RESEARCH REPORT

THE EFFECTS OF EXCHANGE RATES AND COMMERCIAL POLICY ON AGRICULTURAL INCENTIVES IN COLOMBIA: 1953-1978

Jorge García García

June 1981

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FOREWORD

Agricultural price policy is a widely recognized overt means of influencing agricultural production incentives, but its effects are complex. A number of researchers at the International Food Policy Research Institute (IFPRI) have examined the interplay between production incentives and consumer burdens, both in static and dynamic environments. Raisuddin Ahmed, P. S. George, Shubh Kumar, James Gavan, and Indrani Sri Chandrasekera have each treated particular aspects of these producer and consumer price effects in recent IFPRI publications. Work on other aspects is under way. Grant Scobie is completing a manuscript on domestic pricing policies and food imports in Egypt. Peter Hazell continues to study risk-uncertainty interactions with price policy. G. M. Desai and Mark Rosegrant deal with pricing policies for fertilizer and water, respectively. And Per Pinstrup-Andersen is analyzing several aspects of food pricing policy and its impact on low-income people. This report by Jorge García García treats a quite different and underemphasized aspect of agricultural price policy: the effect of foreign exchange and commercial policies that restrict imports and subsidize exports on domestic agricultural prices and production incentives.

In many countries these macro policies, which are often the product of broad development considerations, are the most important determinants of relative agricultural prices. Although these policies are basic to overall development strategy and to the balance between agricultural and industrial growth, their broader implications do lessen their importance to agriculture.

Jorge García García brings to bear on subject his broad experience as a sch and as deputy director of the Nati Planning Department of Colombia. His search report reflects careful inquiry substantial operational experience. Colon where trade protectionism has been part larly important during the past few deca is the subject of the report. However, analysis, both as an example of an analyt approach and in its conclusions, is applic to many developing countries. Altho García uses modeling extensively, a shi policy in Colombia during the period stu also allows historical comparison betwe period of stringent import displacement one of export promotion. Growth of dom agricultural production was much n vigorous during the latter period, as would expect from the modeling exer

If a period of rising real prices agricultural commodities emerges, as se likely, the conclusions drawn by García become increasingly relevant. For this rea IFPRI will pursue similar analyses for o countries. This work will be combined several other price policy-oriented proj to form the basis for a sounder price pc framework than is currently availabl policymakers.

John W. Mellor

Washington, D.C.
June 1981

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Finally, my greatest debt is to my wife, Patricia, who helped me throughout the research process by gathering, processing, checking, and proofreading. Had it not been for her, this research would still be far from finished.

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SUMMARY

This report studies the effects on incentives to agriculture of policies to encourage import substitution and export promotion in Colombia from 1953 to 1978. It shows how efforts to attain self-sufficiency in finished and semifinished manufactured products and in food production distorted incentives, favoring industrial activity over agriculture and, within agriculture, favoring food production over production of agricultural exports. Within industry there was also a distortion of incentives among different activities, but no effort is made here to measure that pattern. Exchange rates and commercial policy are examined to determine the level and structure of incentives between industry and agriculture and within the latter.

Agriculture is an important part of the gross national product and provides a large share of Colombia's foreign exchange earnings. It is a major source of employment and food. (Colombia is self-sufficient in food on the aggregate; wheat is the only major imported food product.) Therefore, a study of the incentives granted to agriculture not only must analyze what is commonly understood as agricultural policy, but must also analyze policies to promote other sectors that can affect agricultural incentives perhaps more than policies for specific crops.

To encourage import substitution in manufactured products, a protectionist blanket of tariffs and quantitative import restrictions was created that practically isolated domestic production from external competition. The exchange rate policy adopted was applied without regard to the movement of international prices and its relations with monetary and fiscal policies. It overvalued the Colombian peso considerably in some years. Restrictions were used mainly to solve balance-of-payments problems rather than to protect particular sectors.

The overvaluation of the Colombian peso made possible by trade restrictions was the equivalent of a tax on agricultural exports, some agricultural food products, incipient industrial exports, and some less protected branches of industry that could have produced substitutes for imports.

