percentage of non-rebatable taxes than the United States.

An examination of the percentages of rebatable consumption taxes in column 5 shows that in 1965, the United States also had the lowest percentage of these taxes with 4.8 percent of GNP attributable to that source. The EEC countries had the highest percentages of non-rebatable taxes, but they also had the highest percentages of rebatable taxes. Therefore, it seems that the disadvantage stemming from a large percentage of non-rebatable taxes is offset by having a large percentage of rebatable business taxes. The comparison of the percentage of the different taxes in GNP provides no basis, then, for concluding that any particular country has suffered under the current border tax policy.

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[3]Property tax calculations are made from "Gross Assessed Value of Locally-Assessed Taxable Real Property, by Type, by States, 1961," Census of Governments, U.S. Department of Commerce, 1962, p. 32. One-fourth of assessed value is upon business establishments.

3. Comparison of the Share of the Corporate Income Tax in the GNP

In most of the articles concerned with shares of different taxes in GNP, the focus has been upon the share of the corporate income tax in the GNP and not on total non-rebatable business taxes. Comparisons that are concerned only with the corporate income tax have had great appeal in the United States because such comparisons seem to illustrate that the United States has been most injured by current border tax policies in view of the fact the EEC and EFTA rely on this tax so much less extensively than does the United States (Table III:2, col. 2).

In a 1964 article, Aliber and Stein[4] sought to determine the amount by which the United States competitive position in world markets might be improved if the U.S. were to replace the non-rebatable corporate income tax with a rebatable tax on value-added. They based their position on the fact that the U.S. share of corporate income taxes in GNP was nearly 4 percent versus EEC and EFTA shares of between 2 percent and 3 percent. In treating the 4 percent United States corporate income tax share of the GNP as being four cents to the dollar as contrasted with the European percentages of two and three cents to the dollar, they concluded that the United States could improve its relative price position by one or two percent if the corporate income tax were replaced by a value-added tax with similar incidence.

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[4]Aliber and Stein, "The Price of U.S. Exports and the Mix of U.S. Direct and Indirect Taxes," American Economic Review, LV (September, 1964), pp. 703-710.

TABLE III:2 — Percentages of total, non-rebatable, and rebatable taxes in the GNP

	Col. 1 % of Total Taxes in GNP	Col. 2 % of Corporate Income Taxes in GNP	Col. 3 % of Social Security Taxes in GNP	Col. 4 Non-Rebatable Business Taxes as % of GNP (2+3+¼ property)*	Col. 5 Rebatable Taxes as % of GNP
U.S.	24.5	3.9	1.8	6.5	4.8
Canada	26.6	4.2	.6	5.6	8.7
Japan	20.0	4.5	2.0	6.8	5.4
EFTA					
Austria	34.4	1.7	6.1	8.0	11.2
Denmark	28.6	1.3	.6	2.3	11.9
Norway	34.6	1.6	3.8	5.5	13.8
Portugal	19.4	3.9	2.9	6.8	5.6
Sweden	37.1	2.5	3.4	6.2	11.9
Switzerland	21.0	2.3	1.2	3.5	6.3
U.K.	28.8	2.0	2.1	4.9	10.2
EEC					
Belgium	28.7	1.8	5.9	7.7	11.2
France	37.6	1.8	10.1	12.0	12.8
Germany	34.8	3.8	5.2	9.1	9.7
Italy	29.7	2.9	8.1	11.2	10.2
Luxembourg	30.6	2.9	5.9	8.9	7.0
Netherlands	32.8	2.6	7.9	10.6	8.3

*Column 4 includes corporate, employers' social security, and ¼ of all property taxes.

Source: OECD, Border Tax Adjustments and Tax Structures (Paris: OECD, 1968), compiled from information throughout book.

The conclusions of Aliber and Stein are open to serious question because it is likely that the United States' higher percentage of corporate tax to GNP occurs simply because its financial and service sectors are more incorporated, and are thereby sources of more corporate income tax revenue.[5] The removal of the corporate tax on these sectors would not affect the prices of goods tradeable in world markets. If Aliber and Stein had based their price estimates on the percentage share of corporate income taxes in tradeable goods, their analysis would have been more useful and might have shown that the United States would gain no international price advantage if the corporate income tax were replaced.

B. Rates of Non-Rebatable Taxes

1. Comparison of the Statutory Corporate Income and Social Security Tax Rates

The relative competitive position of producers in different countries can not be accurately determined by comparing the share of non-rebatable taxes in the GNP or in the total tax budget. The relevant item in analyzing the extent to which producers' costs are affected by taxation is the tax rate. The producer is not concerned with the share of corporate income tax in the GNP or in government revenue, but with the

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[5]Otto Eckstein, "Indirect Versus Direct Taxes," Public Finance and Fiscal Policy: Selected Readings (Boston, Massachusetts: Houghton Mifflin Co., 1966), p. 159 says, without giving precise data, that United States business is more incorporated than that of other countries.

rate of tax he must pay on his profits (or on any item). The higher the tax rates, the higher the costs of using capital or labor. The relative impact on costs can be observed by comparing undistributed corporate income tax rates of the OECD countries, and it can be seen that the rates are relatively similar. (See Table III:3.) The United States' rate of 48 percent is not the highest in the world, and is actually lower than that of Germany and France. This reinforces the hypothesis that the lower percentage of corporate income tax to the GNP in Germany and France is due to a smaller corporate sector.

Examination of the employers' social security tax rates (column 2) demonstrates that the United States again has one of the lowest tax rates; of the major exporting countries only the United Kingdom and Canada show lower rates. This explains why the share of social security taxes in the GNP is also low for these three countries.

From a comparison of the statutory rates of non-rebatable taxes, it would appear that the United States is in an advantageous competitive position, since its corporate income tax rate is not significantly higher than the rates of other countries, and its employers' social security tax rate is lower than most. If the rates are important in determining a country's competitive position, it would appear that the United Kingdom is well off because both its corporate income tax rate (40 percent) and its social security rate (3.46 percent) are among the lowest.

2. Comparison of the Effective Rates of Corporate Income Tax

The analysis thus far has focussed on nominal corporate income tax rates. In fact, while the nominal rates appear to be similar, the effective rates of taxation may be quite dissimilar. If corporate income and costs are defined differently by the various OECD countries, the resulting effective tax rates may show a wide variation.

Until the early 1960's there was a great disparity in effective rates because some countries did not define the difference between personal and corporate income in establishing their tax rates. With the emergence of the Common Market, however, the member nations realized that corporate taxes would need to be similar if capital flows were not to be distorted. As a consequence, all EEC nations now define corporate income in a similar manner. Some differences still persist, however, in the way in which they define costs. There is a notable divergence in the amounts of depreciation of capital goods that can be considered as costs for tax purposes. If a country permits larger allowances, it decreases the income subject to taxation and reduces the effective tax rate.

In a 1964 article Peggy Richman compared the depreciation allowances of the EEC and United States to determine the disparity between effective and nominal rates.[6] D. Dosser adopted

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[6]Peggy Richman, "Depreciation and the Measurement of Effective Profits Tax Rates in the ECM and the U.K.," National Tax Journal, XVII (March, 1964), p. 90.

TABLE III:3 — Corporate income and social security tax rates in the major OECD countries

	Corporate Income Tax Rates	Employers' Social Security Tax Rates
U.S.	48.0%*	7.5%
Canada	50.0%	2.39%**
Japan	35.0%	10.8%
EFTA		
Austria	69.5%	20.27%
Denmark	36.0%	2.08%**
Norway	47.0%	7.0%
Portugal	25.0%	18.0%
Sweden	57.0%	11.87%
Switzerland	7.2%	2.4%
U.K.	40.0%	3.46%**
EEC		
Belgium	36.0%	18.55%
France	50.0%	28.7%
Germany	66.0%	12.58%
Italy	47.75%	43.8%
Luxembourg	40.0%	11.9%
Netherlands	47.0%	15.9%

*For income over $25,000.

**Percentage rate calculated by comparing employers' social security payments with total wage bill for years 1963-65. Data from Yearbook of National Accounts Statistics.

Source: OECD publication: Border Tax Adjustments and Tax Structures (Paris: OECD, 1968), pp. 212-213.

Peggy Richman's method of analysis and extended the comparison to several other members of the Atlantic community.[7] In their analyses, a straight-line method of depreciation with an annual profit rate of 20 percent and an interest rate of 5 percent was used. The formula used in their calculations was

$$t_e = t_n \left[1 - \frac{\text{present discounted value of depreciation stream}}{\text{present discounted value of income stream} - \text{present discounted value of cost of asset}} \right]$$

TABLE III:4 -- A comparison of nominal and effective corporate income tax rates in percentages

		Nominal	Effective
1.	France	50	46
2.	Germany	56	53
3.	Netherlands	45	37
4.	Belgium	30	30
5.	Italy	36	32
6.	United Kingdom	54	39
7.	Sweden	57	35
8.	United States	48	46
9.	Canada	50	47
10.	Japan	35	49

Source: 1-6: Peggy Richman, National Tax Journal (March, 1964), p. 90.

7-10: D. Dosser, "Fiscal and Social Barriers to Economic Integration," Studies in Trade Liberalization: Problems and Prospects for the Industrial Countries (Baltimore: Johns Hopkins University Press, 1967), appendix 8-2.

[7] D. Dosser, "Fiscal and Social Barriers to Economic Integration," in Studies in Trade Liberalization: Problems and Prospects for the Industrial Countries (Baltimore: Johns Hopkins Press, 1967), appendix 8-2.

Their comparisons of the effective rates of taxation show that in most cases the effective rates are only two or three percentage points below their nominal counterparts. For most countries, then, the relative ranking of the tax rate does not change; countries with higher nominal rates remain with higher effective rates. For three countries, however, the relative ranking changes significantly when the comparison shifts from nominal to effective tax rates. In the case of the United Kingdom and Sweden, the effective rates are at least 15 percentage points below the nominal rates; this dramatic difference means that the United Kingdom and Sweden have among the highest nominal rates, but also the lowest effective rates. Japan is in the reverse position; its effective rate is actually higher than its nominal rate, so that Japan ranks among the countries having the highest effective rates of taxation. The inconsistency between nominal and effective tax rates in these three countries indicates a need for caution in using nominal rates for analysis.

On the basis of a comparison of the effective rates of taxation, there is no reason to conclude that the United States is at a competitive disadvantage. The effective United States rate of 46 percent compares favorably with the Canadian 47 percent, the Japanese 49 percent, the French 46 percent and the German 53 percent. The only major country which may have a competitive advantage because of a low effective tax rate is the United Kingdom with 39 percent.

In Richman's and Dosser's analyses, the principal reason for the divergence of effective rates from nominal rates was

the differing treatment of depreciation. This treatment has an impact beyond the current tax rate that producers must pay. Depreciation allowances affect the rate of investment and the long-run competitive position of producers in different countries. Government policies to encourage investment and the adoption of improved production methods will be discussed later in this chapter.

C. Rates of Rebatable Taxes

The analysis thus far has focussed on the differences in non-rebatable business taxes among nations; it is equally important to direct attention to those taxes which are rebatable. The taxes eligible for border adjustment are consumption taxes including sales, excise, value-added, and turnover or cascade taxes.

According to the analysis of the previous chapter, it is clear that the use of taxes eligible for border adjustment offers some advantages. The imposition of border taxes on imports can discourage the consumption of those imports. Likewise, it is possible that the rebating of taxes on exports may provide some subsidy for the exporters, if the elasticity of supply is less than infinite. The higher the rates of taxation, the greater will be the potential benefit to the balance of payments of the country employing them. This section will compare the various rates of rebatable taxes in use in the OECD in 1967 to determine which country may enjoy the greatest benefit.

1. Sales Taxes

As of March 1, 1967, sales taxes, or taxes assessed at only one point in the chain of distribution, were levied in almost all the countries considered in this study except the EEC nations. Such taxes were in effect in Canada, Denmark, Norway, Portugal, Sweden, Switzerland, Japan, the United Kingdom, and the United States. Table III:5 lists the stage at which the tax is levied and the tax rates applied. It indicates that the United States had the lowest rates of sales taxes.

TABLE III:5 -- Sales tax rates of various countries in 1967

Countries	State of Assessment	Tax Rate (Percent)
Canada	Manufacturer	12.0
Denmark	Wholesale	12.5
Norway	Retail	13.36
Portugal	Retail	7.0, 20.0 luxury
Sweden	Retail	11.11
Switzerland	Wholesale	5.4
Japan	Manufacturer	Varies from 5.0 to 40.0
United Kingdom	Wholesale	11.0 clothing, furniture and kitchen utensils, 27.5 on most others
United States (by states)	Retail	1.5-5.0 depending upon state

Source: OECD publication: Border Tax Adjustments and Tax Structures (Paris: OECD, 1968).

While in the United States the sales tax is assessed by the different states, rather than on a national basis, border adjustments still occur. Since the tax is charged at the retail level, exporters are exempt; likewise, the sales tax is charged on imports when the goods are sold at the retail level. Thus the border adjustment for the sales tax does not occur "at the border", but when the goods are purchased by

the final consumer. Even for those countries which impose a sales tax on goods before they reach the retail level, no tax is paid "at the border" unless the importer is an unregistered trader. Registered exporters are also able to buy domestic goods free of tax so that no rebating is usually necessary.

2. Cascade or Turnover Taxes

The consumption tax that is imposed by countries not using the sales tax is the cascade or turnover tax. Of the countries included in this study, Austria and all the members of the EEC except France levied a cascade tax as of March 1, 1967. Listed below in Table III:6 are the stages at which the tax is collected and the rates that are imposed.

TABLE III:6 -- Tax rates for cascade taxes

Country	Stage at Which Collected	Tax Rates (Percent)
Austria	All stages	5.5
Belgium	All stages, retail occasionally excluded	7.0
Germany	All stages	4.2
Italy	All stages, retail occasionally excluded	4.0
Luxembourg	All stages	3.125
Netherlands	All stages, except retail	5.25

Source: OECD publication: Border Tax Adjustments and Tax Structures (Paris: OECD, 1968), p. 209.

Normally, a cascade or turnover tax is imposed on an item each time that it changes hands -- the more an item is sold, the more it is taxed, and the higher its price. As was illustrated in Table III:1 on page 34, the integrated producer can

sell at lower prices than the non-integrated producer because his output is traded less often. As a way of eliminating this incentive for vertical integration, the members of the EEC plan to adopt a tax on value added.

a. Border adjustments for the cascade tax: Since the amount of tax included in the selling price varies with the number of times a product has been sold under a cascade-type tax, border adjustments can never be exact. As a consequence, the six countries simply employ a border tax rate that is thought to be the average amount of tax included in domestic products. Below in Table III:7 are listed the normal rates of refund or rebate for exports and the tax rates imposed on imports at the border as of March, 1967.

TABLE III:7 -- Border adjustments for cascade taxes

Countries	Rebate of Exports (Percent)	Border Tax on Imports (Percent)
Austria	8.5	3.0
Belgium	10.5*	10.5
Germany	7.0	6.0
Italy	7.8	7.8
Luxembourg	1.0	3.0
Netherlands	3.5	7.0

*Since May, 1967.

Source: OECD publication: Border Tax Adjustments and Tax Structures (Paris: OECD, 1968), pp. 35, 37.

For imported goods, the tax base on which the border tax is calculated usually includes any customs or excise duty imposed on the product; this means that the effective tax rate is really higher than the nominal rate indicates.

b. The change from the cascade to value-added tax: Because the EEC realizes that border adjustments cannot be exact under a cascade tax system, the organization has decided to strengthen economic union by replacing the cascade tax with a tax on value-added which will permit precise assessment. While January 1, 1970 was the original target date for the implementation of a tax on value-added by all members, this goal was not met because of Belgium and Italian postponements caused by inflationary problems. In agreeing to the use of a value-added tax, the EEC members went a step further and decided to set common tax rates and exemptions as soon as possible. Given common tax rates, it is obvious that no border adjustment is necessary because imports will then bear the same amount of taxation as domestic products.

France was the first country to initiate use of the value-added tax. In 1954, the French adopted a value-added rate of 20 percent on most items, with certain "luxury" items such as cameras and furs being assessed at 25 percent.[8] As of January 1, 1968, the tax was extended to cover all industrial and commercial firms whether incorporated or not, and the general rates were reduced to 16 2/3 percent.[9]

The adoption of the value-added tax is thought to have lowered French export prices by 2 percent since the value-

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[8]OECD, Border Tax Adjustments, op. cit., p. 12.

[9]Ibid., p. 125.

added tax permitted exact calculation of the tax rebate, whereas the turnover did not.[10]

As of January 1, 1968, Germany also adopted a value-added tax at a 10 percent tax rate. As a transitional measure, a special tax on investment goods is being assessed through 1972, but no border adjustments are permitted for this tax.[11] On January 1, 1969, the Netherlands joined France and Germany in using the value-added tax.[12] While not a member of the EEC, Denmark also adopted, in July 1967, a value-added tax rate of 10 percent which is assessed on most goods and services. As of April 1, 1968, the tax rate was raised to 12 1/2 percent.[13]

The countries that are replacing the cascade taxes with the value-added tax have thought that a 10 percent rate adopted for the value-added tax should yield about the same revenue as the old cascade tax. It is anticipated that domestic prices will remain relatively stable with this tax, and that the impact of the change will be noticed only at the border. The application of varying border adjustment rates will be abandoned in favor of a uniform rate pegged at 10 percent.

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[10]National Bureau of Economic Research and the Brookings Institution, Foreign Tax Policies and Economic Growth: A Conference (New York: Columbia University Press, 1966), p. 296.

[11]OECD, Border Tax Adjustments, op. cit., p. 130.

[12]Ibid., p. 48.

[13]Ibid., p. 120.

Since these adjustments will be applied equally to finished products and inputs, the effective protection implied by the border taxes will be the same as the nominal.[14]

3. Excise Taxes

The last type of tax currently eligible for border adjustments is the excise tax. Excise taxes, employed by all of the countries included in this study, are similar to single stage sales taxes in that exporters are usually exempt from paying the tax, while imported goods are taxed at the same rates as domestic goods. In some countries, the yield from excise taxes is nearly equivalent to the yield from other indirect taxes. The traditional goods subject to excise taxes are tobacco, alcohol, and gas-oil products,[15] with tax collections varying from 23.8 percent of the total tax bill in the United Kingdom to 8.3 percent in Canada for 1963-1965.[16]

Table III:8 shows the percentage of total taxes and of GNP attributable to traditional excise taxes. It shows that the United States and Canada receive the lowest percentages of traditional excises, while Denmark and the United Kingdom receive the highest.

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[14]J. Clark Leith, "Across the Board Nominal Tariff Changes and the Effective Rate of Production," The Economic Journal, LXXVIII (December, 1968), p. 984.

[15]OECD, Border Tax Adjustments, op. cit., p. 42.

[16]Ibid., p. 198.

TABLE III:8 -- Percentage of traditional excise taxes to total taxes and to GNP

	Percentage of Total Taxes	Percentage of GNP
United States	10.2	2.5
Canada	8.3	2.2
Japan	19.8	3.9
Austria	15.8	4.6
Denmark	24.5	6.7
Switzerland	19.0	3.6
Sweden	16.5	6.2
United Kingdom	23.8	7.0
Belgium	12.4	3.4
France	10.5	3.9
Germany	10.8	3.6
Italy	16.4	5.0
Netherlands	11.6	3.9

Source: OECD publication: Border Tax Adjustments and Tax Structures (Paris: OECD, 1968), pp. 198-199.

In addition to the "traditional" excise duties, most countries levy excise taxes on other products. Taxes are levied on such goods as soft drinks, confectionery, sugar, motor vehicles, radio and television receivers, records, clocks, furs, jewelry, toilet goods, coffee and tea.

For example, excise taxes are levied on motor vehicles in seven of the thirteen countries considered here. The tax rates (including consumption taxes) on motor vehicles range from 4 percent in Germany to 30 percent in Denmark.[17] Products such as radios and jewelry are also subject to a similar wide range in tax rates.

[17] Ibid., p. 209.

As of 1967, the only non-traditional excise taxes of consequence in the United States were assessed upon sugar, motor vehicles, and long distance telephone calls. No other country limited its use of excise taxes to so few products or services. Thus it is possible that the United States has been at some competitive disadvantage because its products are subject to more taxes abroad than are imposed at home. The American system of excise taxes discourage manufactured imports of motor vehicles, while foreign excise taxes may deter United States exports of motor vehicles, radios, television, and record players.[18] It is likely, however, that restraints on United States exports of motor vehicles arise less from foreign excise assessment than from the fact that United States automobiles are too large and expensive for use in Europe, and that restraints on television exports arise from incompatible picture transmission systems rather than from taxes.

4. Summary on the Significance of the Various Tax Rates

The comparison of the rates of non-rebatable taxes in the OECD countries indicates that the EEC countries may have been at a disadvantage in export markets because their corporate income and social security tax rates are higher than those of most other OECD members. In Chapters IV, V, and VI, a numerical assessment is made of possible EEC export losses.

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[18] Ibid., p. 203.

At the same time, Europe and Japan may have gained some advantage over the United States because their rebatable consumption tax rates are higher than the sales tax rates of 1.5 to 5 percent used in the United States. Chapter VII contains estimates of the improvement in the balance of trade that other OECD countries have realized due to high sales, turnover, and value-added tax rates.

In the long run, exchange rates could adjust to compensate for the international trade distortions caused by the current GATT policies; these adjustments, however, could not eliminate the distortions between the corporate and non-corporate sectors caused by the failure to treat corporate income taxes consistently with consumption taxes of similar incidence.

D. Other Government Policies that Affect the Competitive Position of Business

While this study is concerned primarily with the effect of taxes on the competitive position of businesses, it must be remembered that other government policies are also important. Particularly relevant here are government treatments of special depreciation allowances and tax incentives that can encourage investment and lower costs for future production. Equally important are the export incentives that have been adopted from time to time. Government regulation for sanitary standards of pollution control, and government expenditures providing external economies for domestic producers will also be examined briefly.