To determine how these different policies affect incentives for agriculture, the effects of general policies are analyzed first. The way import tariffs and export subsidies and taxes affect relations between the prices of exportable commodities, importable commodities, and commodities produced exclusively for domestic consumption is considered. The true surcharge imposed by the system of restrictions on importable commodities is measured, and the export incentives granted to coffee, other agricultural exports, and exports of manufactured products are calculated.

To measure the effect on prices of a system of tariffs and subsidies on imports and exports, a simple model that incorporates three main sectors—importable goods, exportable goods, and goods produced for domestic consumption only (nontraded goods)—is used. It concludes that an import tariff of, say, 10 percent leads to a fall in the price of exported commodities relative to nontraded goods of 9 percent. In other words, with the same amount of exports, an exporter can obtain 9 percent less of nontraded commodities.

To calculate the total surcharge on imports, the tariff equivalent of quantitative import restrictions is estimated. The import duties actually paid are added to them. To measure the tariff equivalent of restrictions, the demand for imports, which incorporates the effects of such restrictions, is estimated. The volume of imports is found to be at least 25 percent less than it would have been without restrictions, which means that those who are granted import licenses could impose a surcharge of about 50 percent, given the estimated values for the price elasticity of demand. The total surcharge reached 60 percent, on average, during the period 1956-68. After 1968 restrictions were eased. Import duties actually paid then became a better indicator of the surcharge on imports.

The last step in the analysis of the effects of general policies is to examine the structure of incentives for exports to establish whether they offset the indirect disincentives

of import tariffs and restrictions. The study shows that the incentives granted to all exports in the 1950s and 1960s were not enough to compensate for the taxation arising from the imposition of tariffs on imports. And although the subsidy granted to industrial exports in the 1970s offset such taxation, coffee and other agricultural exports continued to be taxed.

After analyzing the effects of general policies, the effects of policies for particular agricultural commodities are examined. Did the incentives from these policies for specific crops offset those arising from the more general policies? The nominal rate of protection (as measured by a direct comparison of domestic and international prices) for a group of agricultural commodities, mainly food products, is compared with the rate of overvaluation of the peso to establish which products received net protection. The findings of this study show that many food products received high rates of protection in the 1950s and 1960s, but that these rates fell in the 1970s and sometimes turned into a tax. Nominal rates reached more than 100 percent for milk, wheat, sugar, and vegetable oil, and ranged between 30 and 50 percent for corn, barley, and rice in the first two decades under study. During the 1970s only corn, milk, wheat, and vegetable oil received nominal protection, with rates between 25 and 50 percent. When overvaluation of the peso is taken into account, some food products still received net rates of protection in the 1950s and 1960s. The pattern changed in the 1970s when the net rates turned negative, as they did for barley, sugar, and rice.

The last analysis made in this report is of how price distortions stimulate the production of food. To examine this point, the model with three goods used to analyze the incidence of import tariffs is used. Because the results derived from this model are essentially analytical, not based on empirical estimations for specific crops, the results have to be taken with care.

The analytical model used to examine the effects of distortions on food production indicates that output would have increased by 1.2 percent at most. This is true if certain assumptions are made, such as that no technological change occurs and that price distortions—static and dynamic—have neutral effects on income.

However, it is unlikely that distortions of the size measured in this report did affect real income and technical chan Thus, the superior economic performa of Colombia after 1967 indicates that earlier trade regime probably did reduce rate of income growth. Had the authorit followed a less protectionist policy bef 1967, the country would have reache higher level of income and food producti than it did. In other words, price distortic reduced the potential output and consun tion of food by preventing real income fr increasing as much as it would have oth wise. If the rate of growth of food out between 1953 and 1967 had been the sa as between 1967 and 1978, food output 1967 would have been 10 percent higl than it actually was.

These results explain some patterns Colombia's past economic performan especially its agricultural performance. Tl have important implications for the des of economic policy.

The importance of a strategy to prom exports and the depressing effect a tariff on exportable goods points to the need keeping all tariffs low. If tariffs are as higl 30 percent, commodities with high exp potential will be unable to compete international markets. The policy of elimir ing competition from food imports is inc sistent with policies to promote cheap fo unless a system of domestic subsidies established to offset the higher cost of fc produced at home. The best way to h cheap food is to reduce protection.

The domestic/international price cc parisons in this study show the clear adv tage nonfood agricultural products h over food in international markets. The h rates of taxation of exports in the 1950s a 1960s did not keep many nonfood agricultu products from being exported, althou they probably reduced the volume of expc while the market for most food products v cleared at prices above the internatio ones. This substantial comparative advant is not a good reason to tax agricultu exports. In fact, freer trade will lead (as it in the 1970s) to the birth of many exp activities in agriculture and industry t high rates of taxation would make inc ceivable.

Economic policy for agriculture has be analyzed and designed in light of general equilibrium implications of polic by examining only the direct effects o

policy, one could miss important dimensions of incentives. A partial equilibrium framework can lead to misleading conclusions and wrong or inadequate policy recommendations. Rural-urban labor migration, flow of savings, the composition of agricultural output, and the process of adopting technology cannot be understood by looking only at agricultural policy. Reference must be made to movements in the domestic terms of trade induced by commercial policy.

A brief interpretation of some economic phenomena that took place in the 1953-78 period provides an agenda for future research on Colombian agriculture.

Colombia's approach to foreign trade had two well-defined phases: import substitution during 1953-67, and export promotion in 1967-78. The earlier phase was characterized by great distortion between domestic and international prices. These divergences were reduced considerably in the second period and led to an improvement of the domestic terms of trade for agriculture. These developments seem to have affected the country's economic performance. During the period 1953-67, the gross national product (GNP) grew at an annual rate of 4.4 percent. The rate for 1967-78 was 5.9 percent. The annual rate of growth of income per capita was 1.2 percent in the earlier period and 3.2 percent in the later. The patterns for agricultural and food output were similar. Total food output grew at annual rates of 2.7 percent in 1953-67 and 3.4 percent in 1967-78. Agricultural output rose 3.1 percent in the former period and 4.5 percent in the latter. Food output per capita declined until 1963, then increased.

Rates of migration from the countryside to the cities have been high in the last three decades—5.4 percent per year from 1951 to 1964 and 3.7 percent from 1964 to 1976. Crude figures indicate that the rural real wage was almost constant during the 1950s and 1960s, but the ratio of rural to urban wages fell steadily until 1970, when it recovered rapidly. As opportunities for employment in agriculture dwindled, and labor moved out of agriculture, the overall land/labor ratio tended to increase. This was an incentive for agriculture to become more land intensive, reducing incentives for the adoption of high-yield technology.

Because of the limited size of the domestic market and its low growth rate, agriculture grew slowly. And given the resource endowment of the country the increase in output was based mainly on the growth of inputs and little on adoption of new technology. An export-oriented policy would have increased the price and growth potential of exportable agricultural goods by increasing foreign demand. Demand for labor and land would have grown more rapidly, making land more expensive, and thus accelerating the adoption of new technology. This point is important in understanding how the labor employment and income potential of agriculture can be expanded through changes in output composition. Thus, whereas an export crop like cotton demands one man-year per hectare cropped, one man can easily raise cattle on 200 to 300 hectares of land.

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INTRODUCTION

Agriculture in most developing countries is a source of labor and capital for the rest of the economy as well as a source of food and foreign exchange earnings.[1] This sector is so large relative to other sectors that incentives to agriculture affect the behavior of other sectors and, in turn, incentives to these sectors affect the economic performance of agriculture.

Governments of many developing countries have tried to promote the production of manufactured products through the use of different instruments of commercial policy and overvalued national currencies.[2] The resulting disincentive to produce agricultural export goods has seriously hampered the development of agriculture and reduced its contribution to economic performance. However, relatively little attention has been paid to the effect of measures to protect and promote the nonagricultural sector on the development of agriculture.[3] Rather, research has been focused mainly on policies for particular farm products or inputs and has been essentially microeconomic despite general equilibrium implications for agricultural incentives of policies towards o sectors.[4] Neglect of either approach result in misunderstanding.