1. Government Policies Which Stimulate the Investment in New Facilities

The tax treatment of depreciation and investment expenditures can be influential in determining the overall rate of investment. By encouraging investment through accelerated depreciation or through investment allowances, a government may encourage companies to adopt new techniques that will lower their production costs and increase their competitiveness in world markets. Some governments also have tax policies designed specifically to encourage exports.

Of all the countries included in this study, Japan seems to have made the most extensive use of special tax allowances to encourage investment and exports. While the other OECD countries have quite frequently employed accelerated depreciation allowances and investment credits to stimulate research activities, Japan has more often used these devices to encourage export sales. Given the data available, it seems that only Japan has improved its competitive position vis-a-vis the rest of the OECD through these tax incentives. (See the Appendix.)

2. Government Regulations of Business that Also Affect Business Costs

In addition to taxation policies, other government regulations may affect producers' costs of operation. For example, legal requirements establishing minimum safety standards for employees can raise business costs. If business concerns in one country are required to meet more stringent health and safety regulations than those applied in another country, the relative competitive position of producers in the first country can be as adversely affected as by higher tax rates.

Lack of international industrial standards regulating water and air pollution introduces a varying cost factor among the OECD nations. Stringent requirements against pollution can lead to cost increases as firms are required to install anti-pollution equipment. Nearly all the OECD countries have strong legislation opposing pollution, but it is impossible to determine the extent to which their requirements affect costs without knowing the rigor of regulation enforcement. For example, the United States has had stringent anti-pollution requirements since 1948, but almost no violations have been prosecuted.

Until recently, most pollution control in the United States has been applied at the local level by municipal sewerage plants rather than by private industry. Now, however, state and federal officials are aware that pollution problems must be handled on a regional basis by both industries and municipalities. Regional authorities for such areas as the Potomac Basin and the Delaware Estuary have been established to develop an efficient approach to pollution problems.

The classic example of pollution control on a regional basis involves the Ruhr Valley Genossenschaflin (Coop. Assoc.) of Germany. This association has facilities for handling waste disposal as well as other water resource needs. Its process costs for disposal are divided among the industrial and municipal membership according to the burden of waste each discharges into a waterway.[19] In England, regional river

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[19]Marshall I. Goldman (ed.), Controlling Pollution: The Economics of a Cleaner America (Englewood Cliffs, New Jersey: Prentice-Hall, Inc., 1967).

authorities were established in 1963 which have the power to charge water "withdrawers" and to license pollutant dischargers. In 1964, France created regional water managing agencies which, like the Genossenschaflin, have power to levy charges on effluents discharged into different river basins. These examples tend to illustrate that United States producers are not likely to be placed at a competitive international disadvantage by enforcement of U.S. anti-pollution requirements.[20]

3. The Effects of Government Expenditure on Business Costs

Government expenditures can have an important influence on business costs. If governments are heavily involved in providing social overhead capital, business costs may be lowered. A high tax burden may be offset by large government expenditures on roads, research, and education.

It might appear that since the United States government spends such a large amount on defense, United States expenditures for improving technology or social overhead capital would be smaller than in other countries. However, an examination of the information in Table III:9 indicates that in all areas of research (Col. 1), commerce and technology (Col. 2), and transportation (Col. 3) the United States government assists business at the same level as do the governments of other countries.

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[20] A. V. Kneese and B. T. Bauer, Managing Water Quality: Economics, Technology, Institutions, Resources for The Future Inc. (Baltimore: Johns Hopkins Press, 1968), Chap. 13.

TABLE III:9 -- Governments' contributions to research, technology, transportation and investment as percentages of GNP

	(1) Gov't Res/GNP ('66)	(2) Gov't Comm/Tech/GNP ('59)	(3) Trans/GNP ('59)	(4) Gov't Invest/GNP ('59)	(5) Gov't Inv/Invest ('59)
Austria	2.9	---	---	4.8	18.6
Belgium	10.5	.46	2.1	3.2	15.1
Canada	---	.33	2.9	4.6	17.8
Denmark	3.7	---	---	2.7	13.0
France	---	1.9	1.5	3.2	14.8
Germany	2.5	.5	1.8	4.3	17.0
Italy	4.2	.7	1.5	3.1	15.0
Japan	---	.8	.08	10.4	33.2
Luxembourg	---	1.5	4.2	---	---
Netherlands	4.6	.41	1.6	4.6	18.3
Norway	---	---	---	4.1	14.2
Portugal	1.0	---	---	2.0	11.3
Sweden	4.6	1.1	1.8	4.4	17.7
Switzerland	---	---	---	---	---
U.K.	.8	2.7	2.2	2.3	13.1
U.S.	4.5	1.5	1.7	2.7	16.1

Source: Calculated from data in The Yearbook of National Accounts and Dosser, op. cit., p. 235.

The United States government's investment relative to GNP (Col. 4) is the only item that lags behind other countries; but its share of total investment is about the same as the others. It is interesting to note the large size of the Japanese government's investment. Fully 10 percent of Japanese GNP arises from investment by the Japanese government, which has economic modernization as a national goal.

In addition to socially beneficial government expenditures, a number of governments make special efforts to promote investment. These programs include national investment companies, guaranteed loans, and subsidies to declining, experimental, and export industries. The United States government,

however, has made little effort to encourage new companies appealing to world markets.

4. Summary

On the basis of this brief examination of the various government policies that may affect business costs in the long run, it does not appear that the United States is at a serious disadvantage in relation to other exporting nations. The United States uses accelerated depreciation allowances and government expenditures to improve the technological and competitive state of its economy. Government regulation of business seems to be no more restrictive than in other countries. If the United States has suffered at all competitively, it has been relative to Japan, which has made the most intense efforts to improve its competitive position in relation to other members of OECD.

The general comparison of tax structures and rates, and of government policies, has failed to reveal that any country in this study has suffered unduly. However, since this type of comparison is not sensitive enough to reveal minor losses and gains, a more precise method is developed in the following chapter to measure the impact of taxes and border adjustments upon an OECD member's balance of payments.

CHAPTER IV

THE IMPACT OF PERMITTING BORDER ADJUSTMENTS FOR THE CORPORATE INCOME TAX

In the previous chapters, the differing theories on the incidence of the corporate income tax were discussed. Strong evidence was presented that the corporate income tax is shifted in the long run, thereby creating trade distortions because border adjustments are prohibited for this tax under current GATT policies. It is the purpose of this chapter to explore the consequences for a country's exports and imports if border adjustments were to be permitted.

In order to estimate the amount by which exports and imports are likely to change, it is necessary to know the effect on the prices of exports and imports when border adjustments are made. A mathematical model is developed in this chapter to predict these price and quantity changes because none of the empirical studies on the incidence of the corporate income tax has estimated how the tax affects prices.[1]

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[1]The hypothetical price estimates of Aliber and Stein are of no value here because they are based on total GNP rather than the tradeable goods sector; while Henry Aaron's estimates can not be used because they apply only to the United States. See Aliber and Stein, "The Price of U.S. Exports and the Mix of U.S. Direct and Indirect Taxes," American Economic Review, LIV (September, 1964), pp. 703-710 and Henry Aaron, "The Differential Price Effects of a Value-Added Tax," National Tax Journal, XXI (June, 1968), pp. 162-175.

By adopting the idea suggested by both Johansen and A. Harberger that the corporate income tax can be viewed as a tax on the input of equity capital, an analytic procedure is suggested for determining how the corporate income tax affects prices and output. When the corporate income tax is viewed as a tax on an input, changes in the tax rate change the price of the input and the firms' marginal cost curves as well. Lower taxes (or the elimination of a profits tax) will lower the marginal cost of a given level of output and will encourage the firms to expand output if profits are still to be maximized. Of course, a border rebate lowers or eliminates this tax and should encourage an expansion of output, or, in this case, exports. If a production function is specified, the degree of change in the cost curve can be determined for the reduction in the price of the capital input.

The specification of a production function is essential in the consideration of a tax on an input, since a particular input accounts for only a part of a firm's costs. The amount by which an input tax affects a firm's costs depends upon the proportion that the input contributes to the firm's costs and upon the degree of substitution between various inputs. A specific production function indicates the proportional contributions of the various inputs and the elasticity of substitution between those inputs. (For a tax on output this procedure is unnecessary since costs can be assumed to increase by the amount of the tax.)

For the purpose of this study the Cobb-Douglas production function will be used since this function has been estimated on an aggregate basis for several countries. The Cobb-Douglas function includes only capital and labor as factors of production and is expressed as $Y = AK\,L^{1-\alpha}$ where α indicates the distributive share to each factor under Euler's theorem of product exhaustion. Under this formulation, the production function has constant returns to scale and a long-run average cost curve that is horizontal. In addition, the elasticity of substitution between the factors of production is equal to unity. The elasticity of substitution is an important element of this study because a change in the price of capital will change the ratio at which capital and labor are combined to produce each level of output in the minimum cost combination. Empirical studies such as that of K. J. Arrow, H. B. Chenery, B. S. Minhas, and R. M. Solow,[2] based on cross-sectional data of United States manufacturing industries, indicate that the elasticities of substitution do range around unity. If these elasticity estimates are correct, calculations using the Cobb-Douglas function should not be seriously distorted.

The assumption is made in this analysis that the capital-labor ratio and output of only the export sector are changed since the tax rebate applies only to exports. This assumption, while contrary to assertions made in this dissertation about

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[2]K. J. Arrow, H. B. Chenery, B. S. Minhas, and R. M. Solow, "Capital-Labor Substitution," Review of Economics and Statistics, XLIII (August, 1961), pp. 225-250.

the impact of indirect taxes, is necessary here because a general equilibrium model appears mathematically insoluble. The model seems insoluable because there are more unknown parameters than equations when the equilibrium price of capital is a function of the relative size of the export sector.

In a general equilibrium situation, domestic sales would be curtailed as capital moved from domestic production to export production because of the higher tax-free rate of return available there. The movement of capital from the domestic sector would raise its marginal product (or rate of return) and would continue until the net rate of return was equal in both sectors. Since limiting the analysis to changes in the export sector alone ignores the market restraints on the movement of capital caused by its rising marginal product in the domestic sector, the estimates of the expansion of export sales from rebates should be viewed as an upper limit of the potential increases.

Since this partial equilibrium analysis assumes that there is no movement of capital from the domestic to the export sector, it must be assumed that there is unemployed capital or a sufficient growth in the capital stock to satisfy export producers. In addition, whether for partial or general equilibrium analysis, it must be assumed that producers are able to employ a different capital-labor ratio for exports from that employed in domestic production. Operationally, the producers must have either separate plants for export production or separate lines within a multi-purpose plant.

The lowering of the cost of capital through rebates allows producers to use new minimum cost combinations for the various levels of output. With lower costs, producers will expand output to maximize profits. Using knowledge of the elasticity of demand, producers can determine the optimum amount of expansion. Since only export production is affected, the elasticity of demand for exports is the only relevant elasticity.

With these assumptions (that only the export market capital-labor ratios and prices are affected) an estimate of the change in quantity of exports can be derived. The functions necessary to determine the change in quantity can be specified as follows:

1. The profit function = Π = PQ - cost; the maximizing solution

$$\frac{d\Pi}{dQ} = P'Q' - c' = 0.$$

2. The demand function with constant elasticity = $Q = BP^{-\eta}$, where η = the elasticity of demand.

3. The production function = $Q = AK^{\alpha}L^{1-\alpha}$.

4. The cost function = TC = wL + rK where the price of capital equals $\underline{r}$ with taxes and equals r(1-t) without taxes.

The constant elasticity form of the demand equation, $Q = BP^{-\eta}$, was used because the empirical estimates for import demand elasticities have assumed that the elasticity is constant at least for small price changes. If the assumption of constant elasticity was not made, it would be essential to know the actual market price of manufactured goods to determine the

elasticity at that point. Since only total revenue, or the value of imports is known, and not market price, it is necessary to employ the constant elasticity form.

The solution to the model can be obtained by using the assumption that producers are on the expansion path employing a cost-minimization process. With this assumption, the cost function can be expressed in terms of quantity and substituted into the profits function. By comparing the profits function which includes the taxed input with the one of a non-taxed input, the percentage differences in profit-maximizing outputs can be determined.

$$Q = AK^{\alpha}L^{1-\alpha}$$

$$TC = wL + rK$$

$O = (1-\alpha)rK + \alpha wL$ is the expression for the expansion path derived from the production function and the cost-minimizing condition that

$$\frac{f_L}{f_K} = \frac{w}{r}$$

Solving the cost and expansion path equations for $\underline{K}$ and $\underline{L}$, and substituting the results into the production function

$$TC = rK + wL$$
$$O = (1-\alpha)rK - \alpha wL$$

$$\underline{L} = \frac{(1-\alpha)TC}{w} \; ; \quad \underline{K} = \frac{\alpha TC}{r}$$

Inserting the above values of $\underline{L}$ and $\underline{K}$ into the production function gives

$$Q_1 = \left(A \frac{\alpha TC}{r}\right)^{\alpha} \left(\frac{(1-\alpha)TC}{w}\right)^{1-\alpha}$$

Solving for TC_1 the equation becomes

$$TC_1 = \frac{r^{\alpha} w^{1-\alpha}}{A\, \alpha^{\alpha} (1-\alpha)^{1-\alpha}} Q_1$$

If the price of capital is changed because of a reduction in taxes to r(1-t), the expansion path becomes:

$$0 = (1-\alpha)r(1-t)K - \alpha wL$$

$$TC = r(1-t)K + wL$$

$$L = \frac{(1-\alpha)TC}{w} \; ; \quad \underline{K} = \frac{\alpha TC}{r(1-t)}$$

Substituting the new values of $\underline{L}$ and $\underline{K}$ into the production function gives:

$$Q_2 = A\left(\frac{\alpha TC}{r(1-t)}\right)^{\alpha} \left(\frac{(1-\alpha)TC}{w}\right)^{1-\alpha}$$

$$TC_2 = \frac{r^{\alpha}(1-t)^{\alpha} w^{1-\alpha}}{A\, \alpha^{\alpha} (1-\alpha)^{1-\alpha}} Q_2$$

Now using the demand function:

$$Q = BP^{-\eta}; \text{ i.e. } P = \left(\frac{Q}{B}\right)^{1/\eta}, \text{ let } \left(\frac{1}{B}\right)^{-1/\eta} = B' \text{ so that}$$

$$P = B'Q^{-1/\eta}$$

The profit function $\Pi = P \cdot Q - TC$ becomes

$$\Pi = B' Q_1^{-1/\eta} \cdot Q_1 - TC_1 \quad \text{(for the taxed input)}$$

or

$$\Pi = B' Q_1^{1-1/\eta} - \frac{r^{\alpha} w^{1-\alpha}}{A\, \alpha^{\alpha} (1-\alpha)^{1-\alpha}} Q_1$$

$$\frac{\partial \Pi}{\partial Q_1} = (1-1/\eta) B' Q_1^{-1/\eta} - \frac{r^{\alpha} w^{1-\alpha}}{A\, \alpha^{\alpha} (1-\alpha)^{1-\alpha}} = 0$$

Solve for Q:

$$Q_1^{-1/\eta} = \frac{r^{\alpha} w^{1-\alpha}}{A\, \alpha^{\alpha} (1-\alpha)^{1-\alpha} \cdot (1-1/\eta) \cdot B'}$$

$$Q_1 = \left[\frac{r^{\alpha} w^{1-\alpha}}{A\, \alpha^{\alpha} (1-\alpha)^{1-\alpha} \cdot (1-1/\eta) \cdot B'} \right]^{-\eta}$$

Likewise

$$\Pi = B' Q_2^{-1/\eta} Q_2 - TC_2 \quad \text{(for the non-taxed input)}$$

or

$$= B' Q_2^{1-1/\eta} - \frac{r^{\alpha} (1-t)^{\alpha} w^{(1-\alpha)}}{A\, \alpha^{\alpha} (1-\alpha)^{1-\alpha}} Q_2$$

$$\frac{\partial \Pi}{\partial Q_2} = B' (1-1/\eta) Q_2^{-1/\eta} - \frac{r^{\alpha} (1-t)^{\alpha} w^{(1-\alpha)}}{A\, \alpha^{\alpha} (1-\alpha)^{1-\alpha}} = 0$$

$$Q_2 = \left[\frac{r^{\alpha} (1-t)^{\alpha} w^{1-\alpha}}{A\, \alpha^{\alpha} (1-\alpha)^{1-\alpha} B' (1-1/\eta)} \right]^{-\eta}$$

The percentage change in Q will be $\frac{Q_1 - Q_2}{Q_1}$

$$= \frac{\left[\frac{r^{\alpha} w^{1-\alpha}}{A\,\alpha^{\alpha}(1-\alpha)^{1-\alpha} \cdot B'(1-1/\eta)}\right]^{-\eta} - \left[\frac{r^{\alpha}(1-t)^{\alpha} w^{1-\alpha}}{A\,\alpha^{\alpha}(1-\alpha)^{1-\alpha} \cdot B'(1-1/\eta)}\right]^{-\eta}}{\left[\frac{r^{\alpha} w^{1-\alpha}}{A\,\alpha^{\alpha}(1-\alpha)^{1-\alpha} \cdot B'(1-1/\eta)}\right]^{-\eta}}$$

$$= 1 - \frac{\frac{[r^{\alpha}(1-t)^{\alpha} w^{1-\alpha}]^{-\eta}}{[A^{\alpha}(1-\alpha)^{1-\alpha} \cdot B'(1-1/\eta)]^{-\eta}}}{\frac{[r^{\alpha} w^{1-\alpha}]^{-\eta}}{[A^{\alpha}(1-\alpha)^{1-\alpha} \cdot B'(1-1/\eta)]^{-\eta}}}$$

$$= 1 - (1-t)^{-\eta\alpha}$$

Solving the system of equations gives the result that the percentage change in the quantity of exports to a particular market will be $1 - (1-t)^{-\eta\alpha}$. In making estimates of the change in exports if border adjustments were permitted for the corporate income tax, other authors' empirical estimates of t, α, and η were used.

The countries included in this study are the United States, Canada, Japan, and the trading blocks of the European Economic Community (Belgium, Luxembourg, France, Germany, Italy, the Netherlands) and of the European Free Trade Area (Austria, Denmark, Norway, Portugal, Sweden, Switzerland and United Kingdom). Limiting this study to these particular OECD

countries is justified on the grounds that they account for over 95 percent of the free world trade in manufactured products.[3]

This study was limited to the consideration of manufactured products (SITC categories 5, 6, 7, 8) for several reasons. First, manufactured products are subject to fewer quantitative trade restrictions than are other commodities such as agricultural goods and mineral ores. This means that the price elasticity is likely to have more relevance in predicting the response of exports to changes in costs and prices. Other trade categories are often subject to quota restrictions where the price mechanism is displaced by government authority. A second reason for considering only the manufacturing sector is that manufacturing is more likely to exhibit constant returns to scale than is the agricultural or mining sector. Finally, when considering the impact of corporate income taxes, it is particularly reasonable to omit the agricultural sector since 93 percent of agricultural production in the United States is done by non-corporate firms and would not be affected by a rebating policy. On the other hand, over 90 percent of manufacturing is done by corporations so that a change in the policies towards the corporate income tax will affect most of the trade of manufactured products.[4]

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[3]Calculated from data in the OECD bulletin, Foreign Trade, Series B, "Commodity Trade," January-December, 1967.

[4]Joe Bain, Industrial Organization, 2nd ed. (New York: John Wiley & Sons, Inc., 1968), p. 88.

A. Values Used for α, n and t

1. Estimates of α

The values used for α come from the estimates made by Edward Denison in his recent book comparing growth rates of nine industrial countries.[5] His estimates for α and $1-\alpha$ are based on the assumption that the contributions of capital and labor to national income or output under constant returns to scale can be inferred from the current share of income accruing to capital and labor. If capital receives 20 percent of national income, a 1 percent increase in capital is equivalent to a .2 percent increase in all inputs and should increase output by .2 percent. From this relationship, the marginal product of capital is defined as .2. Denison gives estimates of factor shares for 1960-62 for nine countries including the United States, Belgium, Denmark, France, Germany, the Netherlands, Norway, the United Kingdom, and Italy. Estimates for Austria, Japan, Canada, Sweden and Switzerland factor shares were obtained by using the National Accounts Statistics of the United Nations. No estimates were available for Portugal, so its factor shares were assumed to be .25 for capital and .75 for labor, i.e., the average values for all other countries. In any case, the values chosen for Portugal are not crucial since Portugal contributes only 3 percent to the α value of EFTA.

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[5]Edward Denison, Why Growth Rates Differ: Post-War Experiences in Nine Western Countries (Washington, D. C.: The Brookings Institution, 1967), p. 38.

Since the EEC and EFTA comprise several nations it was necessary to determine a composite $\underline{\alpha}$ value for each of them. These $\underline{\alpha}$ were calculated as weighted averages of the individual member country's $\underline{\alpha}$ where the proportions of the country's GNP to total bloc GNP in 1967 were used as weights. The $\underline{\alpha}$ values for the individual member countries and their "weighting" factors are shown below for both the EEC and EFTA.

TABLE IV:1 -- Determination of $\underline{\alpha}$ for the EEC and EFTA

(1) EEC:	(2) $\underline{\alpha}$ Value: 1962	(3) Share of Total EEC Output: 1967	(4) 2x3
Italy	.28	.205	.051
Bel-Lux	.261	.061	.016
France	.223	.315	.070
Germany	.258	.347	.090
Netherlands	.252	.071	.018
		.999	.251

(1) EFTA:	(2) $\underline{\alpha}$ Value: 1962	(3) Share of Total EFTA Output: 1967	(4) 2x3
Denmark	.245	.065	.016
Norway	.215*	.048	.010
U.K.	.214	.562	.120
Portugal	.25	.030	.007
Austria	.19	.060	.011
Sweden	.275	.136	.037
Switzerland	.291	.098	.028
		1.00	.229

(For consistency it is necessary to assume that the factor shares have remained constant from 1962 to 1967.)