Since the 1930s, Colombia has trie promote the industrial sector through tar severe import restrictions or import prol tions of certain goods, and an overval national currency (peso). This policy c tinued until the late 1960s when exp were promoted and the overvaluation of peso reduced.[5]

Another important policy goal that pursued systematically was to achieve f self-sufficiency, as it was evident that country had the natural resource b Since the country could not generate all foreign exchange earnings necessary to the raw materials, intermediate produ and capital goods required for its deve ment program, policymakers considere unwise to import food the country cc produce.[6] This led to a prohibition of f

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[1] Bruce F. Johnston and John W. Mellor, "The Role of Agriculture in Economic Development," *American Ecor Review* 51 (September 1961): 566-593.

[2] Incentives to agriculture refer to price incentives given through exchange rate policy, price policy, commercial policy. Commercial policy includes tariffs, subsidies, and quantitative restrictions on imports exports.

[3] An exception is I. M. D. Little, Tibor Scitovsky, and Maurice Scott, *Industry and Trade in Some Developing Cou* (New York: Oxford University Press, 1970), pp. 177-178. In the studies conducted by the National Bure Economic Research on the foreign trade regimes and economic development of nine countries, little attenti paid to the effects overall protection and exchange controls have on agriculture, except in the study on Egypt b Hansen. In T. W. Schultz, "On the Economics and Politics of Agriculture" in T. W. Schultz, ed., *Distortion of Agricu Incentives* (Bloomington, Ind.: Indiana University Press, 1978), pp. 3-23, the author stresses the importan policies that undervalue agriculture. D. G. Johnson in his "International Prices and Trade in Reducing the Disto of Incentives," in Schultz, ed., *Distortion of Agricultural Incentives*, pp. 207-209 stresses how international trade b agricultural incentives in developing countries. Explicit references are made in G. Edward Schuh, "Approach 'Basic Needs' and to 'Equity' that Distort Incentives in Agriculture," in Schultz, *Distortion of Agricultural Incentive* 311-313 to how trade and exchange rate policies have helped extract the surplus from Brazil's agricultural sect the Colombian context see Jaime A. P. de Melo, "Distortions in the Factor Market: Some General Equilib Estimates." *Review of Economics and Statistics* 59 (November 1977): 398-403 where he incorporates intersec relations but holds constant the distortions in the product markets. A study by Christopher Cook deals with sl problems; see Christopher Cook, "The Impact of Commodity Price Distortions on the Development o Agricultural Sector in Third World Countries: A Case Study of Colombia" (Ph.D. thesis, Concordia University, 1

[4] For an exception see G. Edward Schuh, "The Exchange Rate and U.S. Agriculture," *American Journal of Agricu Economics* 56 (February 1974): 1-14; and G. Edward Schuh, "The New Macroeconomics of Agriculture," *Am Journal of Agricultural Economics* 58 (December 1976): 802-812.

[5] It should be noted, however, that more often than not monetary and fiscal policies upset the equilibrium i current account. This disequilibrium was usually met with rationing by quantity rather than by price, w encouraged production of protected goods and discouraged exports.

[6] The objectives of agricultural policy and the instruments used to achieve them are described in Theodc Goering, "Colombian Agricultural Price and Trade Policies," Universidad Nacional de Colombia, Faculta Agronomía, Palmira, 1961. (Mimeographed.)

Table 1—Specific duties, ad valorem tariffs, and other trade restrictions on selected commodities, 1959

Commodity	Specific Duties: Amount	Specific Duties: Ad Valorem Tariff Equivalent	Ad Valorem Tariff	Other Restrictions
	(pesos per kilogram)	(percent)	(percent)	
Corn	0.30	111	50	P
Wheat	0.10	26	20	I
Barley	0.10	...	40	I
Rice (hulled)	0.50	39	50	P
Cheeses	3.00	...	100	P
Butter	3.00	55	100	P
Potatoes	0.40	...	50	P
Beans	1.00	...	50	P
Cotton seed	3.00	...	50	...
Refined sugar	1.00	576	50	P

Source: Theodore J. Goering, "Colombian Agricultural Price and Trade Policies," Universidad Nacional de Colombia, Facultad de Agronomía, Palmira, 1961, p. 24. (Mimeographed.) Ad valorem tariff equivalents of specific duties were calculated by the author.

Notes: P means that imports were prohibited except during severe domestic shortages. I means that imports could only be made by the Instituto Nacional de Abastecimientos (INA).

Table 2—Basic information on the Colombian economy, 1950-77

Year	Share in Gross National Product: Agriculture	Industry	Total Exports[a]	Total Imports[a]	Share of Agriculture in Country Total: Population	Labor Force	Exports[b]	Imports[c]
				(percent)				
1950	35.0	15.0	10.9	10.1	61.1[d]	55.9[d]	85.0	...
1960	30.0	18.0	15.6	15.6	47.2[e]	49.0[e]	77.7	4.6
1970	25.0	19.0	14.2	15.8	36.4[f]	39.7[f]	76.9	4.2
1977	23.0	19.0	16.4	13.4	n.a.	n.a.	82.0	6.3

Sources: Colombia, Departamento Nacional de Planeación, "La Economía Colombiana: 1950-1975," *Revista de Planeación y Desarrollo* 9 (Octubre-Diciembre 1977), Table 1.10; Colombia, Banco de la República, *Cuentas Nacionales de Colombia 1970-77 y Análisis Preliminar para 1978* (Bogotá: Talleres Gráficos del Banco de la República, 1979); Colombia, Departamento Nacional de Planeación, *Política Agropecuaria y el Sistema de Alimentos: Diagnóstico*, tomo 2, Documento de Trabajo DNP-UEA-013 (Bogotá: Departamento Nacional de Planeación, 1979), Appendix Tables 17 and 18.

Notes: The coffee and livestock sectors produced 65 percent of agricultural value added in 1950, 55.3 percent in 1970, and 53 percent in 1975. The livestock sector has consistently contributed 38 percent to agricultural value added.

Less than 6 percent of both total imports and total exports have been raw material foodstuffs except in 1973, 1974, and 1976. The raw material foodstuffs imported have been mostly raw wheat and wheat flour. The nonprocessed foodstuffs exports were mostly bananas and sugar, but recently live cattle and meat have to be added to the list.

[a] Goods and services are included.

[b] Coffee, food, and nonfood agricultural raw materials are included.

[c] Raw materials, foodstuffs, and nonfood agricultural commodities are included.

[d] This figure is for 1951.

[e] This figure is for 1964.

[f] This figure is for 1973.

imports, except for items occasionally considered in short supply. Wheat is the only food product that has been imported continuously and in increasing amounts. In addition, exports of food products for which an export surplus was likely to develop were either not allowed or were severely limited, causing prices to drop below international levels. As a result, the food sector became, in the aggregate, a nontraded goods sector. The foreign trade regime followed has played a greater role in determining the pattern of incentives, both between industry and agriculture and within the agricultural sector, than the policy of government purchases at support prices. Support price policies had little effect on incentives because the support prices were usually below market (domestic) levels and the storage capacity of the government agency in charge of implementing this policy was too small to fulfill its commitments.[7]

Thus, high ad valorem tariffs plus specific taxes and administrative import restrictions were the main tools used to protect the domestic production of manufactured and agricultural products from foreign competition. For some products that could be easily exported to international markets, tariffs and restrictions were redundant. For most products, however, the system provided protection. For example, when a new tariff schedule was issued in 1959, the system established for some agricultural products was highly restrictive, as Table 1 shows.

As this system of protection was applied generally to commodities in the tariff schedule, a low exchange rate was required to maintain equilibrium in the current account balance. This overvaluation of the peso discriminated against exportable goods, which were mainly agricultural products. Not only were exports of commodities reduced, but development of new exports and diversification of exports were hampered. Foreign exchange receipts became m vulnerable to fluctuations in the internatic prices of a small group of commodities

Analysis of the distortions in pri induced by the trade policies is necessar understand the performance of both economy and the agricultural sector dur the 1953-78 period. Table 2 shows importance of the foreign, industrial, a agricultural sectors in the gross natio product (GNP) and of agriculture as a sou of foreign exchange earnings, labor, a food.[8] It also points out the need to consi the interrelation of policies directed different sectors.