*This value is consistent with the .203 value obtained by O. Aukrust and Juul Bjerke, "Real Capital in Norway 1900-56," The Measurement of Wealth, edited by Raymond Goldsmith (London: Bowes & Bowes, 1959), p. 106.

Sources: $\underline{\alpha}$ values taken from Denison's Why Growth Rates Differ, Post-War Experiences in Nine Western Countries (Washington, D. C.: The Brookings Institution, 1967), p. 38; GNP values obtained from Yearbook of National Accounts Statistics.

In conclusion, the α values used in this study were: EEC = .251; EFTA = .229; U.S. = .201; Canada = .254; and Japan = .33.

2. The Estimates of Import Demand Elasticity n

For the values of the elasticities of import demand n, estimates of Balassa and Kreinin[6] were used because these estimates cover manufactured goods and because the estimates covered all countries considered in this study. Their procedure involved first, a direct estimation of the price elasticity of the United States demand for imports; and second, the inference of import demand elasticities for Canada, Japan, EFTA, and the EEC based on the assumptions that domestic elasticities are identical and that import demand elasticities are inversely related to the share of imports in domestic consumption. The resulting elasticty estimates were U.S. = -4.1; Canada = -2.1; Japan = -3.1; EFTA = -2.3; and EEC = -3.1. The measured elasticity of import demand for the United States is higher than those of any other industrial country because the share of imports in domestic consumption in the United States is lower than anywhere else.

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[6]Bela Balassa and M. E. Kreinin, "Trade Liberalization Under the Kennedy Round," Review of Economics and Statistics, XLVII (May, 1965), p. 129.

The import demand elasticity of the United States was taken from least-squares estimates presented by R. J. Ball and K. Marwah.[7] Their estimate of -3.5 for the price elasticity was adjusted upward by one standard deviation to -4.1 to compensate for the downward bias of least-squares estimates.

This elasticity estimate of -4.1 is consistent with values obtained by other authors. In 1951, B. A. de Vries[8] found the U.S. import elasticity of demand for finished manufacturers to be -3.9. Likewise, in a more recent article, M. E. Kreinin[9] indicates that the price elasticities of United States import demand are -4.7 for finished manufactures and -4.2 for SITC categories 5-8 considered as a whole.

Unfortunately, there are few direct estimates of the elasticity of import demand for countries other than the United States. However, Balassa's a priori value of -2.1 for Canada is close to the empirically estimated value of -1.99 provided by L. H. Officer and J. R. Hurtubise in 1969.[10]

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[7]R. J. Ball, and K. Marwah, "The U.S. Demand for Imports," 1948-58, Review of Economics and Statistics, XLIV (November, 1967), pp. 395-401.

[8]B. A. de Vries, "Price Elasticities of Demand for Individual Commodities Imported in the U.S.," International Monetary Fund Staff Papers (April, 1951), pp. 397-419.

[9]M. E. Kreinin, "Price Elasticities in International Trade," The Review of Economics and Statistics, XLIX (November, 1967), pp. 514-515.

[10]L. H. Officer and J. R. Hurtubise, "Price Effects of the Kennedy Round on Canadian Trade," Review of Economics and Statistics (August, 1969).

They also estimated the elasticities of import demand to be -1.74 for construction goods, and -1.04 for motor vehicles. These elasticity values as a group correspond roughly with the -1.75 elasticity obtained for Canada during the interwar period by Chang.[11]

The import-demand elasticities indicated above for each country are considered to be elasticities of demand for exports of the country's trading partners. For example, the United States faces a demand elasticity of -2.1 for its exports going to Canada, of -3.1 for exports to Japan; -2.3 for exports to EFTA; -3.1 for exports to the EEC. Since these elasticities differ for each market the total change in United States exports could only be determined by adding together the change in exports to the individual markets, rather than by calculating the aggregate directly.

The use of import demand elasticities instead of the elasticities of demand for exports was necessary because there are no applicable empirical estimates of the latter. While, Junz and Rohmberg[12] have estimated the elasticity of demand for United States exports of manufactured products, their estimates are relevant only when the United States alone changes its

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[11]Chang: cited in R. E. Caves and R. H. Holton, The Canadian Economy -- Prospect and Retrospect (Cambridge, Massachusetts: Harvard University Press, 1959), p. 86.

[12]H. Junz, and Rohmberg, "Prices and Export Performance of Industrial Countries," IMF Staff Papers, XII (July, 1965), pp. 244-271.

export prices. Even if their estimates could be used when all countries' prices are lowered through tax rebates, they provide no elasticity estimates for the other countries in this study. On the other hand, the estimates of H. Houthakker and Stephen Magee,[13] while covering all countries, relate to all exports and not just manufactured products.

The United States import demand elasticity of -4.1 was viewed as the elasticity of demand for the exports of Canada, Japan, EFTA, and the EEC when all these countries pursue a policy of rebating their corporate income tax. This view of the elasticity is applicable when all exporters change prices by the same amount. Since the corporate income tax rates are fairly similar, price changes should also be similar, making this view of the elasticity of demand for exports a reasonable one.

In addition, calculations were made for the situation in which only the United States would pursue a rebating policy. Estimates for the increase in United States exports were made using both Junz and Rohmberg's elasticity of substitution and Kreinin's elasticity of demand for exports.[14]

3. The Estimates of t

The values of t used were the tax rates on undistributed corporate income in the OECD countries as found on page 47 of

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[13] H. Houthakker and Stephen Magee, "Income and Price Elasticities in World Trade," Review of Economics and Statistics, LI (May, 1969), pp. 111-126.

[14] M. E. Kreinin, "Price Elasticities in International Trade," op. cit., p. 513.

this dissertation and as reported in the OECD publication on border tax adjustments.[15] In the case of the EEC and EFTA, the t values employed are the weighted averages of the individual members tax rates, where each member's share in the total bloc exports to a particular market in 1967 was used as a weight. Since the shares change in each of the export markets, the composite tax rates of the EEC and EFTA are different for each market.

The first policy considered is one in which countries would permit a rebating of the entire corporate income tax on exports, but would impose no border tax on imports. The change in the corporate income tax rate, therefore, is the full value of t. This policy could be justified on the ground that countries would not find it feasible to assess a border tax on the amount of capital involved in production of foreign products. They might also feel that the corporate income tax paid by the importer is sufficient to maintain a balance between imported products and domestic products.

The second policy considered is one in which countries would impose a border tax on imports. The relevant change in taxes would then become the difference between the domestic tax rate in the exporter's country and the corporate income tax rate in the importing country.

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[15] OECD, Border Tax Adjustments and Tax Structures in OECD Countries (Paris: OECD, 1968), p. 213.

The change in taxes can be positive if the tax rate in the importing country is higher than the exporting country ($t_m > t_x$) such that $1 - (t_x - t_m) > 1$. In this case the final expression $1 - [1 - (t_x - t_m)]^{-\eta\alpha}$ will indicate a decrease in the quantity of goods exported. Particularly in the case of Japan that change will be $[1 - \Delta t] > 1$ since all other countries have higher taxes. For Japan, the imposition of the border taxes will mean an increase in costs and a decrease in exports.

B. The Estimated Results

The tables below show the percentage changes in the quantities of exports as estimated from the formula $1 - (1-t)^{-\eta\alpha}$. The export data used in these calculations were obtained from the OECD bulletin Foreign Trade, Series B "Commodity Trade" for January-December of 1967. The data are in millions of dollars for all countries.

Table V:2 shows the percentage changes in both quantity ($\Delta Q/Q$) and values ($\Delta V/V$) of exports that would be expected under a rebating only policy of the corporate income tax. Table IV:3 shows the percentage change in the quantity and value of exports if full border adjustments (i.e. both rebates on exports and border taxes on imports) were permitted.

The percentage change in the value of exports ($\Delta V/V$) was determined by using the following information:

1. current value of exports = P_0Q_0

2. new value of exports = P_1Q_1, where $P_1 = (P_0 - \Delta P)$ and $Q_1 = (Q_0 + \Delta Q)$

3. the percentage change in the value of exports =

$$\frac{P_1Q_1 - P_0Q_0}{P_0Q_0}$$

$$= \frac{(P_0-\Delta P)(Q_0+\Delta Q) - P_0Q_0}{P_0Q_0}$$

$$= (1 - \frac{\Delta P}{P_0})(1 + \frac{\Delta Q}{Q_0}) - 1$$

The value for the percentage change in price was calculated from the formula $\Delta P/P = \frac{\Delta Q/Q}{\eta}$. Once the percentage changes in the values of exports were known, the post-adjustment values of exports were estimated by multiplying the pre-adjustment values by $(1 + \Delta V/V)$. In the cases in which there was a loss of exports, the pre-adjustment values were multiplied by $(1 - \Delta V/V)$. The post-adjustment values of exports are reported in the tables beside the heading "Estimated new value of exports".

To determine the impact of these border adjustments on a country's balance of trade, the sum total of a country's new exports was computed and then compared with its total new imports (the new exports of other countries to it). The balance of trade effects are shown on Table IV:4.

1. Changes in Exports under a Rebating Only Policy

The information that is contained in Table V:2 about the effects of rebating the corporate income tax without imposing border taxes indicates that the United States would experience the smallest percentage increase in exports of any of the countries considered. The total percentage increase in the

value of United States exports would only be 13.4 percent, while the increase in the Canadian exports would be over 30 percent. Interestingly enough, the difference in the total percentage increases of United States and Canadian exports can be attributed almost entirely to the change in value of trade between the two countries. Canadian exports to the United States would increase by 32.6 percent while United States exports to Canada would only increase by 9.3 percent. The reason for this dramatic difference in the trade between the two countries is the difference in the elasticities of demand for each other's exports. The Canadian elasticity of demand for United States exports is only -2.1; whereas the United States demand for Canadian manufactured products has an elasticity of -4.1.

The increase in United States exports to each of the other markets would be smaller than the increase in those markets' exports to the United States. Once again the asymmetry in increases can be explained by the fact that the elasticities of demand for United States exports are smaller than the United States elasticity of import demand. For Canada, the opposite conditions hold. The elasticity of demand for Canadian exports by all countries is higher than the elasticity of Canadian demand for imports. This means that the increase in Canadian exports to the individual markets would be larger than the increase in Canadian imports from those markets.

In the case of Japan, increases in exports to each of the markets would be less than the increase in imports from those countries with the exception of the United States market.

TABLE IV:2 -- Estimates of the percentage change in the quantity and value of exports; and the new total value of 1967 exports under a rebating only policy for the corporate income tax

Exporter	Importer: U.S.	Canada	Japan	EEC	EFTA	Estimated Additional Exports	Total of New Value of Exports
United States							
Percentage change in quantity		22.5	33.8	33.8	26.9		
Percentage change in value		9.3	19.2	19.2	12.0		
Estimated change in value		$496.2	$191.5	$608.2	$242.6	$1538.5	
Estimated new value of exports		$5832.0	$1188.9	$3828.4	$2264.2		$13113.5 (U.S.)
Canada							
Percentage change in quantity	51.5		42.6	42.6	33.8		
Percentage change in value	32.6		21.7	21.7	14.1		
Estimated change in value	$1441.75		$21.42	$41.38	$74.2	$1578.75	
Estimated new value of exports	$5869.75		$114.32	$220.78	$600.5		$6805.3 (Canada)
Japan							
Percentage change in quantity	43.8	25.9		35.4	22.7		
Percentage change in value	28.4	10.3		19.8	10.5		
Estimated change in value	$821.89	$27.0		$91.1	$67.2	$1007.19	
Estimated new value of exports	$3715.89	$286.9		$548.9	$707.42		$5259.1 (Japan)
EEC							
Percentage change in quantity	18.2	34.9	48.2		40.5		
Percentage change in value	12.8	12.5	25.2		15.8		
Estimated change in value	$917.7	$60.67	$127.81		$1294.9	$2401.08	
Estimated new value of exports	$4908.8	$546.07	$635.01		$9506.4		$15596.28 (EEC)
EFTA							
Percentage change in quantity	42.4	21.0	26.1	21.7			
Percentage change in value	27.7	11.2	15.4	13.0			
Estimated change in value	$640.75	$74.6	$55.3	$622.89		$1433.54	
Estimated new value of exports	$2951.45	$735.4	$414.3	$5606.59			$11099.64 (EFTA)
Estimated Additional Imports	$3822.09	$668.47	$396.03	$1385.57	$1678.92		
Estimated Total New Value of Imports	$17445.87 (U.S.)	$7400.37 (Canada)	$2352.53 (Japan)	$10214.67 (EEC)	$13078.52 (EFTA)		

Since the United States absorbs over 70 percent of Japanese exports, the Japanese relative gain vis-a-vis the United States would be enough to offset any relative loss with the other countries.

For the EEC and EFTA the pattern of relative increases in exports is more complicated. Both blocks of countries would experience relative export gains over the United States and Japan, and they would both experience relative losses with Canada. The EEC would enjoy a relative gain in its trade with EFTA. Since their bilateral trade is so large, the EEC's relative gain would mean that the EEC balance of payments would improve while EFTA's balance of payments would deteriorate.

2. Changes in Exports under a Policy of Full Border Adjustments

Table V:3 shows the possible impact on exports when full border adjustments are permitted for the corporate income tax. When both rebates on exports and border taxes on imports are used, the crucial factor in determining the change in exports is the difference in tax rates between countries. The country with the lower domestic tax rate will experience a decrease in exports when faced with the higher tax rate assessed at the foreign port. The other country (with a higher domestic tax rate) will experience an expansion in exports due to the lower taxes at the destination.

There is one exception to the general situation in which one country experiences an increase while the other experiences a decrease. This anomaly occurs in the case of the bilateral trade of Japan and EFTA and is caused by the fact that the

composite tax rate of EFTA is different depending upon whether EFTA exports to or imports from Japan. The composite rate for EFTA as an exporter to Japan is .347, which is less than Japan's tax rate of .35. This implies that EFTA exports to Japan will fall when full border adjustments are used. On the other hand, the composite tax rate of EFTA as an importer from Japan is .411; this means that when Japan exports to EFTA, it faces a higher tax rate and so its exports to EFTA will also decline.

If full border adjustments were permitted, the United States would experience a decrease in exports to Canada and the EEC, and an increase in its exports to all countries because the composite EEC tax rates are higher than those of the other countries. On the other hand, Japan and EFTA which would experience decreases in exports to all markets since their tax rates are lower than those of the other countries. Canada would experience increases in its exports to all markets except the EEC. It is to be expected that Canada and the EEC would experience an improvement in their balance of trade, while EFTA and Japan would experience a deterioration.

3. Balance of Trade Effects

Table IV:4 shows the new balance of trade positions for each of the markets included in this study, and gives the summary results from both Table V:2 and Table V:3. It is shown that if only rebates for the corporate income tax were permitted, the United States, which has a highly elastic demand for foreign products, would experience a serious

TABLE IV:3 — Estimates of the percentage change in the quantity and value of exports; and the new total value of 1967 exports with full border adjustments for the corporate income tax

	Importer					Estimated Additional Exports	Total of New Value of Exports
Exporter	U.S.	Canada	Japan	EEC	EFTA		
United States							
Percentage change in quantity		-0.8	8.6	-2.8	5.8		
Percentage change in value		-0.4	5.5	-1.8	3.1		
Estimated change in value			-$21.88	$55.35	-$58.61	$63.68	$38.54	
Estimated new value of exports			$5313.92	$1052.75	$3161.59	$2085.28		$11613.54 (U.S.)
Canada							
Percentage change in quantity	1.4		11.3	-0.9	5.6		
Percentage change in value	1.1		7.3	-0.61	3.0		
Estimated change in value		$48.2		$6.77	-$1.1	$14.77	$68.64	
Estimated new value of exports		$4476.2		$99.67	$178.3	$541.87		$5296.04 (Canada)
Japan							
Percentage change in quantity	-18.0	-9.0		-20.1	-4.7			
Percentage change in value	-14.4	-5.5		-17.1	-2.8			
Estimated change in value		$416.7	-$14.5		-$68.3	-$17.93	-$517.43	
Estimated new value of exports		$2477.26	$245.4		$389.5	$622.27		$3734.4 (Japan)
EEC								
Percentage change in quantity	5.2	3.2	19.5		11.1			
Percentage change in value	3.8	1.5	10.7		5.5			
Estimated change in value		$51.66	$7.76	$54.6		$451.6	$565.6	
Estimated new value of exports		$4142.76	$493.16	$561.8		$8663.1		$13860.8 (EEC)
EFTA								
Percentage change in quantity	-12.1	-9.4	-9.6	-0.5				
Percentage change in value	-9.4	-5.39	-6.8	-0.35				
Estimated change in value		-$308.9	-$35.23	-$14.5	$17.4		$376.03	
Estimated new value of exports		$2091.8	$625.57	$334.5	$4936.3			$9195.7 (EFTA)
Estimated Additional Imports		-$625.74	-$63.85	$102.2	$145.41	$512.12		
Estimated Total New Value of Imports		$13188.06 (U.S.)	$6678.05 (Canada)	$2048.72 (Japan)	$8665.69 (EEC)	$11912.72 (EFTA)		

TABLE IV:4 -- 1967 manufactured products' balance of trade: current and estimates when border adjustments are permitted for the corporate income tax (in millions of $)

	Exports	Imports	Balance of Payments
United States			
before adjustments	11575.0	13623.8	-2048.5
after adjustments, only rebating	13113.5	17445.89	-4332.39
after adjustments, with border taxes	11613.54	13188.06	-1574.52
Canada			
before adjustments	5226.6	6731.9	-1505.3
after adjustments, only rebating	6805.3	7400.37	-695.07
after adjustments, with border taxes	5296.04	6678.05	-1382.01
Japan			
before adjustments	4251.9	1956.5	2305.4
after adjustments, only rebating	5259.1	2352.53	2906.57
after adjustments, with border taxes	3734.4	2048.72	1685.68
EEC			
before adjustments	13195.2	8829.1	4366.1
after adjustments, only rebating	15596.28	10214.67	5381.61
after adjustments, with border taxes	13860.8	8665.69	5195.11
EFTA			
before adjustments	9493.5	11399.6	-1906.1
after adjustments, only rebating	11099.64	13078.52	-1978.88
after adjustments, with border taxes	9195.7	11912.72	1717.02

deterioration in its balance of trade because its imports would increase dramatically. The balance of trade of Canada, Japan, and the EEC would improve while that of EFTA would suffer.

In this context, it should be mentioned that Mr. N. R. Danielian, President of the International Economic Policy Association, has proposed that the U.S. Congress establish special export corporations which would pay little or no corporate income tax and no foreign border tax.[16] Unfortunately for the United States, if Mr. Danielian's suggestions were followed by all the OECD countries, indications are that the United States would experience even greater deficits in the balance of trade rather than the anticipated improvements.

When the second policy of permitting full border adjustment is considered, the United States balance of trade shows a dramatic improvement compared to the first policy. The deficit would be reduced by a third of its pre-adjustment level. The improvement in the United States balance of trade stems primarily from the 14.4 percent cut in imports from Japan and the 9.4 percent cut in imports from EFTA, since these trading sources account for about a third of United States imports.

With full border adjustments, the Japanese balance of trade would deteriorate significantly, with its surplus cut

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[16]N. R. Danielian, Pres. International Economic Policy Association, Administration's Balance-of-Payments Proposals: Maintaining the Strength of the U.S. in a Strong Free World Economy, U.S. Department of Treasury (January, 1968), p. 805.

by almost a third. Japan would undergo an increase in imports and an decrease in exports in relation to all markets.

This study indicates that the use of full border adjustments for the corporate income tax should find acceptance by the United States, Canada, and the EEC because of the improvement in their balance of trade. Japan would be likely to oppose such a move. If the use of border adjustments did become permissable under the GATT rules, there would be strong pressure in Japan to equalize its corporate income tax rates with other countries so as to encourage Japanese exports.

4. Consequences for United States Exports when Only the United States Employs Corporate Income Tax Rebates

As an interesting side light, this study explored the potential impact on exports if only the United States were to employ rebates for the corporate income tax. The change in quantity of exports was estimated by the same formula, $\Delta Q/Q = 1 - (1-t)^{-\eta\alpha}$. Junz and Rohmberg's estimates of -3.3, -5.5, -.87 for the elasticity of demand for United States manufactured products were appropriate in this case since only the United States is assumed to change export prices. M. E. Kreinin's estimate of -2.6 was also used to calculate the change in U.S. exports on an aggregate basis. The results are shown in Table IV:5 and indicate that estimated changes in the values of exports would range from -3.2 percent to +24.2 percent, depending upon the elasticity value.

Needless to say, this situation is of only theoretical interest since it is unlikely that OECD members would permit the U.S. to rebate the corporate income tax without following suit.

TABLE IV:5 -- Estimated effect on United States exports when only the United States employs rebates

	Elasticity	Percentage Change in Q	Percentage Change in Value	Estimated Value of Additional Exports	Estimated New Value of Total Exports (in $ millions)
A.	Elasticity = 2.6 (Kreinin)	28.8%	11.1%	1,323.25	12,989.25
B.	Elasticity = 3.3 (middle estimate) (Junz and Rohmberg)	35.2%	20.7%	2,396.02	13,971.02
C.	Elasticity = 5.5 (upper limit)	42.8%	24.2%	2,801.15	14,376.15
D.	Elasticity = .87 (estimate for U.S. specifically)	-11.7%	-3.2%	-370.4	11,204.6

CHAPTER V

THE IMPACT OF EXTENDING BORDER ADJUSTMENTS TO SOCIAL WELFARE TAXES

This chapters considers the effects upon exports and imports of permitting border adjustments for employers' contributions to social security. It was indicated in Chapter III that the social security tax on employers is generally assumed to raise business costs and to hurt producers' competitive positions in the world because the tax is not currently eligible for border adjustments. It is the purpose of this chapter to explore the consequences for world trade if the border adjustment policies were changed to conform with economic reasoning.