Although the introduction of price d tortions to promote import substitution co be defended with the infant industry ar ment, there is not yet empirical evidenc suggest that a strategy of import substitut is preferable to one of export promotic For the results of this study to be seriou affected it would have to be argued that infant industry argument is less relevant exports of nontraditional products—agri tural and manufactured—than for imp competing products, and that learning-doing cost reductions offset the costs of large price distortions created. Therefore long as these issues are not settled empiric one cannot say that protection is better t free trade, particularly when theory supp the latter.

A tariff on imports affects exports, ei by raising the price of imports and dome prices or by lowering the exchange r Therefore, the first question is whether price of exportable goods relative to h goods falls by the full amount of a tari by less, and if so, by how much?[10] Ano way of putting the question is: given fi exchange rates, do the prices of dome commodities (home goods) remain const rise by less than the tariff, or rise by the amount of it? An empirical answer is gi

[7] See Goering, "Colombian Agricultural Policies," p. 11; and Fundación para la Educación Superior y el Desarr "Manejo de Existencias, Comercio Exterior y Precios Agrícolas: El Papel del IDEMA," Bogotá, 1976. (Mimeograp

[8] For an analysis of the development of food production in Colombia, see Jorge García García, "Es Importar Seguridad del Suministro de Alimentos en Colombia?" *Revista de Planeación y Desarrollo* 11 (Septiembre-Dicie 1979): 129-175.

[9] See Jagdish N. Bhagwati and T. N. Srinivasan, "Trade Policy and Development," in *International Economic P Theory and Evidence*, ed. Rudiger Dornbusch and Jacob A. Frankel (Baltimore, Md.: Johns Hopkins University P 1979), pp. 17-21.

[10] Home goods are those goods that are not traded internationally, such as transportation, construction, and s services like public utilities. In this study the terms "nontraded goods" and "home goods" will be interchangeably, unless explicitly noted. The term "nontraded" should not be confused with the idea comm related to the marketed surplus, which refers to how much of a peasant's output is sold to the market.

in Chapter 4.

Several questions relate to a comparison of the size of incentives for different economic activities resulting from Colombia's trade policies with the size of those that would be expected in a free trade situation. These questions are:

What has been the effect of import restrictions on the contraction of imports?

What has been the size of the implicit tariff resulting from administrative restrictions on imports and exports? These restrictions were widely used to solve balance-of-payment problems during the 1950s and 1960s. The main function of tariffs during this period was to raise revenue for the central government.

How large were the subsidies and taxes on exports? Exports were promoted during the 1950s through differential exchange rates and in the 1960s and 1970s by subsidies, export credits, and drawback and tariff exemptions on inputs. Coffee exports were taxed most of the time, either directly or by lower exchange rates.[11]

What has been the nominal protection for the different agricultural activities from restrictions on actual or potential imports and exports? Insofar as prohibitions were the main instrument of policy for several products, the incentive for any particular activity would be the difference between the internal price, established through domestic demand and supply, and the international price.

What has been the net result for incentives of the different policies followed? This question has several facets. Have import restrictions through tariffs and quantity rationing led to an overvaluation of the peso that more than offsets the subsidies to exports? Has the prohibition on imports of potentially tradable agricultural products compensated for the negative effects of the overvaluation of the peso? How much has the prohibition on potentially exportable products added to the tax that an already overvalued currency imposes on them?

What has been the aggregate effect on food production of policies intended to protect industry and agriculture?

The basic framework for the analysis is a model in which the interactions between the importable, exportable, and home goods markets are recognized.[12] This is a general equilibrium framework, and it is simple enough to convey the main interrelationships in the products market. In this model, prices of both importable and exportable goods are expressed in terms of home goods. Therefore, the movement of resources between exportable and importable goods is not only a function of the import tariff or export subsidy, as in the standard two-country, two-commodity model of trade theory, but also depends on the price of home goods. This simplified model is used to explain the effect of commercial policy on the exports of Colombia and the size of incentives for different economic activities resulting from the application of different foreign trade policies. A partial equilibrium framework is presented to illustrate the combined effect of policies with generalized effects and policies specifically tooled for a product, after which the effect of protection on the structure of relative prices is estimated. Then the demand elasticity for imports and the impact of restrictions on the volume of imports are estimated so the implicit tariff resulting from quantitative restrictions can be estimated. This is followed by an analysis of the system of observed tariffs and subsidies, which is combined with the results on the incidence of protection and the tariff equivalent of import restrictions to determine the direction and size of net incentives. Finally, it is determined which agricultural products were protected or taxed as a result of general and specific trade policies and the potential impact of price distortions on the production of food is examined with the help of an analytical model.