A. The Procedure

The calculations in this chapter were made under the same assumptions and formulae used in the previous chapter. The basic data used were the same except, of course, that employers' social security tax rates were used rather than corporate income tax rates.

The basic assumptions made were these:

(1) Producers pursue a profit-maximizing policy.

(2) The Cobb-Douglas function with constant average cost is applicable for the manufacturing sectors of all countries considered in this study.

(3) The use of border adjustments for the employers' social security tax affects only the export sector and not the domestic sector.

(4) It is reasonable to limit the study to the manufacturing sector because elasticity estimates are more reliable in predicting export changes from price changes than in the case of other economic sectors.

The model used for calculating the change in the quantity of exports was the same as in the previous chapter.

(1) profits function = $\Pi = PQ - TC$

(2) the demand function is $Q = BP^{-\eta}$, with the constant elasticity, η.

(3) the cost functions are $TC = rK + wL$, when taxes are included in the price of labor, w; and $TC = rK + w(1-t_s)L$, when taxes are not included in the price of labor.

(4) employers are on the expansion path

$0 = (1-\alpha)rK - \alpha wL$ with taxes

and $0 = (1-\alpha)rK - \alpha w(1-t_s)$ with no taxes.

Solving the equations in the same manner as in the previous chapter, the change in quantity of exports becomes $1 - (1-t_s)^{-\eta(1-\alpha)}$.

The values used for $(1-\alpha)$ were once again derived from Denison. The employed elasticity values, η, are those of Balassa and Kreinin. The values for t_s are reported in the OECD book, Border Tax Adjustments and Tax Structures on page 213 and listed in this dissertation on page 47. The tax rates for the United Kingdom, Norway, Canada, and Denmark were calculated from information in the United Nations' National Accounts Statistics

by comparing the aggregate figures on employers' contributions to social security with the national wage bill for the years 1964-1967.

For estimating the change in exports from the EEC and EFTA, the $\underline{t}$ values employed are weighted averages of the individual members' tax rates. The weighting factor in these averages was a member's share of the total bloc exports to a particular market in 1967. Since the shares change for each of the export markets, the composite tax rates of the EEC and EFTA are different for each market.

Tables V:1 and V:2 show the change in exports and imports when border adjustments are made for the employers' social security taxes. Table V:3 is a summary table which shows the new balance of trade positions of the United States, Canada, Japan, EFTA, and the EEC, when these border adjustments are permitted.

B. The Estimated Results

1. Impact on Exports under a Rebating Only Policy

Table V:1 shows the estimated change in exports when rebates are permitted but border taxes are not imposed. The increase in United States exports to Canada, Japan, the EEC and EFTA would be less than the increase in exports of each of those markets to the United States. The increase in the EEC exports to all markets would be greater than the increases in exports to the EEC. This favorable situation for the EEC is due to the fact that the EEC has the highest social security tax rates. The increase in EEC exports to the United States

would be the largest of all EEC exports because the United States has the highest elasticity of demand. The increase in Canadian exports to each of the markets, except for exports to the United States, would be less than the increases in exports to Canada. The small degree of expansion of Canadian exports is caused by its already low social security tax rates, so that producers would be unable to lower prices significantly even if rebates were permitted. For Japan, there would be a relative gain in exports with all markets except the EEC. EFTA would experience a mixed improvement in its bilateral trade because it would gain relative to the United States and Canada and lose relative to Japan and the EEC.

2. The Impact on Exports under a Policy of Full Border Adjustments

Table V:2 shows the possible changes in exports when full border adjustments (both rebates and border taxes) are permitted. With full border adjustments, the significant factor is the difference in tax rates between trading partners; one partner will experience an absolute increase in exports while the other will experience an absolute decrease in exports. The country with the higher domestic tax rate will experience the increase, because the imposition of border taxes by the importing country does not restore prices to their pre-rebate level. The country with the lower tax rate will experience a decrease in exports because the border taxes assessed on its products abroad will be higher than those borne at home.

Table VI:2 shows that Canada would experience a decline in exports to all markets under a policy of full border adjustments for the employers' social security tax because its export prices would rise when higher border taxes are imposed than are rebated. The EEC would enjoy an increase in exports to all markets, because its social security tax rates are the highest considered in this study. EFTA would experience a decrease in exports to all markets except Canada. Japan would enjoy increases in exports to all markets except the EEC. The United States would enjoy increases in exports to Canada and EFTA, but would experience losses in exports to the EEC and Japan.

3. Effects on Balance of Trade

Table V:3 summarizes the impact on the individual countries' balance of trade under the two border adjustment policies considered above. Under both policies, the United States balance of trade would deteriorate dramatically, but the negative effect would be greater when full border adjustments are permitted than when only rebates are permitted. The primary source of America's unfavorable balance of trade is its increased deficit with the EEC. Because the U.S. social security rate is much lower than those of the EEC members, full border adjustments would mean that U.S. exports to the EEC would decline in value by 37.2 percent, while EEC exports to the U.S. would increase by 27.4 percent.

Under either border adjustment policy, EFTA's balance of payments would deteriorate even more drastically than that of the United States. With only rebates permitted, the deficit in the EFTA balance of payment would double. This increase stems from a relative weakening in EFTA's bilateral trade with the EEC and Japan. With full border adjustments EFTA would experience absolute losses in exports to the EEC, Japan and the United States making its balance of trade deficit increase even more.

The Canadian balance of trade would deteriorate slightly under both border adjustment policies because of its low tax rates. The impact for Canada would be less than that for EFTA or the United States because Canada has the lowest elasticity of demand for imports.

The two "winners" in the use of border adjustments for the social security tax appear to be the EEC and Japan. The EEC balance of payments would improve greatly because its tax rates are higher than those of any other country and Japan would gain because its tax rate is the second highest. The Japanese balance of payments' position would be slightly weaker under full adjustments policies than under a rebating only policy, since Japanese exports to the EEC would decline absolutely.

The information contained in Table VI:3 indicates that the United States and EFTA could experience dire balance of trade problems if GATT were to extend its permission for border adjustments to the employers' social security tax.

Since it is likely that the EEC countries would push for such an adjustment if permission were granted for the rebate of corporate income tax, the United States may be wise to leave the GATT policies as they are. The next chapter will explore the consequences for exports if border adjustments are used for both corporate income and employers' social security taxes.

TABLE V:1 — Estimates of the percentage change in the quantity and value of exports; and the new total value of 1967 exports under a rebating only policy for the social security tax

Exporter	Importer: U.S.	Canada	Japan	EEC	EFTA	Estimated Additional Exports	Total of New Value of Exports
United States							
Percentage change in quantity		12.2	17.7	17.7	13.4		
Percentage change in value		5.6	12.1	12.1	6.8		
Estimated change in value		$303.24	$121.28	$391.57	$137.87	$953.96	
Estimated new value of exports		$5639.4	$1118.68	$3611.77	$2159.47		$12529.32 (U.S.)
Canada							
Percentage change in quantity	7.2		5.4	5.4	4.1		
Percentage change in value	5.3		3.6	3.6	2.2		
Estimated change in value	$793.12		$3.35	$6.45	$11.57	$814.99	
Estimated new value of exports	$4662.68		$96.25	$185.85	$537.87		$5482.65 (Canada)
Japan							
Percentage change in quantity	31.3	17.5		24.8	19.0		
Percentage change in value	21.3	7.7		14.8	9.2		
Estimated change in value	$616.42	$20.01		$67.75	$58.89	$763.07	
Estimated new value of exports	$3510.42	$279.91		$525.55	$699.09		$5014.97 (Japan)
EEC							
Percentage change in quantity	53.3	32.1	37.6		31.2		
Percentage change in value	33.4	11.9	22.9		13.4		
Estimated change in value	$1333.02	$57.76	$116.14		$1200.34	$2707.26	
Estimated new value of exports	$5324.12	$543.16	$623.34		$9311.84		$15802.46 (EEC)
EFTA							
Percentage change in quantity	15.7	7.4	10.6	14.2			
Percentage change in value	11.3	2.7	6.8	9.0			
Estimated change in value	$261.1	$18.56	$24.4	$455.83		$759.89	
Estimated new value of exports	$2571.30	$678.64	$383.4	$5399.53			$8688.31 (EFTA)
Estimated Additional Imports	$3003.67	$399.57	$265.18	$922.1	$1408.67		
Estimated Total New Value of Imports	$16079.02 (U.S.)	$7140.11 (Canada)	$2221.67 (Japan)	$9727.7 (EEC)	$12708.27 (EFTA)		

TABLE V:2 -- Estimates of the percentage change in the quantity and value of exports; and the new total value of 1967 exports with full border adjustments for the social security tax

Exporter	Importer: U.S.	Canada	Japan	EEC	EFTA	Estimated Additional Exports	Total of New Value of Exports
United States							
Percentage change in quantity		9.9	-8.0	-45.1	4.4		
Percentage change in value		4.7	-5.7	-37.2	2.4		
Estimated change in value		$252.38	-$55.96	-$1195.99	$48.72	-$950.85	
Estimated new value of exports		$5588.18	$941.44	$2024.21	$2070.32		$10524.15 (U.S.)
Canada							
Percentage change in quantity	-16.5		-19.4	-49.2	-3.5		
Percentage change in value	-13.2		-19.0	-41.3	-2.1		
Estimated change in value	-$582.29		-$17.66	-$79.1	-$11.06	-$685.03	
Estimated new value of exports	$3845.71		$75.24	$105.30	$515.24		$4541.49 (Canada)
Japan							
Percentage change in quantity	8.9	11.6		-19.6	7.6		
Percentage change in value	6.6	6.4		-14.5	4.0		
Estimated change in value	$191.29	$16.63		-$74.1	$104.1	$237.92	
Estimated new value of exports	$3085.29	$276.53		$391.41	$665.80		$4419.03 (Japan)
EEC							
Percentage change in quantity	41.9	28.8	16.7	20.5			
Percentage change in value	27.42	11.1	10.4	11.1			
Estimated change in value	$1089.35	$53.87	$52.2	$911.47		$2106.89	
Estimated new value of exports	$5085.45	$539.27	$559.94	$9122.97			$15307.63 (EEC)
EFTA							
Percentage change in quantity	-7.3	3.6	-15.0	-36.9			
Percentage change in value	-5.7	1.1	-10.9	-24.9			
Estimated change in value	-$130.56	$7.26	-$39.14	-$1233.48		-$1395.92	
Estimated new value of exports	$2180.14	$668.06	$319.86	$3720.22			$6882.28 (EFTA)
Estimated Additional Imports	$867.39	$330.14	$60.56	$2577.67	$1053.23		
Estimated Total New Value of Imports	$14196.59 (U.S.)	$7072.04 (Canada)	$1896.48 (Japan)	$6241.14 (EEC)	$12374.33 (EFTA)		

TABLE V:3 -- 1967 manufactured products' balance of trade: current and estimates when border adjustments are permitted for the employers' social security tax (in millions of $)

	Exports	Imports	Balance of Payments
United States			
before adjustments	11575.0	13623.5	-2048.5
after adjustments, only rebating	12529.32	16079.02	-3549.70
after adjustments, with border taxes	10624.15	14196.59	-3572.44
Canada			
before adjustments	5226.6	6731.9	-1505.3
after adjustments, only rebating	5482.65	7140.11	-1657.4
after adjustments, with border taxes	4541.49	7072.04	-2530.55
Japan			
before adjustments	4251.9	1956.5	2305.4
after adjustments, only rebating	5014.97	2221.67	3291.82
after adjustments, with border taxes	4419.03	1896.48	2522.55
EEC			
before adjustments	13195.2	8829.1	4366.1
after adjustments, only rebating	15802.46	9727.7	6252.36
after adjustments, with border taxes	15307.63	6241.14	9066.49
EFTA			
before adjustments	9493.5	11399.6	-1906.1
after adjustments, only rebating	8688.31	12708.27	-3966.99
after adjustments, with border taxes	6882.28	12374.33	-5492.05

CHAPTER VI

THE IMPACT ON EXPORTS WHEN BORDER ADJUSTMENTS ARE USED FOR BOTH THE CORPORATE INCOME AND SOCIAL SECURITY TAXES

The purpose of this chapter is to explore the consequences of border adjustments for both the corporate income and employers' social security taxes on the imports of the same OECD countries. The same model and assumptions were used in making the calculations here as in the previous chapters.

A. Method of Analysis

The model used was:

(1) profits function = $\Pi = PQ - TC$

(2) the demand function $Q = BP^{-\eta}$, has the constant elasticity, η.

(3) the total cost function is: $TC = rK + wL$ when taxes are included in the price of both inputs, and it equals $r(1-t)K + w(1-t_s)L$ when taxes are excluded because of rebating.

(4) Producers are on the expansion path

$O = (1-\alpha)rK - wL$ with taxes

and $O = (1-\alpha)r(1-t)K - \alpha w(1-t_s)L$ with no taxes.

Solving the equations in the same manner as in Chapter IV, the resulting percentage change in the quantity of exports is $1 - [(1-t)^{-\eta\alpha}(1-t_s)^{-\eta(1-\alpha)}]$. The change in quantity is determined by a multiplicative interaction of the two tax

rates, rather than by an additive effect of the rates. The multiplicative interaction results from the substitution of the cost-minimizing values of labor $\left(L = \frac{(1-\alpha)TC}{w(1-t_s)}\right)$ and capital $\left(K = \frac{\alpha TC}{r(1-t)}\right)$ into the production function $Q = AK^{\alpha}L^{1-\alpha}$.

Tables VI:1 and VI:2 show the estimated impact upon the quantity and value of exports when border adjustments are permitted. Table VII:3 summarizes the results of the previous tables to indicate the estimated impact upon the balance of trade of the OECD members.

B. Estimated Results

1. Impact on Exports under a Rebating Only Policy

Table VI:1 shows the estimated impact on exports of allowing only export rebates for the two taxes. The table indicates that the expansion of United States exports to Canada, Japan, EFTA, and the EEC would be less than the increase in exports of those countries to the United States. This loss in relative expansion is once again caused by the high elasticity of import demand in the United States. The table further shows that Canada would experience a relative gain in exports with all its trading partners because of the low elasticity of Canadian import demand. Japan would enjoy relative gains only with the United States. The EEC would experience relative gains in exports with the United States and Japan; while EFTA would enjoy relative gains with the United States, Japan and the EEC.

2. Impact on Exports under a Policy of Full Border Adjustments

Table VI:2 shows the possible impact on exports of full border adjustments for the two taxes. EFTA would experience absolute losses in exports to all markets because its tax rates are very low. On the other hand, the EEC would experience dramatic gains over all countries because the rebating of high EEC taxes lowers EEC prices so much that foreign border taxes will not restore them to their pre-adjustment levels. Japan would experience gains with EFTA and losses with the EEC and the United States; while Canada would experience losses with all markets except Japan. The United States would experience gains to all markets except the EEC.

What is interesting in this case of full border adjustments is that the usual bilateral condition that one country experiences a gain while the other experiences a loss, does not occur in all cases. In the bilateral trade of Canada and EFTA both countries would experience absolute losses in exports. Likewise in the bilateral trade between Japan and Canada both countries would experience increases. This last anomalous situation would occur because Canada would have a relative gain due to higher corporate income tax rates, while Japan would have a relative gain due to higher social security taxes. Neither country would be left with an absolute loss.

With the full border adjustments, the total volume of trade would increase only slightly, with the EEC the only country enjoying any actual gain. The other countries would all experience a decrease in the value of their exports.

3. Balance of Trade Effects under Both Border Adjustment Policies

Table VI:3 shows the balance of trade effects of the two different policies of border adjustments for the corporate income and social security taxes. If only rebates were permitted for the two taxes the United States and EFTA would experience a serious deterioration in their balance of trade while Canada would enjoy some improvement and Japan and the EEC would have great gains. If full border adjustments were permitted, all countries except the EEC would experience a deterioration in their balance of payments. EFTA would experience the worst deterioration of all.

It seems quite apparent that the United States has nothing to gain by pushing for border adjustments for the currently ineligible taxes if the members of the EEC were to insist that border adjustments be permitted for both the social security and corporate income tax. The United States would be well advised to leave matters as they are.

TABLE VI:1 — Estimates of the percentage change in the quantity and value of exports; and the new total value of 1967 exports under a rebating only policy for both the corporate income and social security taxes

Exporter	U.S.	Canada	Importer Japan	EEC	EFTA	Estimated Additional Exports	Total of New Value of Exports
United States							
Percentage change in quantity		31.9	45.5	45.5	36.7		
Percentage change in value		11.8	24.1	24.1	14.8		
Estimated change in value		$626.69	$240.57	$776.72	$299.6	$1943.68	
Estimated new value of exports		$5962.49	$1237.97	$3996.91	$2321.20		$13518.5 (U.S.)
Canada							
Percentage change in quantity	55.0		45.8	45.8	36.6		
Percentage change in value	34.2		24.3	24.3	14.8		
Estimated change in value	$1514.3		$22.5	$43.5	$77.9	$1736.1	
Estimated new value of exports	$5942.3		$115.4	$222.9	$604.2		$6884.8 (Canada)
Japan							
Percentage change in quantity	61.5	39.0		51.5	37.5		
Percentage change in value	37.2	13.2		26.3	15.0		
Estimated change in value	$1076.5	$34.3		$120.4	$96.0	$1327.2	
Estimated new value of exports	$3970.5	$294.2		$578.2	$736.2		$5579.1 (Japan)
EEC							
Percentage change in quantity	79.7	55.8	66.9		59.1		
Percentage change in value	44.8	14.5	31.0		18.2		
Estimated change in value	$1788.0	$70.4	$157.2		$1494.4	$3510.0	
Estimated new value of exports	$5779.1	$555.8	$664.4		$9705.9		$16705.2 (EEC)
EFTA							
Percentage change in quantity	51.5	26.9	34.0	37.9			
Percentage change in value	31.0	5.0	19.0	21.0			
Estimated change in value	$716.3	$33.0	$68.2	$1040.2		$1857.7	
Estimated new value of exports	$3027.0	$693.8	$427.2	$5993.9			$10141.9
Estimated Additional Imports	$5095.1	$764.39	$488.47	$1980.81	$1967.9		
Estimated Total New Value of Imports	$18718.9 (U.S.)	$7506.29 (Canada)	$2444.97 (Japan)	$10791.1 (EEC)	$13675.0 (EFTA)		

TABLE VI:2 — Estimates of the percentage change in the quantity and value of exports; and the new total value of 1967 exports when full border adjustments are used for both the corporate income and social security taxes

Exporter	Importer: U.S.	Canada	Japan	EEC	EFTA	Estimated Additional Exports	Total of New Value of Exports
United States							
Percentage change in quantity		9.2	.3	-49.1	9.9		
Percentage change in value		4.5	.2	-41.1	5.2		
Estimated change in value		$240.12	$1.99	-$1321.58	$105.52	-$973.95	
Estimated new value of exports		$5575.91	$999.39	$1898.62	$2127.12		$10611.04 (U.S.)
Canada							
Percentage change in quantity	-14.8		0.8	-15.9	-9.6		
Percentage change in value	-11.8		0.5	-11.7	-5.9		
Estimated change in value	-$519.85		$.4	-$21.0	-$30.9	-$571.35	
Estimated new value of exports	$3908.15		$93.3	$158.4	$495.4		$4655.25 (Canada)
Japan							
Percentage change in quantity	-7.4	3.1		-34.4	2.8		
Percentage change in value	-5.8	1.5		-27.2	1.7		
Estimated change in value	-$165.54	$3.8		-$124.6	$10.8	-$285.26	
Estimated new value of exports	$2728.46	$263.7		$333.2	$651.0		$3976.36 (Japan)
EEC							
Percentage change in quantity	45.0	31.2	44.0		28.0		
Percentage change in value	29.1	11.5	23.5		12.5		
Estimated change in value	$1161.41	$55.8	$119.0		$1026.4	$2363.43	
Estimated new value of exports	$5152.51	$541.2	$626.2		$9237.9		$15557.81 (EEC)
EFTA							
Percentage change in quantity	-20.2	-5.3	-9.0	-14.2			
Percentage change in value	-15.3	-3.0	-5.6	-10.4			
Estimated change in value	-$353.31	-$19.9	-$20.2	-$515.1		-$908.51	
Estimated new value of exports	$1957.39	$640.9	$338.8	$4438.6			$7375.69 (EFTA)
Estimated Additional Imports	$453.8	$279.7	$101.19	-$1982.28	$1111.82		
Estimated Total New Value of Imports	$13746.51 (U.S.)	$7021.73 (Canada)	$2057.69 (Japan)	$6828.92 (EEC)	$12511.42 (EFTA)		

TABLE VI:3 -- 1967 manufactured products' balance of trade: current and estimates when border adjustments are permitted for both the corporate income and social security taxes (in millions of $)

	Exports	Imports	Balance of Payments
United States			
before adjustments	11575.0	13623.5	-2048.5
after adjustments, only rebating	13518.5	18718.9	-5200.4
after adjustments, with border taxes	10601.04	13746.51	-3145.47
Canada			
before adjustments	5226.6	6731.9	-1505.3
after adjustments, only rebating	6884.8	7506.29	-621.49
after adjustments, with border taxes	4655.25	7021.73	-2366.48
Japan			
before adjustments	4251.9	1956.5	2305.4
after adjustments, only rebating	5579.1	2444.97	3134.13
after adjustments, with border taxes	3976.36	2057.69	1918.67
EEC			
before adjustments	13195.2	8829.1	4366.1
after adjustments, only rebating	16705.2	10791.1	5914.1
after adjustments, with border taxes	15557.81	6828.92	8728.89
EFTA			
before adjustments	9493.8	11399.6	-1906.1
after adjustments, only rebating	10141.9	13675.0	-3533.1
after adjustments, with border taxes	7375.69	12511.42	-5135.73

CHAPTER VII

THE NEUTRALITY OF BORDER ADJUSTMENTS FOR THE INDIRECT TAXES

In previous chapters, the rationale of GATT's prohibition of border adjustments for the corporate income and social security taxes has been questioned and attempts have been made to estimate the impact on manufactured exports if the prohibition were dropped. It is now appropriate to examine the effect of the current use of border adjustments for indirect taxes on the flows of commodity trade.