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[11] Although an optimum tariff argument can justify taxing coffee exports, several reasons undermine the argument. Large amounts of coffee are produced outside Colombia; therefore, any price increase caused by restrictions on Colombian exports will be offset by an increased supply from foreign sources, particularly in the long run. Consumers can substitute other goods for coffee. The main consumers of Colombian coffee—the United States and West Germany—have enough economic power to challenge such a unilateral action. Finally, if Colombia really has monopoly power, as the optimum tariff argument implies, why did it join the International Coffee Organization and why has it always sought an agreement between producers and consumers on prices?

[12] See W. Max Corden, *The Theory of Protection* (Oxford: Oxford University Press, 1971); W. Max Corden, *Trade Policy and Economic Welfare* (Oxford: Clarendon Press, 1974); and Rudiger Dornbusch, "Tariffs and Non-Traded Goods," *Journal of International Economics* 5 (May 1974): 177-185.

3

ANALYTICAL FRAMEWORK

The effects of exchange rate and commercial policy can be examined at different levels of aggregation. For example, to find out the effect on domestic production and consumption of a subsidy to exports of cotton, the best approach is a partial equilibrium analysis, but the impact of industrial protection on the agricultural sector can best be analyzed with a general equilibrium framework.

In this research, general equilibrium tools are used to determine how the structure of protection changed the structure of the relative prices between industry and agriculture and within agriculture compared to a free trade situation. Also, partial equilibrium tools are used to determine whether a particular activity within agriculture was protected or not as a result of the combination of the overall trade regime and of particular trade policies toward that activity. A partial equilibrium model is presented below in which the experience of policies for rice and cotton in Colombia is used as a frame of reference to illustrate the impact of macroeconomic and microeconomic policies on these activities.

Partial Equilibrium Framework

The qualitative effects of commercial and exchange rate policy on the prices, output, consumption, and trade of cotton and rice in Colombia are analyzed in this section. It is assumed, for the moment, that everything else in the economy remains constant, so that a change in the absolute price of each commodity would change its price relative to all other commodities.

Commercial policy will be limited to tariffs, subsidies, and quotas or prohibitions on imports and exports.

Rice and cotton are representative of the food and nonfood commodity groups that receive different policy treatment. Production of nonfood agricultural export commodities was taxed and production of food commodities was protected. This led to a distortion in relative prices within agriculture that affected the allocation and rewards factors of production within the sector.

Since rice and cotton are traded int nationally, the domestic price of each prc uct in the absence of trade barriers is giv by its international price times the (offici exchange rate. Let P_r^* and P_c^*, denote t international (c.i.f. or f.o.b.) prices of ri and cotton (asterisked variables refer foreign prices or quantities) and let P_r, denote their domestic prices and E t nominal exchange rate, respectively. The

$$P_r = EP_r^* \qquad (3$$

and

$$P_c = EP_c^*. \qquad (3$$

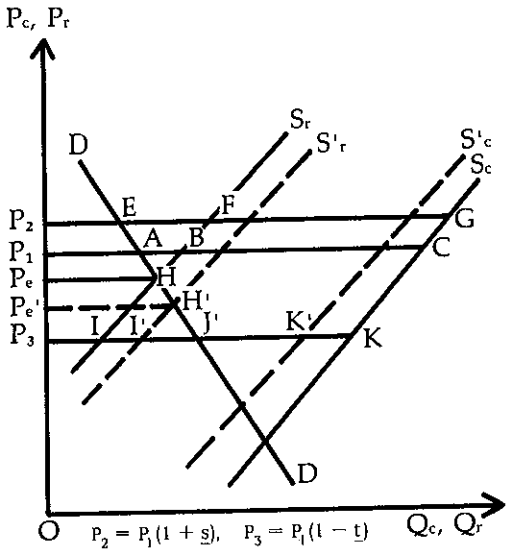
It is assumed that initially both commoditi are exportable and that the marginal cost generating one unit of foreign exchan through cotton production (S_c) is lower th that through rice exports (S_r). The situati is like the one depicted in Figure 1.