GATT's objective in permitting the use of border adjustments for consumption taxes was to leave international trade flows unaffected by any internal tax policies. The signators of GATT thought that this neutrality could be achieved if countries were permitted to rebate only the amount of taxes that had actually been collected on goods to be exported, and if countries could only impose border taxes on imports at a rate equivalent to that imposed on domestic products. Unfortunately, it is only under very unusual circumstances that border adjustment for the full amount of the domestic tax will leave foreign trade flows unaffected. Full rebating of consumption taxes on exports will induce export sales at prices below pre-tax levels; similarly, the imposition of border taxes on imports at rates equivalent to domestic taxes will <u>reduce</u> imports below pre-tax levels. It is the purpose of

this chapter to estimate the extent to which exports and imports have been affected by border adjustments of the consumption taxes.

A. Method of Analysis

The procedure adopted for estimating the impact of consumption taxes on international trade is less complex than the procedure used for the corporate income or the social security tax. Since a consumption tax is assessed upon the product rather than upon one of the inputs, it is not necessary to specify a production function to determine the amounts by which the cost function or supply function will shift vertically. In economic analysis, it is assumed that a per unit consumption tax of a certain percentage will increase marginal costs by that percentage; whereas, a percentage tax on an input will increase marginal costs by an amount dependent upon that input's contribution to total costs and its "substitutability".

In this chapter, the export supply function will be determined by the difference between domestic demand and domestic supply at prices above the equilibrium price level. Thus, the export supply function is really an excess supply function; it shows the quantities exported at different prices, and is completely independent of the import-demand of other countries for those exports. This is in contrast with the supply of exports considered in the cases of corporate income taxes and social security taxes. In those cases, there was nothing that could be categorized as an export supply schedule.

Only the equilibrium points mutually determined by the cost function and the import demand function ($Q = BP^{-\eta}$) could be defined. The quantitites of exports supplied were the quantities at which marginal revenue equalled marginal cost, and whose market prices were determined by the formula p = marginal revenue/(1-1/η). In imperfectly competitively situations, the observed supply of exports is not identical with the excess supply function that is considered here.

The excess supply function used in this chapter is determined by the difference between the domestic demand function and domestic supply function in a competitive situation, where the domestic supply schedule is simply the horizontal sum of the individual firms' marginal cost curves. If the individual firm's production conditions exemplify the Cobb-Douglas characteristics, the sum of the marginal cost curves in the long run will be perfectly elastic. Since the analysis in this chapter is not restricted to functions of infinite elasticity, it can no longer be assumed that the Cobb-Douglas applies to all cases.

The reliance upon the Cobb-Douglas function in the analysis of input taxes and the dismissal of it in the consideration of consumption taxes is not as capricious as it may appear. When competitive markets are considered, the Cobb-Douglas function with constant returns to scale cannot yield definitive output statements for the individual firms; however, in a non-competitive situation the Cobb-Douglas function can yield definitive results with a minimum of mathematical complexity.

The analysis in this chapter will also consider the import demand function to be an "excess" function; namely the difference between the domestic demand and domestic supply at prices below the domestic equilibrium price and quantity.

The following analysis shows that border adjustments for the full amount of domestic consumption taxes will lead to a change in international trade flows.

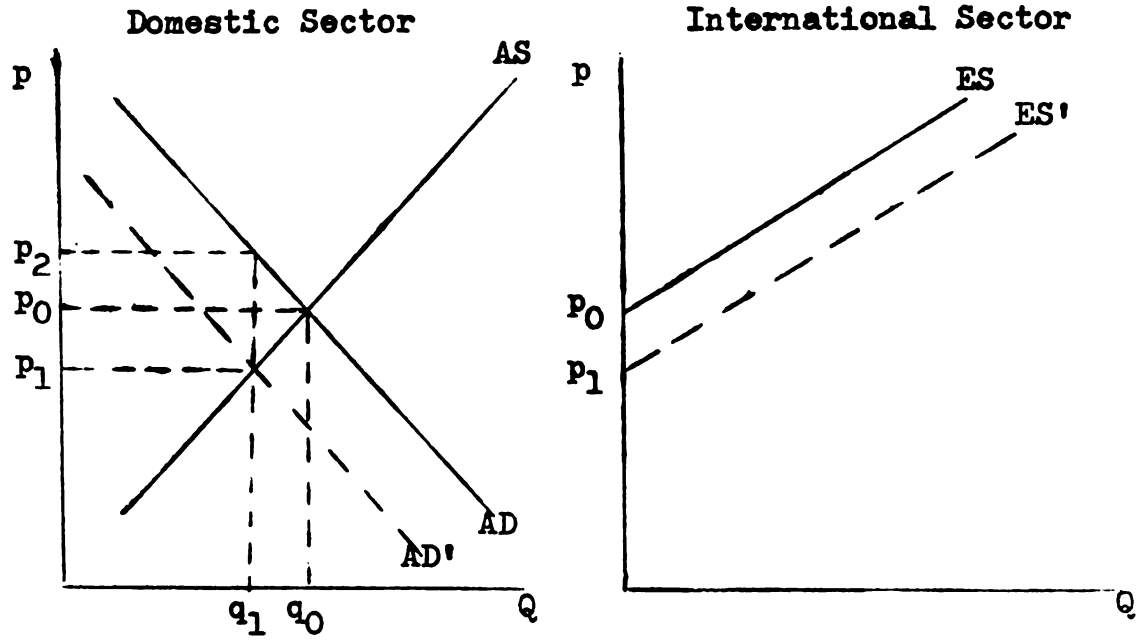
B. Theoretical Analysis of the Impact of Border Adjustments

1. Impact on Export Supply

The theoretical analysis will first illustrate the way in which tax rebates can enable exporters to sell at prices below pre-tax levels. A pre-tax excess supply function will be compared with an excess supply function resulting from the imposition of taxes on domestic but not export sales. Using the analysis presented on page 9 of this study, the initial effect of a consumption tax will be viewed as a decrease in net revenues gained from sales, i.e. as a downward shift in the demand function. The Figure VII:A illustrates the subsidizing effect of exempting consumption taxes on exports.

In Figure VII:A, the domestic demand is shown by the demand curve AD. The export supply function, ES, is the difference between AS (domestic supply) and AD at prices above p_0. From the suppliers' point of view, an imposition of a consumption tax of amount $\underline{x}$ on domestic sales alone shifts the domestic demand curve downward by $\underline{x}$ amount. As the tax shifts the domestic demand curve to AD', the quantity of goods sold in the domestic market is diminished, thereby releasing

Fig. VII:A -- Subsidizing effect on exports of full rebates.



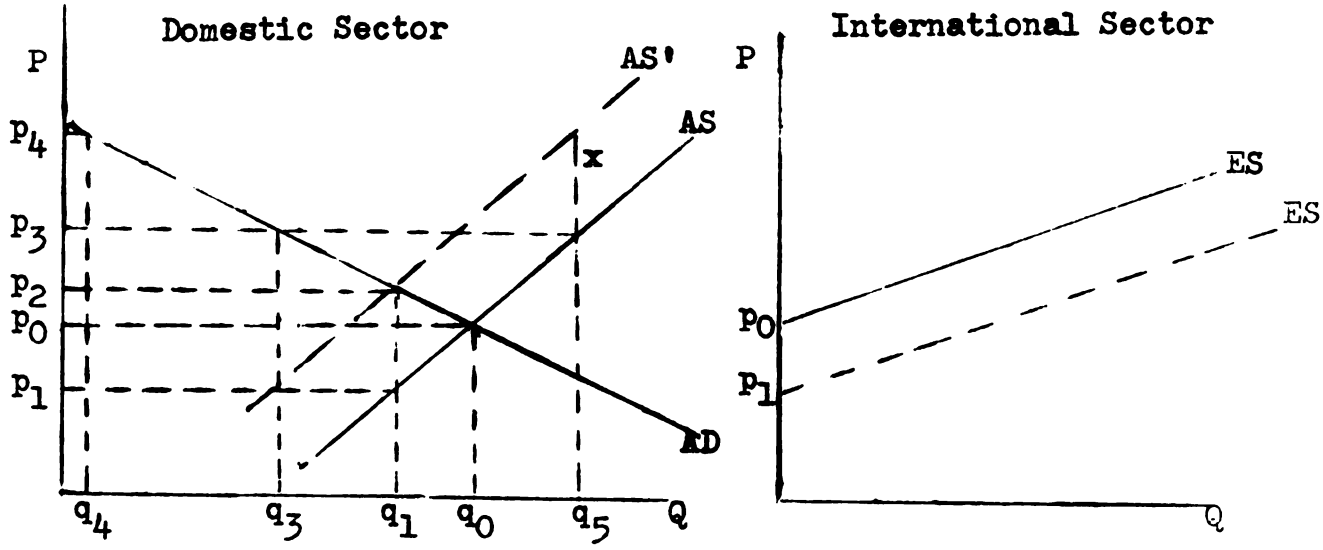
goods for sale in the export market. The tax cuts domestic sales to q_1; the domestic consumers are charged price p_2 while the producers receive p_1, and p_2-p_1 goes to the government in taxes. Since the producers can now sell any quantity greater than q_1 in the export market at a price starting at p_1 which is less than p_0, the producers experience an increase in their export supply function to ES'. ES' is the horizontal difference between AD' and AS. If the domestic supply function had been perfectly elastic, the imposition of a domestic tax would have cut domestic demand but would not have lowered the price received by producers below p_0 so that the export supply schedule would have remained unaffected.

The use of domestic taxes and rebates will expand export sales only when the supply function is less than perfectly elastic. Such an expansion can occur because domestic taxation decreases domestic consumption thereby releasing products

for sale abroad at prices below pre-tax levels.

The same conclusions can be drawn from an analysis which views a consumption tax as an increase in producers' costs. The procedure is much clumsier than in the previous case, but perhaps the analysis is worthwhile to indicate that the results are indeed the same.

Fig. VII:B -- Border adjustment effects on excess supply when tax viewed as increase in costs.



Before taxes, the domestic demand function is AD and the supply function is AS. Equilibrium domestic price is p_0 with q_0 sold. ES is the excess supply function. A consumption tax of amount $\underline{x}$ will shift the supply function AS upward by the amount $\underline{x}$ to AS'. Since the AS' function implies that both domestic and export sales are taxed, it is not truly applicable for prices above the domestic equilibrium. In determining the export supply function, curve AS still applies. The downward shift in the supply function reduces the pre-trade domestic equilibrium sales to q_1 at a market price of p_2 with the producers receiving p_1. Since domestic demand

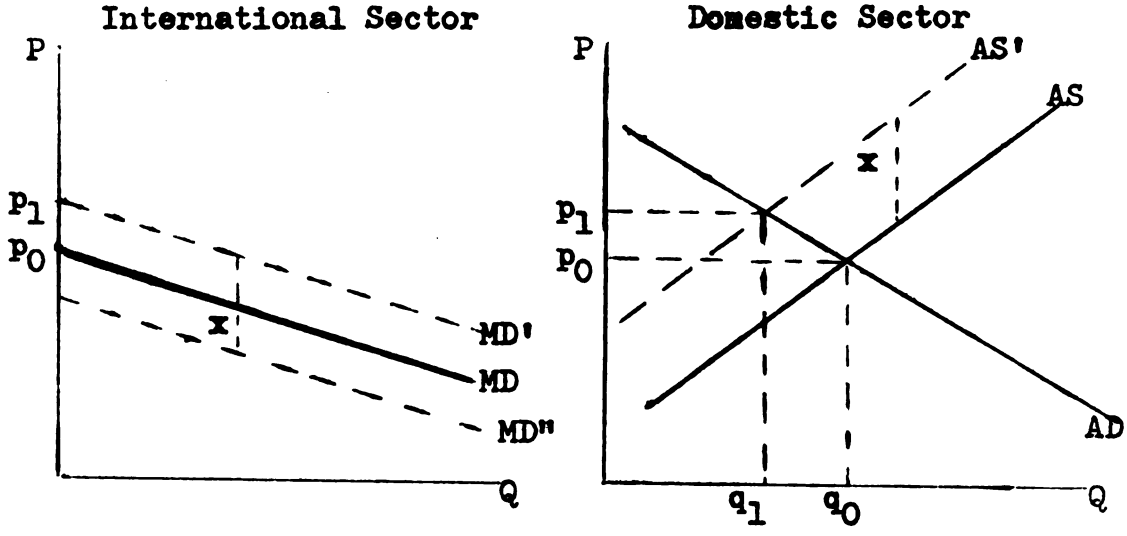
has been curtailed, producers can now export at the price p_1 which is lower than the original initial export supply prices of p_0. Producers can export at p_1 because they pay no taxes on exports, even though they would charge p_2 if the product were sold domestically. As exports increase, costs increase and so the supply price to both the domestic market and the export market will increase. The price in the domestic market will be the same as that of the export market except with the amount of tax $\underline{x}$ added onto the domestic price. For example, at a price p_3 for the export market, the price charged in the domestic market will be $p_3 + \underline{x}$ (or p_4). At export price of p_3, the quantity consumed domestically with taxes would be q_4, leaving q_5-q_4 available for export. This quantity is greater than the quantity q_5-q_3 that was available for export before taxes were introduced. No matter which analytic approach is taken, a rebating policy that exempts exports from consumption taxes will increase the supply of exports at all prices, compared to a no-tax no-rebate situation.

2. Impact upon Import Demand

Similar analysis, this time employing the import demand function, can be used to demonstrate the non-neutrality of border taxes. The analysis will compare a pre-tax excess demand function with a post-tax demand function. The tax on domestic production will be viewed as an upward shift in the domestic supply function, and the border tax on imports will be viewed as a downward shift in the import demand function. Fig. VII:C shows that when the import demand function is less than

perfectly elastic, the use of domestic and border taxes lowers the import demand below pre-tax levels but that the amount of downward shifting is less than the amount of tax.

Fig. VII:C — Impact of border taxes on imports.

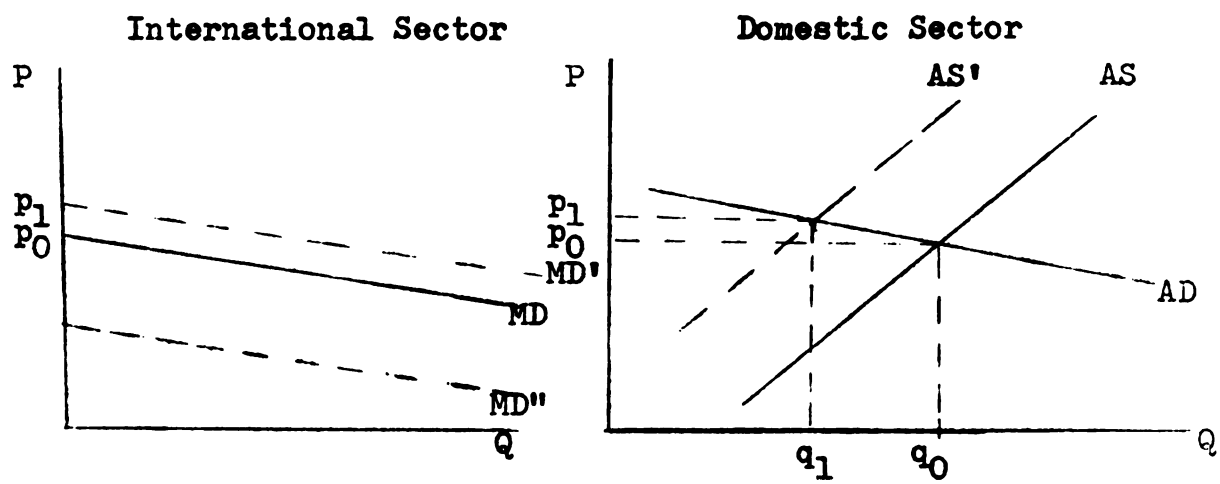


The before-tax demand curve is AD and the before tax supply function is AS. The import demand function MD is the horizontal difference between AS and AD at prices below the domestic equilibrium price of p_0. The imposition of a tax of amount x on domestic sales will decrease the producers' supply function to AS'. The tax will increase the domestic equilibrium price to p_1 and will decrease the domestic quantity sold to q_1. The imposition of taxes on domestic sales alone creates a "substitution" effect with consumers buying imports rather than domestic production at prices below p_1. This "substitution" effect causes the import demand curve to shift upward to MD', which is determined by the horizontal difference between AS' and AD. In turn, the imposition of a border tax of amount x on imports will shift the "effective" import demand

function downward by the amount $\underline{x}$ to MD". The imposition of border taxes in amounts equal to the taxes assessed on domestic production will lower the demand for imports below pre-tax levels. The price differential, however, between the pre-tax demand function and the after tax function will be less than the amount of the tax.

a. The importance of the relative elasticities of supply and demand: The degree to which a border tax will decrease import demand below a pre-tax import demand is dependent upon the relative elasticities of domestic demand and supply. If the domestic demand curve is very elastic compared to the domestic supply, a domestic tax will raise domestic prices very little and cause very little substitution of imports for domestic goods. In other words, MD' would only be slightly greater than MD. The imposition of a border tax on imports will lower effective demand (MD") by almost the entire amount of the tax below the pre-tax level of demand. This situation is illustrated in the diagram below.

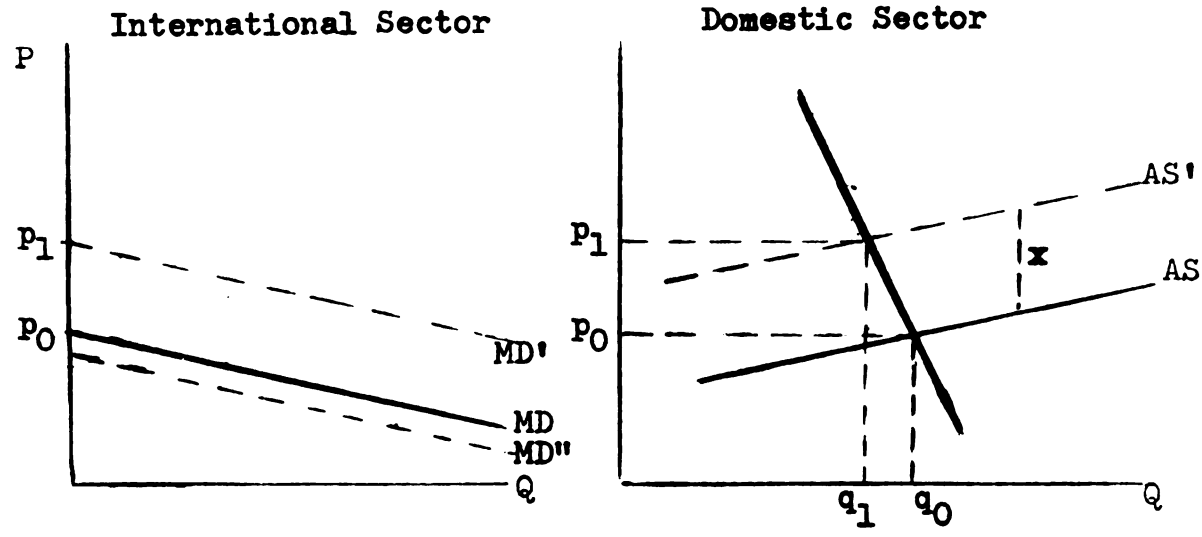
Fig. VII:D -- A border tax's effect on import demand when domestic demand is very elastic relative to supply.



The domestic demand and supply before taxes are AD and AS with the resulting import demand being MD. The imposition of a consumption tax of amount x shifts the supply function vertically to AS'. The resulting substitution of imports for domestic production raises the import demand to MD'. The imposition of a border tax on imports lowers the "effective" demand curve faced by producers to MD" which is almost the amount x below MD. If the domestic demand function were perfectly elastic, and import demand were perfectly elastic, MD" would be the amount x below MD if border taxes were used.

If the supply function is relatively elastic in comparison to the domestic demand function, a border tax may simply eliminate any substitution effect caused by domestic taxation and restore the pre-tax import demand. Fig. VII:E illustrates such a case.

Fig. VII:E -- Impact of a border tax on import demand when domestic supply function is more elastic than domestic demand.



AD and AS are pre-tax domestic demand and supply function. MD is the resulting import demand. A domestic tax raises supply to AS' and causes a great increase in demand for imports. A border tax of amount x does little more than restore the initial import demand, i.e. MD" is only slightly less than MD. Thus the key factor in size of MD" relative to MD is the relative elasticities of domestic demand or supply.

After the final shift in the import demand function is known, it is necessary to introduce the foreign export supply function to illustrate the final equilibrium position when taxes are imposed on domestic and import sales alike.

In the diagram on page 121, AD and AS represent the domestic demand and supply functions before taxes. MD is the resulting import demand function. With an export supply function of ES, the equilibrium price in the international and domestic markets is p_0. At price p_0, q_0 is produced domestically, and (q_1-q_0) or Q_0, is imported. The imposition of domestic and border taxes shifts the domestic supply function to AS' and the import demand function to MD". The border tax cuts the volume of imports and creates a divergence between the prices producers receive and consumers pay. At the equilibrium point under a policy of domestic and border taxes, all producers receive p_1 for their sales, while consumers pay p_2 for that quantity. At a market price of p_2, consumers in the importing country will buy a quantity q_2 from domestic sources and a quantity (q_3-q_2), or Q_2, from foreign suppliers. The amount $q_3(p_2-p_1)$ is paid to the government in taxes. With

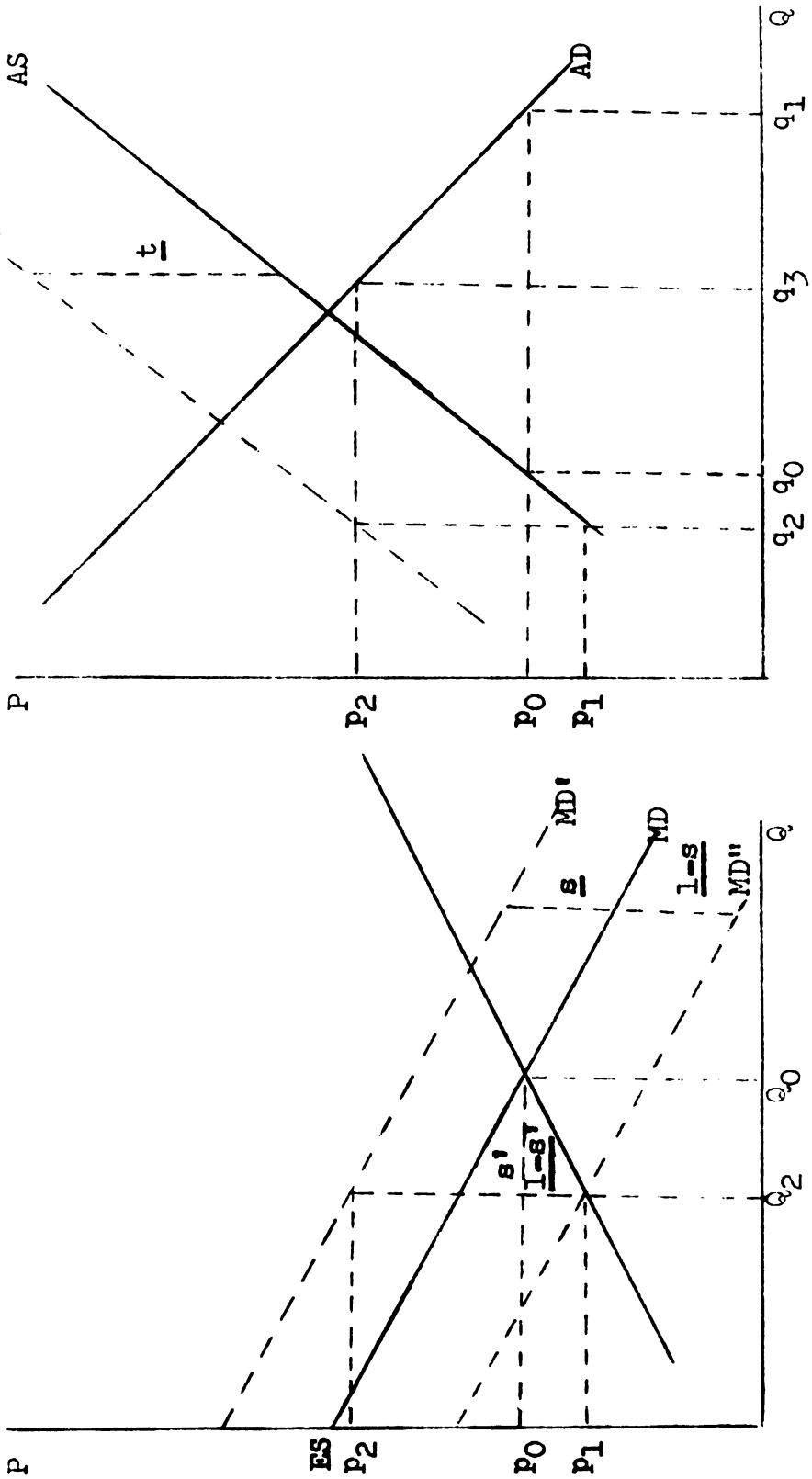


Fig. VII:F — The impact on equilibrium quantity and price of imports when border taxes are imposed to equalize domestic taxation.

domestic and border taxes, both domestic and import sales are smaller than at pre-tax levels.

b. The procedure for estimating the percentage change in equilibrium export prices with border taxes: A method for determining the difference between the pre-tax price p_0 and the post adjustment export price of p_1 is suggested on page 10 of this dissertation. It presents a formula for calculating the consumers' and producers' shares of the tax burden, either domestic or international. This formula is applicable when the effects of government expenditures of tax revenues can be ignored. The following notation is useful in determining the actual percentage price change:

η_D = elasticity of domestic demand for manufactured products.

ϵ_D = elasticity of domestic supply of manufactured products.

η_m = elasticity of import demand.

ϵ_x = foreign elasticity of export supply.

t = tax rate, domestic and border of the importing country.

s = consumers' share of the domestic tax burden (i.e. the proportion of the tax passed on to the consumers).

(1-s) = producers' share of domestic tax.

A domestic tax will cause the domestic price to rise by $\underline{s \cdot t}$. The upward shift in the import demand function MD to MD' will also equal $\underline{s \cdot t}$. The imposition of a border tax $\underline{t}$ on imports will lower the import demand function by (1-s)t below the pre-tax level. As shown in Fig. VII:F, MD" will be

vertically lower than MD' by t; but (1-s)t below MD. This net reduction in the import demand function is shared by consumers of the importing country and by producers of the exporting country. The consumers' share will be defined as (s'), while the producers' share from lowering export prices will be (1-s'). Thus the post adjustment equilibrium price p_1 will be (1-s')(1-s)t below the pre-tax price p_0.

From the formula on page 10, it is known that

$$(1-s) = \frac{|\eta_D|}{|\eta_D| + \varepsilon_s}$$

and

$$(1-s') = \frac{|\eta_m|}{|\eta_m| + \varepsilon_x}$$

so that the percentage difference between p_0 and p_1 =

$$(7\text{-}1) \quad \frac{\Delta P}{P} = \left(\frac{|\eta_m|}{|\eta_m| + \varepsilon_x}\right)\left(\frac{|\eta_D|}{|\eta_D| + \varepsilon_s}\right) \cdot t$$

$$= \left(\frac{1}{1 + \varepsilon_x/\eta_m}\right)\left(\frac{1}{1 + \varepsilon_s/\eta_D}\right) \cdot t$$

The elasticity of import demand can be shown to equal:

$$(7\text{-}2) \quad \eta_m = \frac{Q_D}{Q_m} \cdot \eta_D + \frac{Q_s}{Q_m} \cdot \varepsilon_s \qquad [1]$$

η_m depends upon the domestic demand and supply in elasticities and the relative size of imports to domestic consumption and production in the importing country.

Under the assumption that trade is balanced $Q_D = Q_s$, the equation becomes:

$$\eta_m = \frac{Q_D}{Q_m} (|\eta_D| + \varepsilon_s)$$

---

[1] Proof of formula,

Q_D = domestic consumption;

Q_s = domestic production;

Q_m = imports.

$$\eta_m = \frac{P}{Q} \cdot \frac{dQ}{dP} = \frac{-P}{Q_D - Q_s} \cdot \frac{d(Q_D - Q_s)}{dP} = \frac{P}{Q_D - Q_s} \cdot \frac{dQ_D}{dP} - \frac{P}{Q_D - Q_s} \cdot \frac{-dQ_s}{dP}$$

$$= \frac{\frac{-P}{Q_D} \cdot \frac{dQ_D}{dP} \cdot Q_D}{Q_D - Q_s} + \frac{\frac{P}{Q_s} \cdot \frac{dQ_s}{dP} \cdot Q_s}{Q_D - Q_s}$$

$$= \frac{Q_D}{Q_m} \eta_D + \frac{Q_s}{Q_m} \varepsilon_s$$

Source, M.E. Kreinin, "Price Elasticities in International Trade," Review of Economics and Statistics, XLIX (November, 1967).

Likewise the export supply elasticity of another country can be shown to equal

$$(7\text{-}3) \quad \varepsilon_x = \frac{Q_D}{Q_x} \cdot |\eta_{D_x}| + \frac{Q_s}{Q_x} \cdot \varepsilon_{s_x} \qquad [2]$$

The export supply elasticity depends upon the domestic demand and supply elasticities in the exporting country and the relative size of exports to domestic consumption and production.

Under the assumption that trade is balanced $Q_D = Q_s$, the equation becomes:

$$\varepsilon_x = \frac{Q_D}{Q_x} (|\eta_{D_x}| + \varepsilon_{s_x})$$

On the assumption that the domestic demand and supply elasticities are the same in both the importing and exporting

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[2] Proof of formula, supplied privately by Kreinin

$$\varepsilon_x = \frac{P}{Q} \cdot \frac{dQ}{dP} = \frac{P}{Q_s - Q_D} \cdot \frac{d(Q_s - Q_D)}{dP}$$

$$= \frac{\frac{P}{Q_s} \cdot \frac{dQ_s}{dP} \cdot Q_s}{Q_s - Q_D} + \frac{\frac{P}{Q_D} \cdot \frac{dQ_D}{dP} \cdot Q_D}{Q_s - Q_D}$$

$$= \frac{Q_s}{Q_x} \varepsilon_s + \frac{Q_D}{Q_x} \eta_D \text{ , where } Q_x = \text{exports or } (Q_s - Q_D).$$

country, the equation for the percentage change in price becomes:

$$(7\text{-}4)\quad \frac{\Delta P}{P} = \left(\frac{1}{1 + \frac{\frac{Q_D}{Q_x}(\eta_D + \varepsilon_s)}{\frac{Q_D}{Q_m}(\eta_D + \varepsilon_s)}} \right) \left(\frac{1}{1 + \frac{\varepsilon_x}{\eta_D}} \right) \cdot t$$

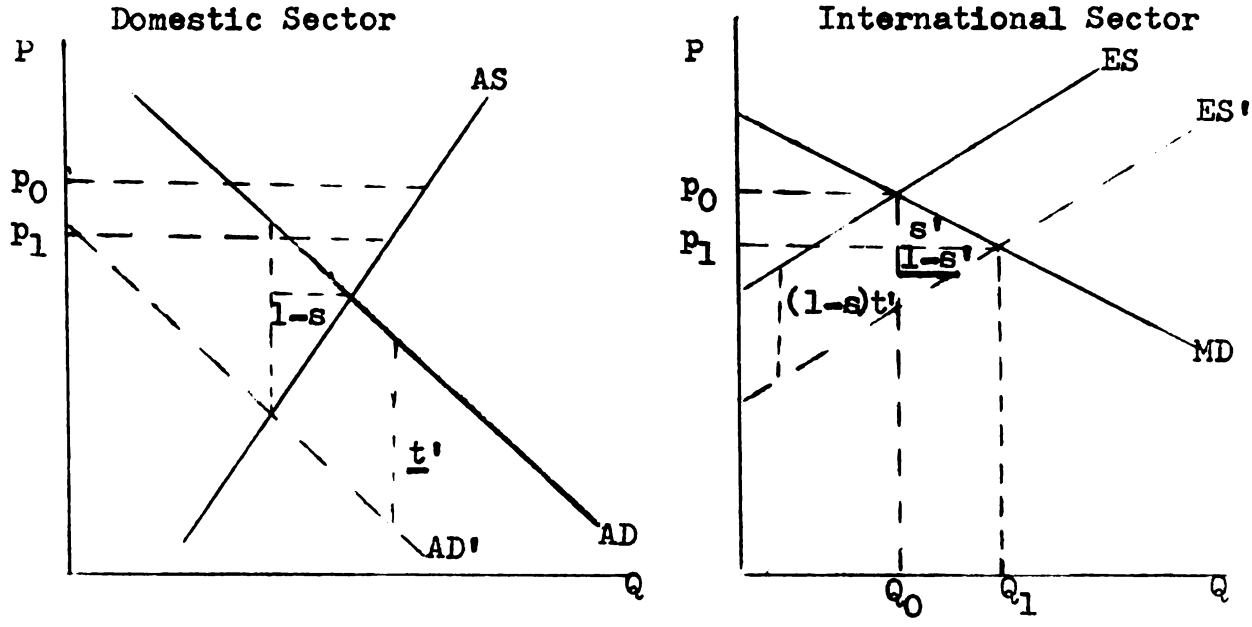
$$\frac{\Delta P}{P} = \left(\frac{1}{1 + \frac{\frac{Q_D}{Q_x}}{\frac{Q_D}{Q_m}}} \right) \left(\frac{1}{1 + \frac{\varepsilon_s}{\eta_D}} \right) \cdot t;$$ where $\frac{Q_D}{Q_m}$ refers to the importing country and $\frac{Q_D}{Q_x}$ to the exporting.

For all situation, the percentage change in quantity can be estimated from:

$$(7\text{-}5)\quad \frac{\Delta Q}{Q} = \frac{\Delta P}{P} \cdot \varepsilon_x$$

c. The procedure for estimating the percentage change in the equilibrium export price with export rebates: In a similar manner, these formulae can be used to estimate the impact of domestic taxation and rebates upon the equilibrium export price. The same definitions of elasticities and shares are applicable here, where t' is the tax rate in the exporting country.

Fig. VII:G -- A comparison of an equilibrium pre-tax export price with one in which domestic taxes and exports rebates are used.



The use of domestic taxes with exemptions for the exporters encourages the supplying of exports at prices (1-s)t' below the pre-tax levels. Therefore, the vertical difference between the pre-tax export supply function and the post-adjustment schedule can be measured as (1-s)t'. The effects of this shift in the supply schedule are shared by consumers of the importing country and producers of the exporting country, where the consumers' share is equal to s'. The percentage change between the equilibrium pre-tax export price P_0 and the post adjustment export price P_1 is s'(1-s)t'.

Thus:

$$(7\text{-}6) \quad \frac{\Delta P}{P} = \left(\frac{\varepsilon_x}{|\eta_m| + \varepsilon_x}\right)\left(\frac{\eta_D}{\eta_D + \varepsilon_s}\right) \cdot t'$$

where η_D + ε_s are the domestic demand and supply elasticities in the exporting country.

The percentage change in quantity can be determined from:

$$(7\text{-}7) \quad \frac{\Delta Q}{Q} = \frac{\Delta P}{P} \cdot \eta_m$$

d. The formula for estimating the change in export values from border taxes or rebates: Once the percentage change in price is determined for either the border tax or the export rebate situation, the percentage change in the value of exports can be calculated from the formula:

$$(7\text{-}8) \quad \frac{\Delta V}{V} = (1 - \frac{\Delta P}{P})(1 - \frac{\Delta Q}{Q}) - 1.$$

See page 83 of this dissertation for proof of this formulation.

C. Estimation of the Effects of Border Adjustments on the U.S. and OECD Manufacturer's Balance of Trade

By using the formulae developed above, estimates can be made of the changes in international trade flows caused by border adjustments for consumption taxes. Since border adjustments are currently employed for these taxes, the estimates will be for actual changes in trade flows rather than for hypothetical changes as estimated for corporate income and employers' social security taxes. The analysis here will treat all members of the OECD, other than the United States, as one group rather than as separate members, because the only empirical estimates of export supply elasticities apply to

the OECD as a whole. This group will hereafter be referred to as the OECD. Unlike the analysis of the impact of possible border adjustment for the corporate income and social security taxes, there is no matrix of trade flows considered here but only the trade between United States and the OECD.

The analysis will be divided in two parts. The first step will consider the impact of OECD rebates and United States border taxes upon OECD exports (which are the same as United States imports). The second part will consider the impact of United States rebates and OECD border taxes upon United States exports (which are the same as OECD imports). The conclusions of both parts will be combined to determine the actual impact on the balance of trade of the United States and the OECD.

1. The Impact of Border Adjustments upon OECD Exports or U.S. Imports

In considering the impact of border adjustments on European exports, it is necessary to know how much OECD rebates have encouraged exports and how much the U.S. border taxes have discouraged the consumption of OECD products. In order to make numerical estimates, the OECD and U.S. domestic and international elasticities of supply and demand must be known. Likewise, the OECD and U.S. tax rates must be established.

a. Estimates of domestic demand elasticities: According to recent studies, the price elasticity of domestic demand for consumer durables (and some producer goods) is in

the neighborhood of unity.[3] This estimate is very plausible for total demand because any elasticity value less than unity implies that total consumption and the average propensity to consume must increase as prices rise. For the purposes of this analysis it will be assumed that both the OECD and United States domestic demand elasticities are equal to one.

b. Estimates of import demand and domestic supply elasticities: Once again, the -4.1 estimate of Balassa and Kreinin[4] will be used as the value of the import demand elasticity of the U.S. There is no empirical estimate for the domestic U.S. supply elasticity, but a consistent value can be inferred from the manipulation of formula (7-2).

From that formula,

$$\varepsilon_s = \frac{\eta_m - Q_D/Q_m \, \varepsilon_D}{Q_s/Q_m}$$

Using the assumption of Balassa and Kreinin that the ratios of domestic consumption and production to imports are both equal to four in the U.S.,[5] the U.S. domestic supply elasticity is calculated to be .025. Since this calculated value of .025

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[3]Arnold Harberger, The Demand for Durable Goods (University of Chicago Press, 1960), p. 16.

[4]Bela Balassa and M. E. Kreinin (import demand elasticity of -4.1) from "Trade Liberalization Under the Kennedy Round," Review of Economics and Statistics, XLIX (May, 1967), p. 125.

[5]Balassa and Kreinin, op. cit., p. 128.

is sufficiently different from the .5 elasticity value arbitrarily assumed by Robert Stern[6] and the .8 elasticity value used by Bela Balassa,[7] this study will make separate calculations for each of the three values to test the sensitivity of the quantity of United States imports to domestic supply conditions.

c. Estimates of OECD export supply elasticity: There is also no direct estimate of OECD export supply elasticities, but their values may be inferred from two studies which attempt to assess the extent to which the benefit of tariffs reductions will be reaped by foreign producers in higher export prices. M. E. Kreinin[8] suggests that 1955 and 1956 tariff concessions were shared nearly equally by United States consumers and OECD producers. This means that the elasticity of United States import demand and OECD export supply must be roughly equal at about 4.1. A more recent study on the effects of the Dillon Round by Robert Goodman[9]

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[6]Robert M. Stern, "The U.S. Tariff and the Efficiency of the U.S. Economy," American Economic Review, Papers and Proceedings, LIV (May, 1964), pp. 459-79.

[7]Bela Balassa, Trade Liberalization among Industrial Countries (New York: McGraw-Hill, 1967), p. 58.

[8]M. E. Kreinin, "The Effects of Tariff Changes on the Prices and Volume of Imports," American Economic Review, LI (June, 1961), p. 317.

[9]Robert Goodman, "As Evaluation of the Effect of the Dillon Round on the Unit Value and Volume of United States Imports and Exports," (unpublished Ph.D. dissertation, Department of Economics, Michigan State University), p. 68.

suggests that 85 percent of the tariff reduction benefitted United States consumers in the form of lower prices, while European exporters absorbed 15 percent of the tariff cut. This means that the OECD elasticity of export supply is equal to 23.2 and nearly six times larger than the import demand elasticity. In order to test the sensitivity of United States imports to foreign export supply conditions calculations will be made for each of the alternative OECD supply elasticities.

d. U.S. and OECD tax rates: In addition to the elasticities, it is necessary to know the tax rates employed in the OECD and the United States. For the United States, a 3 percent tax rate will be used because it is the average sales tax levied by the various states. An average tax rate of 10 percent will be used for the OECD since this is the tax rate that the EEC countries and Denmark are expected to utilize when the tax on value-added is fully adopted. The EEC countries have felt that a 10 percent tax on value-added will have the same tax yields as the current combinations of cascade taxes, and the same price effect as a single stage retail sales tax of 10 percent. For those countries employing single stage sales taxes rather than value-added taxes, the rates also center around 10 percent. The United Kingdom and Sweden employ a single stage retail sales tax of 10 percent on many consumer items such as clothing and furniture. Canada and Norway use a retail sales tax of 12 percent. Tax rates in Portugal, Switzerland, and Austria are lower than 10 percent but these countries play only a minor role in United States-OECD trade.

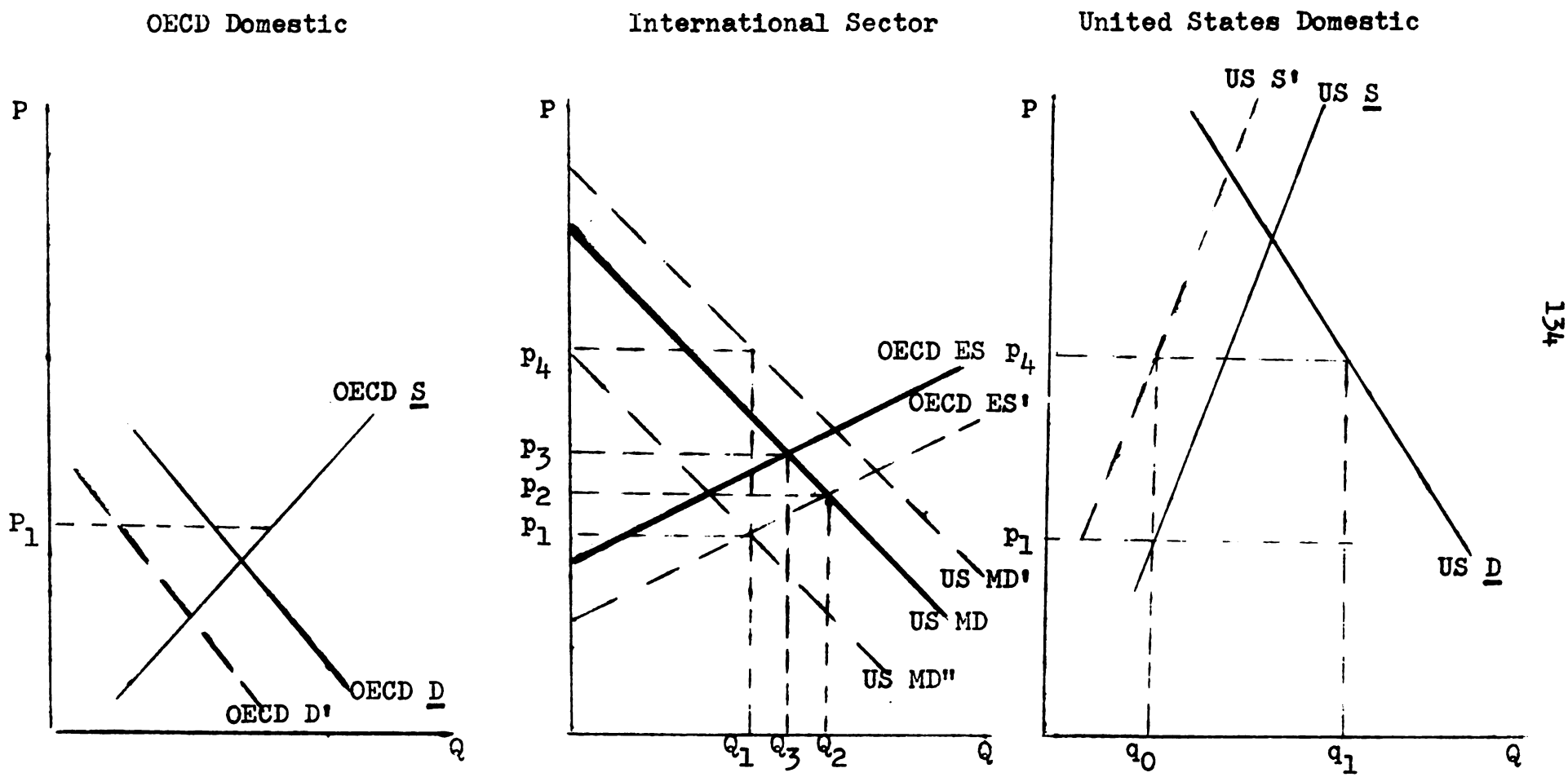
Japanese tax rates center around 20 percent, but since most are imposed at the manufacturer's level, the equivalent rate at the retail level must be significantly lower. Excise taxes are ignored in this analysis since the majority of them are imposed on non-manufactured products. In this analysis, it is assumed that exports are fully exempt from the sales or value-added tax.

With the elasticities and tax rates mentioned above, it is possible to calculate the extent to which trade flows have been affected by taxation policies. Because the procedure involves several steps, a diagram may help identify which export values the analysis attempts to determine.

In Fig. VII:H, the OECD domestic demand and export supply functions with domestic taxes and export rebates are OECD D' and OECD ES'. The pre-tax functions would be OECD D and OECD ES. The United States domestic supply and import demand functions with domestic and border taxes are U.S. S' and U.S. MD". The pre-tax functions would be U.S. S and U.S. MD.

Since border adjustments are currently used in both the OECD and the United States, it is necessary to trace backward to determine the possible pre-tax values. The current value of OECD exports is P_1Q_1. United States consumers pay P_4Q_1 for these exports because of the U.S. sales tax. The elimination of United States domestic and border taxes would raise equilibrium export sales to P_2Q_2. The elimination of OECD domestic taxes and rebates would further raise prices but lower volume to P_3Q_3.

Fig. VII:H — A comparison of the current border adjusted OECD export value with a pre-tax value.



While estimates of P_3Q_3 will be made for each of the six possible combinations of U.S. domestic supply and OECD export supply elasticities, the following analysis will trace the impact upon OECD exports for the case in which the U.S. domestic supply elasticity equals .025 and the OECD export supply equals 4.1. In making the calculations, the particular elasticity values are assumed to be constant over the range of price changes considered in the analysis.

e. The impact of eliminating U.S. domestic and border taxes: The 1967 OECD export value, P_1Q_1, was $13,623.5 (in millions). Elimination of United States sales and border taxes would raise the export value to P_2Q_2.

The estimated percentage change in the value of exports between P_1Q_1 and P_2Q_2 ($\Delta V/V$) can be easily determined by substituting the appropriate values of $\Delta P/P$ from equation (7-1), and $\Delta Q/Q$ from equation (7-5) into equation (7-8). An elimination of a border tax will increase both prices and quantities.

$$\frac{P_1-P_2}{P_1} = \left(\frac{\eta_m}{\eta_m + \varepsilon_x}\right)\left(\frac{\eta_D}{\eta_D + \varepsilon_s}\right) \cdot t$$

With the assumed elasticities this becomes:

$$\frac{\Delta P}{P} = \left(\frac{4.1}{4.1+4.1}\right)\left(\frac{1}{1+.025}\right) \cdot .03 = 0.0146 = 1.46\%$$

$$\frac{\Delta Q}{Q} = \frac{\Delta P}{P} \cdot \varepsilon_x = .0146 \cdot 4.1 = .0598 = 5.98\%$$

$$\frac{\Delta V}{V} = (1+.01)(1+.0598) - 1 = .075 = 7.5\%$$

TABLE VII:1 — Estimated price, quantity, and values changes plus new total value of 1967 OECD exports assuming U.S. pre-tax conditions

OECD Export Supply Elasticity	U.S. Domestic Supply Elasticity	Percentage Change in Price ($\Delta P/P$)	Percentage Change in Quantity ($\Delta Q/Q$)	Percentage Change in Value ($\Delta V/V$)	Estimated Additional Value	Estimated $ Value of Total 1967 OECD Exports P_2Q_2 (in millions)
4.1	.025	1.46%	5.98%	7.5%	$1041.76	$14,665.26
4.1	.5	1.00%	4.1%	5.1%	$695.89	$14,318.39
4.1	.8	.82%	3.36%	4.2%	$572.28	$14,195.78
23.2	.025	.439%	10.18%	10.5%	$1430.56	$15,054.06
23.2	.5	.300%	6.96%	7.28%	$991.89	$14,615.39
23.2	.8	.246%	5.73%	5.98%	$841.78	$14,438.28

The estimated increase in the value of 1967 exports would be $2,031.7 in millions and the new total value of 1967 exports (P_2Q_2) would be $14,655.26 in millions. The estimated results of eliminating the U.S. domestic and border sales taxes for the example just illustrated and for the other five elasticities are summarized in the table on page 136.

f. The impact of eliminating OECD domestic tax and export rebates: The elimination of OECD domestic taxes and export rebates will change the value of OECD exports from P_2Q_2 to P_3Q_3. The percentage change in value ($\Delta V/V$) can be determined by substituting the appropriate estimates of $\Delta P/P$ from equation (7-6) and $\Delta Q/Q$ from equation (7-7) into equation (7-8). The elimination of OECD taxes and rebates will raise prices, but lower quantities.

$$\frac{\Delta P}{P} = \left(\frac{\varepsilon_x}{|\eta_m| + \varepsilon_x}\right)\left(\frac{\eta_{D_x}}{\eta_{D_x} + \varepsilon_{s_x}}\right) \cdot t'$$

Estimates for all elasticities except ε_{s_x} are available. ε_{s_x} can be inferred from equation (7-3) so that:

$$\varepsilon_{s_x} = \frac{\varepsilon_x - Q_D/Q_x \, \eta_{D_x}}{Q_P/Q_x}$$

The values of Q_D/Q_x and Q_P/Q_x are estimated to be equal to 2.5 for the OECD, by taking an average of individual member's ratios weighted by their exports to the United States.

Thus when

$$\varepsilon_x = 4.1, \quad \varepsilon_{s_x} = .6$$

and when $\varepsilon_x = 23.2$, $\varepsilon_{s_x} = 8.3$.

This analysis will trace the change in exports when $\varepsilon_x = 4.1$. With this information:

$$\frac{\Delta P}{P} = \left(\frac{4.1}{4.1+4.1}\right)\left(\frac{1}{1+.6}\right) \cdot .10 = .031 = 3.1\%$$

$$\frac{\Delta Q}{Q} = \frac{\Delta P}{P} \cdot \eta_m = .031 \cdot -4.1 = -.1271 = -12.71\%$$

$$\frac{\Delta V}{V} = (1 + \frac{\Delta P}{P})(1 - \frac{\Delta Q}{Q}) - 1 = -.1001 = -10.01\%$$

The change in the value of OECD exports with no OECD taxation or rebates, when the U.S. domestic supply elasticity equals .025, would be $1,458.0 in millions and the new estimated value of exports P_3Q_3 would be $13,197.24 in millions. The estimated results of eliminating the OECD domestic taxes and export rebates for the example just illustrated and for the other five elasticities are summarized in Table VII:2.

The summarized results indicate that the OECD export supply elasticity is very important in determining whether the use of rebates has benefited OECD exports. If the supply elasticity is only 4.1, the use of border adjustments can help the exporter because the rebates tend to subsidize him. Column 5 illustrates that in the three cases in which the OECD elasticity is 4.1, estimated pre-tax exports would be

TABLE VII:2 -- Estimated effect on price, quantity and value of OECD exports of the elimination of OECD rebates and domestic taxes*

OECD ε_x	U.S. ε_s	(1) Percentage Change in Price $\frac{P_3-P_2}{P_2}$	(2) Percentage Change in Quantity $\frac{Q_2-Q_3}{Q_2}$	(3) Percentage Change in Value $\frac{P_2Q_2-P_3Q_3}{P_2Q_2}$	(4) Estimated Change in Value	(5) Estimated New Value of OECD Exports (P_3Q_3) (in millions)	(6) Percentage Change From Current Value* (P_1Q_1) to (P_3Q_3)
(4.1)	.025	+3.1%	-12.71%	-10.01%	-$1468.02	$13,197.24	-3.2%
	.5	+3.1%	-12.71%	-10.01%	-$1433.18	$12,885.21	-5.5%
	.8	+3.1%	-12.71%	-10.01%	-$1420.90	$12,774.88	-6.3%
(23.2)	.025	+ .891%	- 3.65%	- 2.80%	- $421.42	$14,632.64	+7.4%
	.5	+ .891%	- 3.65%	- 2.80%	- $409.14	$14,206.25	+4.2%
	.8	+ .891%	- 3.65%	- 2.80%	- $404.18	$14,034.10	+3.0%

*Current value: $13,623.5 millions.

smaller than the current OECD exports of $13,623.5. For the cases in which the OECD export supply elasticity is considered to be very high at 23.2, the table indicates that exports would actually be greater if no domestic taxes and rebates had been applied. The fact that border adjustments offer little subsidy to exporters when supply elasticities are large should be kept in mind by U.S. exporters since the U.S. export supply function generally is assumed to be very elastic.

2. The Impact of Border Adjustment upon United States Exports or OECD Imports

In order to complete the assessment of the effect of border adjustments on U.S.-OECD trade, the impact on OECD imports (U.S exports) must be determined. The analysis will be the same as the previous one, except that now the U.S. is viewed as exporter and the OECD as importer.

a. Estimates of elasticities and tax rates: In making the calculations of the impact of rebates and border taxes on United States exports, the same domestic demand elasticities and tax rates are used as in the preceding analysis. The United States export supply elasticity is assumed to be infinite since exports form such a small percentage of United States production. The OECD import demand elasticity taken to be 2.5. This is the weighted average of the separate import demand elasticities of the EEC, EFTA, Canada, and Japan used elsewhere in this dissertation; where the individual member's share in OECD imports from the United States were used as weights. The values of .025, .5, .8 will be used for the

OECD domestic supply elasticities. The values of .5 and .8 are consistent with the .6 domestic supply elasticities estimated from the OECD export supply elasticity on page 138. The estimate of .025, calculated from the import demand elasticity equation (7-2), can be viewed as a short-run supply elasticity, particularly applicable in times of full employment. The domestic supply elasticity of 8.3, calculated from the export supply elasticity estimated by Robert Goodman, can be viewed as the long-run supply elasticity. From economic analysis and empirical studies,[10] it is expected that the elasticity of supply will become higher as longer time periods are considered. Calculations will be made for each of the three values (.025, .5, and .8) to test the sensitivity of OECD imports to the domestic supply conditions.

With these values of elasticities and tax rates, it is possible to estimate the extent to which U.S. exports have been affected by domestic and foreign tax policies. Because the procedure involves several steps, a diagram may help identify which pre-tax export values the analysis attempts to determine.

In Figure VII:I, the OECD domestic supply and import demand schedule, with domestic and border taxes are OECD S' and OECD MD'. With an elimination of these taxes, the schedules would become OECD S and OECD MD. The United States export

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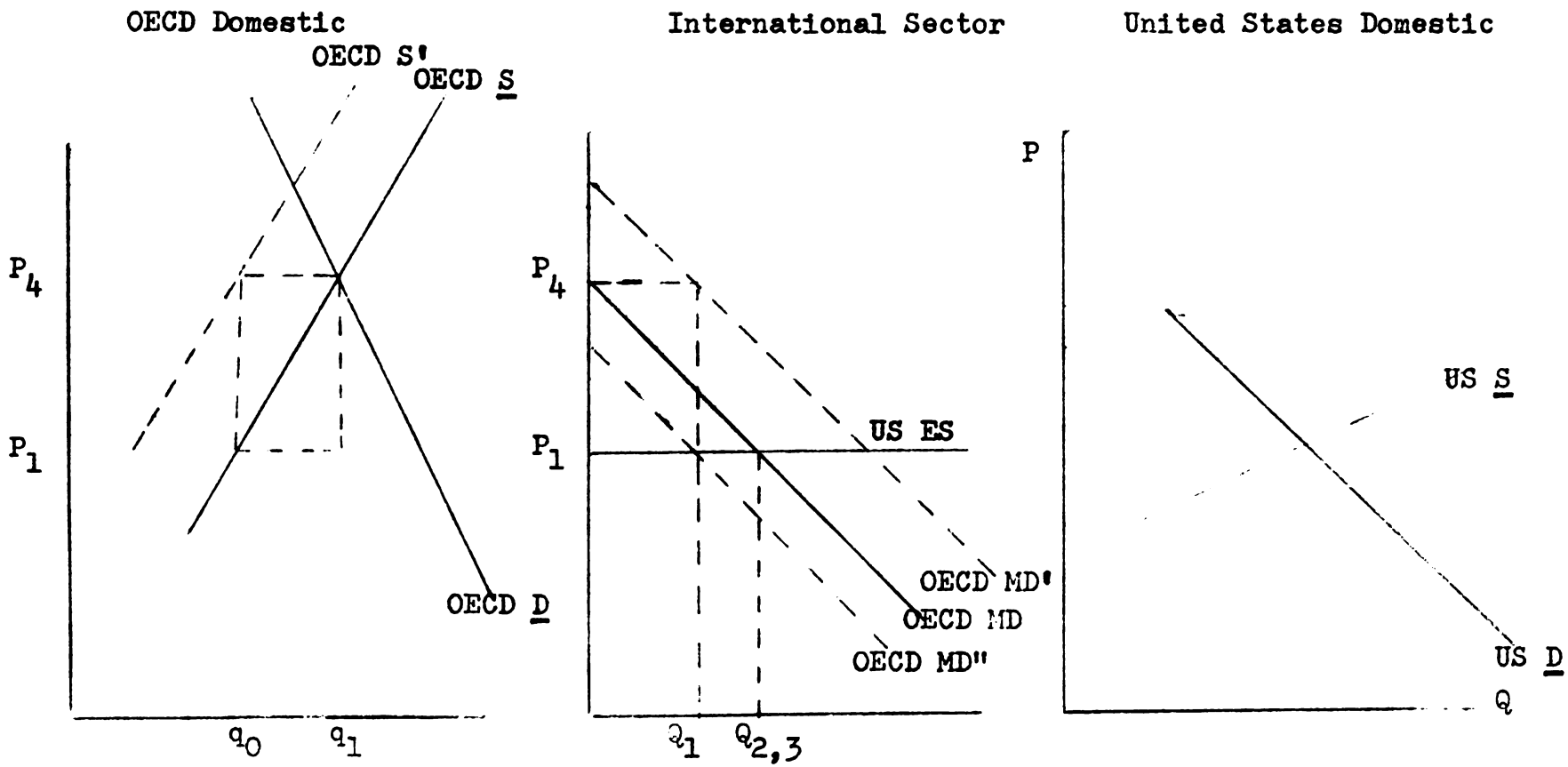
[10]Goodman's high elasticity of supply was estimated from data covering a five year span, while Kreinin's lower estimate was based on data covering two and four year periods. Their methods of analysis were the same.

Fig. VII:I — A comparison of the current border adjusted U.S. export value with a pre-tax value.



supply schedule is illustrated by U.S. ES. This schedule applies whether U.S. domestic taxation and rebates occur or not.

The current value of U.S. exports to the OECD is P_1Q_1. OECD pays P_4Q_1 for these exports because of OECD border taxes. The elimination of OECD domestic and border taxes would increase U.S. exports to P_1Q_2. Since the elimination of U.S. domestic taxes and rebates would not affect the U.S. export supply schedule, P_1Q_3 would be identical with P_1Q_2.

While P_1Q_3 values will be estimated for each of the three OECD domestic supply elasticities, the descriptive analysis will trace the impact of OECD border taxes only for the case in which the domestic supply has an elasticity of .025.

b. Estimates of the impact of eliminating OECD domestic and border taxes: In 1967, the value of U.S. exports (P_1Q_1) to the OECD was $11,575.0 million. As was shown in Fig. VII:I, the elimination of OECD domestic and border taxes would not affect the price of U.S. exports P_1, but it would increase the volume. Estimates of this change in volume ($\Delta Q/Q$) can be made by utilizing the information on the OECD domestic producers' share of domestic taxation. From the analysis earlier in this chapter, it is known that their share is equal to (1-s)t and that the vertical distance between OECD MD" and OECD MD is also equal to (1-s)t. An elimination of OECD domestic and border taxes would raise the "effective" import demand curve by (1-s)t and increase volume by $(1-s)t \cdot \eta_m$.

$$\frac{\Delta Q}{Q} = (1-s)t \cdot \eta_m =$$

$$\frac{\Delta Q}{Q} = \frac{\eta_D}{\eta_D + \varepsilon_s} \cdot t \cdot \eta_m = \frac{1}{1+.025} \cdot .10 \cdot 2.5 = .244 = 24.4\%$$

$$\frac{\Delta V}{V} = (1 + 0)(1 + \frac{\Delta Q}{Q}) - 1 = .244 = 24.4\%$$

The estimated change in the value of U.S. exports would be $2,824.0 and the new value of exports (P_1Q_2) would be $14,399.4. The following table illustrates the impact on U.S. exports (OECD imports) for each of the three domestic supply elasticities, after the elimination of the OECD border tax.

TABLE VII:3 -- Estimated change in quantity and value of exports and new total value of U.S. exports if OECD border taxes were eliminated

U.S. Supply Elasticity	OECD Domestic Supply ε_s	Increase in OECD Import Demand	%ΔP/P	%ΔQ/Q and %ΔV/V	Estimated Additional U.S. Exports	P_1Q_2 Estimated New Value of U.S. 1967 Exports (in millions)
∞	.025	9.75%	0	24.40	$2824.4	$14,399.4
∞	.5	6.6%	0	16.75	$1938.9	$13,513.9
∞	.8	5.6%	0	14.00	$1620.5	$13,195.5

The level of the OECD domestic supply elasticity plays an important role in the effect of OECD border taxes on U.S. exports. If the domestic supply elasticity of OECD producers in import-competing industries is very low, the imposition of border taxes reduces the demand for imports greatly. If the

OECD domestic supply elasticity is as small as .025, the U.S. would experience nearly a 25 percent loss in estimated pre-tax exports; if the supply elasticity approaches unity, the loss would be much smaller.

c. The impact of eliminating U.S. domestic taxes and rebates: An elimination of the United States sales taxes and rebates would have no deleterious effects on the United States exports because of the infinite elasticity of the United States export supply function. With an export supply function that is infinite, the taxation of domestic sales alone provides no stimulus to exports; conversely, the elimination of such policies should have no significant impact. Thus the sole impact of a change in both United States and OECD taxation policies would be the increase in OECD imports arising from the elimination of OECD border taxes.

3. Estimated Impact on the Balance of Trade if Domestic Consumption Taxes and Border Adjustments were Eliminated

The estimated effects of the elimination of domestic consumption taxes and border adjustments are shown in the Table VII:4 for the various elasticity combinations. The table clearly indicates that the amount of improvement in the United States balance of trade position, with elimination of domestic taxes and border adjustments, depends upon the relationship between the domestic supply elasticities of the United States and those of the OECD. If the OECD supply elasticities are .025 for domestic sales and 4.1 for exports, while the United States domestic elasticity is .8, the United States would enjoy

TABLE VII:4 — Estimated 1967 U.S. balance of trade, under various elasticities assumptions, when domestic taxation and border adjustment policies are eliminated. Dollar values in millions*

OECD ε_x	U.S. Domestic ε_s	Estimated U.S. Imports	OECD Domestic Supply Elasticities .025	.5	.8
			Estimated U.S. Exports $14,399.40	$13,513.9	$13,195.50
4.1	.025	$13,197.24	+$1,202.16[1]	+$316.66	-$1.74
4.1	.5	$12,885.21	+$1,514.19	+$628.79	+$370.29
4.1	.8	$12,774.88	+$1,624.62	+$739.05	+$421.62
23.2	.025	$14,623.64	-$233.24	-$1,118.74	-$1,437.14
23.2	.5	$14,206.25	+$193.15	-$692.35	-$1,010.85
23.2	.8	$14,034.10	+$365.30	-$520.20	-$838.60
			Estimated U.S. Balance of Trade		

*In 1967 the actual balance of trade was $2,048.5 millions.

[1]Explanation: +$1,202.16 was obtained by subtracting the estimated value of 1967 U.S. imports from the estimated value of U.S. exports, under pre-tax conditions, for the OECD and U.S. domestic supply elasticities of .025 and the OECD ε_x of 4.1. In other words, it is ($14,399.40 - $13,197.2). Other values in the estimated balance of trade were obtained in a similar manner for various elasticity assumptions.

the greatest improvement in its balance of trade. This would occur because the elimination of U.S. border taxes would do little to stimulate its imports, and at the same time, the elimination of OECD border taxes would stimulate U.S. exports by nearly 25 percent. The $2,048.5 million deficit would be replaced by a $1,624.62 million surplus. If both OECD and U.S. supply elasticities are equal to .025 the improvement in the United States balance of trade would still be substantial. The $1,202.16 U.S. surplus could occur under short run conditions when supply elasticities are small. In the opposite extreme (OECD ε_x = 23.2, ε_s = .8, U.S. ε_s = .025), the U.S. would experience only a small improvement in its balance of trade from an elimination of taxation policies; i.e. the cut in the deficit would be only $600 million. With a .8 OECD supply elasticity the elimination of OECD border taxes would increase U.S. exports by $1,620 million because the current OECD effective import demand function is only (1-s)t or 5.6 percent below a non-taxed import demand function. At the same time, with a U.S. supply elasticity of .025 the elimination of the U.S. border taxes would stimulate import demand by nearly $1,000 million so that the net gains would not be overwhelming. If, as OECD ε_x = 23.2, domestic supply elasticities were both equal to .8, the deficit would be smaller but not eliminated. The -$838.64 deficit can be viewed as the long run position when elasticities are high.

While it is difficult for this author to hypothesize about the appropriate elasticity values, it does seem reasonable to

assume that United States and OECD elasticities are similar, since the two are comparable in size. Given the infinite elasticity of United States export supply, it seems plausible that the United States domestic supply elasticity should be as large as .8. If this value applies to the OECD as well, there is consistency with the estimate of .6 obtained by manipulating the formula for the OECD export supply elasticity of 4.1. If the OECD export supply elasticity is equal to 4.1 and the domestic supply elasticities are equal to .8, the deficit in the United States balance of trade would be replaced by a small surplus if domestic taxation and border adjustments were abandoned.

This study has estimated the possible trade flows of the United States and OECD if no domestic consumption taxes and border adjustments existed. It is these trade flows that the GATT considered "neutral" and hoped to preserve by its border policies. While this analysis has considered the elimination of domestic taxes and border adjustments to achieve this neutrality, the same objective could be assured if countries would make border adjustments at rates below the domestic rates of taxation. For example, if the OECD domestic supply elasticity is equal to .8, and tax rates are 10 percent, a border tax of 4.4 percent is sufficient to eliminate any substitution effects and maintain the import demand at pre-tax levels. Likewise, with an export supply elasticity of 4.1 in the OECD, only a 5.5 percent tax should be rebated if no subsidizing is to occur. (Ironically, the 6 percent to 7 percent rates at which border adjustments were imposed in the EEC under the cascade system

probably did less to distort trade flows than the new fully adjusted rates will do.) The problem in attempting to determine the border adjustment rates which maintain neutrality is that the actual elasticities of import demand, domestic demand and domestic supply must be known. These elasticities, particularly the last one, are difficult to estimate. Furthermore, since it is likely that the elasticities of demand and supply are different for each member country of the OECD and for each industry within a country, different border taxes would have to be imposed on each product to insure "true" neutrality. The administrative problems involved in such a procedure would far outweigh the gains, and would probably lead to an actual decrease in the volume of international trade. A better approach may be to suggest that all countries use similar tax rates, so that no border adjustments need to be made. Since the prices of imports and exports would be equally affected by this system, no country's balance of trade should suffer.[11]

D. Welfare Effects of Border Adjustments

Having analyzed the balance of payments effects of the border adjustments for consumption taxes, it may be interesting to explore their welfare implications. While the following illustration will utilize only one set of elasticity values, the analysis can be applied to all sets of elasticities considered above. The elasticities that will be employed here are

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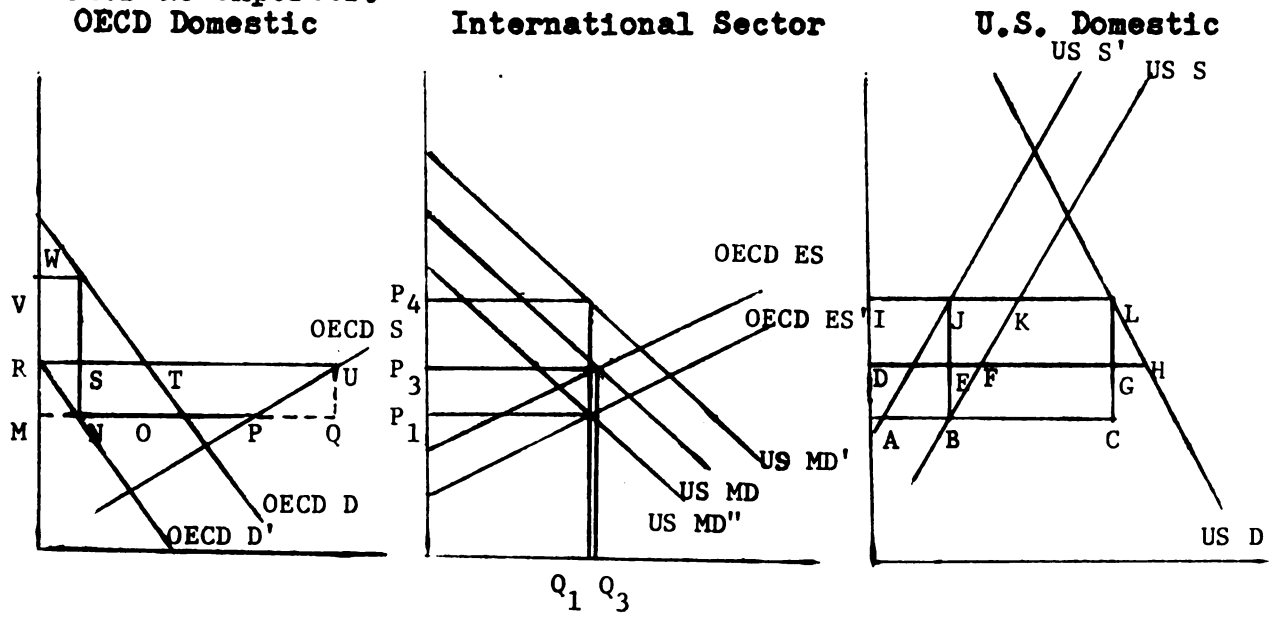
[11]The United States could adopt a 10 percent consumption tax without increasing government revenues by simply lowering its personal income tax rates.

U.S. and OECD domestic demand = 1; U.S. and OECD domestic supply = .8. The international elasticities are United States import demand = 4.1 and OECD export supply = 4.1. U.S. tax rate equals 3 percent and OECD tax rates average 10 percent.

Fig. VII:J -- Welfare effects for U.S. as importer and OECD as exporter.



The net welfare gains (or losses) for each of the two trading areas will be assessed by comparing a pre-tax situation with a post border adjustment condition. If no taxes were employed in either the U.S. or the OECD, the value of OECD exports would be P_3Q_3. The volume of exports would equal TU in the OECD, which equals the volume of imports in the United States FH. With the use of border adjustments and domestic taxes, the export value is P_1Q_1. For this quantity of imports, United States citizens pay P_4Q_1, with $(P_4-P_1)Q_1$ going to various state governments in taxes. The area $(P_4-P_1)Q_1$ is equal to JLCB. The state governments also receive LJBA in tax revenue

from the sale of domestic products; total government revenue is ILCA. The imposition of domestic taxes and border adjustments reduces the Marshallian consumer surplus by ILHD. Since much of this reduction (ILGD) is included in the gains of government revenue, the net loss in consumer welfare is the triangle LGH. The loss in producers surplus (DFBA) is also offset by gains in government revenue. The net gain in welfare from government revenue is FGCB. To determine whether the United States has experienced a net welfare gain or loss, LGH must be compared in size with FGCB (which equals EGCB - EFB).

At the same time, the welfare losses can be measured in the OECD. The imposition of domestic and border taxes can only result in a loss of welfare because there are no areas of gain. Under the taxation policies, the export volume is reduced from TU to NP. Producers' surplus is cut by RUPM; at the same time, consumers' surplus is cut by VWST. The OECD government absorbs VWNM from taxation of sales of OECD domestic products. The net reduction in producers' surplus is thus SUPN and the net reduction in consumers' surplus is WTS. The total welfare loss is WTUP. The portion of loss represented by TUPO can be determined by estimating TUQO and subtracting the triangle UQP.

From the elasticity information listed above, the following results were obtained:

<u>For the United States as importer</u>: $ values in millions

1. P_1Q_1 (OECD exports with border adjustments) = $13,623.5.

2. JLCB (value of U.S. tax collected on imports from OECD) $= t \cdot P_1Q_1 = \frac{P_4-P_1}{P_1} \cdot P_1Q_1 =$ **$408.71.**

3. $JLGE = \frac{(P_4-P_3)/P_3}{P_4-P_1} (P_4-P_1)Q_1$ where

$\frac{P_4-P_3}{P_3} = s(1-s')t$ and

$P_4-P_1 = t$

$= s(1-s') \cdot (P_4-P_1)Q_1 = .22 \cdot \$408.71 =$ **$90.91.**

4. $LGH = 1/2 \cdot \Delta Q/Q \cdot JLGE$ where $GH = \Delta Q/Q = \frac{P_4-P_3}{P_3} \cdot \eta_D$

$= 1/2 \cdot s(1-s')t \cdot \eta_D \cdot JLGE = 1/2 \cdot .0066 \cdot 1 \cdot \$90.91 =$ **$0.30.**

5. $EGCB = ILCB - JLGE = \$408.71 - \$90.91 =$ **$317.80.**

6. $EFB = 1/2 \cdot \frac{P_3-P_1}{P_3} \cdot \varepsilon_s$ $EGCB = 1/2 \cdot .0234 \cdot .8 \cdot \$317.80 =$ **$2.97.**

7. $FGCB = EGCB - EFB = \$317.80 - \$2.97 =$ **$314.83.**

8. Welfare gain of the United States as importer = FGCB - LGH = $314.83 - $.30 = **$314.53 million.**

For the OECD as exporter:

1. P_3Q_3 (OECD exports without tax) = $12,774.88.

2. $TUGO = \frac{P_3-P_1}{P_3} \cdot (P_3Q_3) = .0234 \cdot \$12,774.88 =$ **$298.93.**

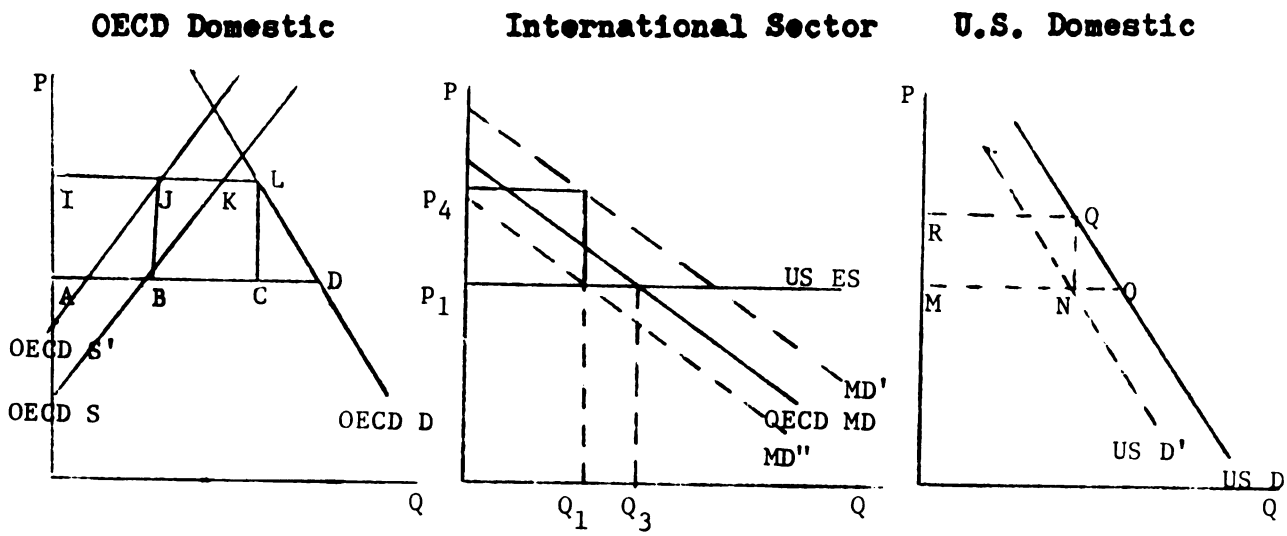
3. $UQP = 1/2 \cdot \frac{P_3-P_1}{P_3} \cdot \varepsilon_{s_x} \cdot TUQO = 1/2 \cdot .0234 \cdot .8 \cdot \$298.05 = \underline{\$2.68}.$

4. $STON = 1/2 \cdot \frac{P_3-P_1}{P_3} \cdot \eta_D \cdot TUQO = 1/2 \cdot .0234 \cdot 1 \cdot \$298.05 = \underline{\$34.87}.$

5. $WST = 1/2 \cdot (t_{OECD} - \frac{P_3-P_1}{P_3}) \cdot STON = 1/2 \cdot .0866 \cdot \$34.87 = \underline{\$1.48}.$

6. OECD welfare loss as exporter: TUQO - UQP + STON + WST = \$298.05 - \$2.68 + \$34.87 + \$1.48 = \underline{\$331.72}.

Fig. VII:K — Welfare effects of OECD border taxes.



The pre-tax U.S. exports to the OECD would be P_1Q_3. With the imposition of domestic and border taxes in the OECD, the

value of exports would be P_1Q_1, but OECD importers would pay P_4Q_1. The amount of tax revenue from the sale of imports is $(P_4-P_1)Q_1$ of JLCB. The increase in government revenue in domestic sales is IJBA, making the total gain in government revenue ILCA. Since the loss in consumers' surplus is ILDA, the net loss in welfare is LCB. There is no change in producers' surplus.

With an export supply function of infinite elasticity, the only change in United States welfare is the loss in consumer surplus caused by domestic taxation, amounting to RQOM. But since the government absorbs RQNM in revenue, the net loss is QNO. With an infinite export supply elasticity, there appears to be no way of determining QNO, without knowing RQMN.

The value of LCD, however, can be determined as follows:

1. P_1Q_1 (U.S. exports for 1967) = $11,575.0 million.

2. $JLCB = \frac{P_4-P_1}{P_1} \cdot (P_1Q_1) = .10 \cdot 11,575.0 = \underline{\$1,157.5}$.

3. OECD welfare loss as importer: $LCD = 1/2 \cdot \frac{P_4-P_1}{P_1} \cdot \eta_D \cdot JLCB = 1/2 \cdot .10 \cdot 1 \cdot \$1,157.5 = \underline{\$57.87}$ million.

4. OECD welfare loss as exporter and importer = $331.72 + $57.87 = $\underline{\$389.59}$.

5. U.S. welfare gains = $\underline{\$314.53}$.

6. Net loss in world welfare (U.S. - OECD) = $\underline{\$75.06}$ milion.

The discussion of the welfare changes showed that the U.S. has experienced welfare gains as an importer whereas the OECD has experienced a welfare loss. The source of the United States' gains is the reduction in the OECD export supply price occurring because tax policies are applied to a less than infinitely elastic export supply function. Because foreign supply prices are lowered with export rebates, the U.S. experiences welfare gains from government revenue (FGCD) that can offset the losses in consumers' surplus (LGH). On the other hand, rebates do not lower U.S. export prices and the OECD countries do not enjoy any net gain in government revenue to offset their loss in consumers' surplus. Thus the less elastic the foreign supply function, the more advantage to welfare under border adjustments policies.

CHAPTER VII

CONCLUSION

This dissertation has attempted to determine whether the current GATT policies toward border adjustments have been theoretically correct and whether any country, particularly the United States, has suffered under these policies.

The analysis has considered the theoretical justification of the GATT's policies towards both taxes which are eligible for border adjustments and those which are ineligible. The analytical discussion in Chapter II of the incidence of consumption taxes indicated that some border adjustments are theoretically justified for these taxes. The discussion also demonstrated, however, that border adjustments for the full amount of the domestic taxes will distort international trade flows if the elasticities of import demand and export supply are less than infinite. In those cases, rebates will expand exports above pre-tax levels, and border taxes will reduce imports below those levels. Since the comparisons of tax structures in Chapter III failed to reveal the extent to which exports have been expanded and imports curtailed, supply and demand analysis was used in Chapter VII to measure these amounts. The analysis of the actual trade flows between the United States and the OECD countries revealed that the United States balance of trade has suffered because of the current use of border adjustments for consumption taxes.

The source of the United States' problems has been the loss of exports caused by the high border taxes imposed on its products rather than the increase in United States imports resulting from OECD subsidies to its exporters.

The 10 percent tax rate imposed by the OECD countries has meant that United States exports have been curtailed by at least 14 percent and perhaps as much as 24 percent, depending upon the elasticity of the domestic OECD supply. On the other hand, U.S. imports have been increased only 2.8 percent because the OECD rebates its 10 percent tax on exports. As a consequence of the border adjustment policies, the deficit in the United States balance of trade is two to three times larger than it would have been with no taxation.

Unfortunately, eliminating the trade distortions caused by border adjustments for the full amount of consumption taxes is not a simple matter. As long as border adjustments are required, the only way they can be neutral is to impose border taxes at rates which will eliminate "substitution effects" and to permit border rebates at rates which will eliminate any "subsidy" to exports. The appropriate border tax and rebate rates would vary for every product depending on the relative elasticities of domestic demand and supply, and would create overwhelming problems. It seems more reasonable to suggest that all countries use similar rates of consumption taxes so that border adjustments would be unnecessary. Even though the volume of trade might diminish under such a scheme, all countries' exports would be taxed at the same rates, and so be equally affected.

In Chapter II, the analysis also considered the theoretical justification of the GATT prohibition of rebates taxes for the corporate income and social security taxes. If these taxes actually increase the costs of inputs, GATT is unjustified in not permitting border adjustments for them since they hamper the producers' ability to compete in world markets. In Chapters IV, V, VI consideration was made of the impact on world trade of permitting border adjustments for the two taxes. The analysis revealed that the EEC stands to gain the most from such a policy, since its social security tax rates are higher than those of all other countries. With full border adjustments, the EEC could increase its exports by 18 percent and improve its balance of trade position by 100 percent at the same time. On the other hand, the United States would experience a 8.5 percent loss in exports and a 53.5 percent worsening in its balance of trade position under this policy. Thus it appears that the United States has nothing to gain from insisting upon border adjustments for these taxes.

If it can be assumed that both consumption taxes and the corporate income or social security taxes affect producers' competitive positions, it is only reasonable to insist that GATT's border adjustment policies be consistent and apply to both sets. If border adjustments for the full amount of tax were extended to include the corporate income and social security taxes, the United States would not improve its competitive position on the world market.

It would continue to experience losses in exports to the OECD because of high consumption tax rates there; and it would experience additional losses in exports to all countries of the OECD except Canada because of the high border taxes imposed to equalize social security burdens. Using border adjustments for all taxes, while attempting to eliminate distortions, would create great administrative problems in determining the exact amounts of adjustment. Thus the use of border adjustments seems to have many drawbacks for the U.S.

If, on the other hand, border adjustments were eliminated altogether, countries would be pressured to adopt similar tax rates so that all products would be taxed equally. This procedure would minimize administrative problems and allow the "world market place" to act as a regulator of international trade flows.

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APPENDIX

APPENDIX

Japan

Of all the countries included in this study, Japan seems to have made mose extensive use of special tax allowances to encourage investment and exports. Japan has permitted the use of accelerated depreciation for all innovative and modernizing expenditure for industries such as the chemical and iron and steel industries which are considered to have high export potential.

Accelerated depreciations have been granted to corporations which raise the proportion of their total income arising from export sales. Income from the sale "important new products" has been exempt altogether from corporate income tax. The use of these special tax allowances seemed to have been one reason for the impressive modernization that has occurred in the Japanese economy.

EEC

The EEC countries have also made use of special depreciation and tax allowances to encourage economic growth. The EEC countries have used these special allowances primarily to encourage the location of industries in the lesser developed areas of the country rather than to specifically encourage exports.

In Germany, for example, accelerated depreciation was used after World War II to encourage reconstruction in all industries. Today, however, accelerated depreciation is only permitted in West Berlin and other remote locations.

France, on the other hand, still makes extensive use of accelerated depreciation allowances. In particular, any investment expenditure that has "research" implications is entitled to a 50 percent deduction in the first year. Purchase of buildings, equipment, stock of research corporations are all entitled to the 50 percent deduction. In addition, tax credits can be claimed for contributions to research organizations and for capital gains that are reinvested within three years.

Italy and the Netherlands both have made vigorous use of accelerated depreciation allowances. The Netherlands also employs an investment tax credit of 5 percent which can be claimed for two consecutive years. In 1959, Belgium passed the Expansion Laws which provided tax exemptions for new industries.

EFTA

Until 1955, Sweden employed the most radical approach to depreciation in which companies could choose any method they wanted as long as it was consistent with internal accounting methods. After 1955, depreciation was limited to 20 percent or 30 percent in the first year.

England has relied more on tax credits than accelerated depreciation to encourage investment. All investment expenditures are eligible for a 25 percent tax credit, while only capital outlays for research equipment are eligible for any accelerated depreciation.

The United States

The United States has not ignored special tax allowances. In addition to accelerated depreciation, the United States has permitted since 1962 a 7 percent investment tax credit. The tax credit permits 7 percent of the value of an investment project to be deducted from profits subject to tax.

Summary

In general it seems that only Japan has been so aggressive in its use of special tax allowances that it has actually improved its competitive position in the world.


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