For purposes of exposition, the domes demand curves and initial prices have be drawn the same for each product, DD and i At that price the country produces P_1C cotton, and P_1B of rice, consumes P_1A of ri and cotton, and exports AB of rice and AC cotton.

When exports of cotton and rice a subsidized by $\underline{s}$ percent, the domestic pric rise to $P_2[P_1(1 + \underline{s})]$, consumption of bc drops to P_2E, production of rice increases P_2F, cotton to P_2G, while exports go up to and EG respectively. The outcome is t same if the exchange rate is increased by percent and no subsidy is granted.

When a tax of $\underline{t}$ percent is imposed c exports of cotton, the domestic price falls $P_3[P_1(1 - \underline{t})]$, consumption increases to P_3 production declines to P_3K, and exports fa to JK. If the tax on rice exports were percent, they would no longer be profitab and would fall to zero. This result al: would have been obtained with a prohibitic on rice exports or with a lower tax- $(P_1 - P_e)/P_e$ percent only.

Figure 1— The effects of trade taxes and subsidies on the prices, production, and consumption of cotton and rice



If the Colombian peso were revalued by $\underline{t}$ percent, the domestic price of both rice and cotton would fall to P_3 $[P_1(1 - \underline{t})]$ and consumption would be P_3J. Production of rice would fall to P_3I, and of cotton to P_3K. At this lower price, $P_3[P_1(1 - \underline{t})]$, because of a revaluation of $\underline{t}$ percent, the country would become an importer of rice but would still export cotton, though less of it. The situation for rice would be quite different from that in which its exports were subject to a tax at a rate of $\underline{t}$ percent, but were neither exported nor imported. The reason is that, at the initial exchange rate, rice could have been imported only at the price P_1. At that price, domestic producers could supply more than the required amounts, and the price would have fallen to P_e. However, when the peso is revalued by $\underline{t}$ percent, domestic consumers can import rice at a price of P_3, the same price they are willing to pay to the domestic producers. This example shows the influence of the exchange rate in determining whether a particular commodity can be imported or exported, viewed from this partial equilibrium position.

Whenever the peso is devalued by $\underline{s}$ percent or revalued by $\underline{t}$ percent, the price of cotton relative to the price of rice remains constant. The price of cotton rises or falls relative to the price of rice only if cotton exports are subsidized by $\underline{s}$ or taxed by $\underline{t}$ percent. Moreover, if rice and cotton exports are taxed by $\underline{t}$ percent, the price of rice falls to P_e and that of cotton to P_3, which means that the tax has induced a rise in the price of rice relative to that of cotton. The effect on rice production is equivalent to the effect when the peso is revalued by $\underline{t}$ percent and either imports of rice are prohibited, its production is subsidized by $(P_e - P_3)/P_3$ percent, or a tariff of $(P_e - P_3)/P_3$ percent on rice imports is imposed.

When the country pursues food self-sufficiency, imports or exports of food are usually prohibited. If food and nonfood products are exportable, prohibiting food exports is equivalent to lowering the price of food products relative to other agricultural exports. Making use of Figure 1, if the price of rice and cotton is P_1, both products would be exportable, but a prohibition on rice exports would reduce its price to P_e, encouraging consumption and discouraging production.

If a food product is importable, a prohibition on imports will raise its price relative to other nonfood agricultural products. Turning again to Figure 1, when the price of rice and cotton is P_3, rice is importable and cotton is exportable; if imports of rice are prohibited its price will increase to P_e and rise relative to the price of cotton.

The supply and demand curves for rice in Figure 1 are drawn on the assumption that the price of cotton and all other prices remain constant. A similar procedure was followed for cotton. In this analysis, however, all prices but those for rice and cotton remain constant, so that the demand and supply curves should have shifted. Since cotton and rice are not related in consumption but compete for resources in production, an initial price of P_1 and a $\underline{t}$ percent revaluation of the peso coupled with a prohibition on rice imports would shift the supply curve of cotton from S_c to S'_c and that of rice from S_r to S'_r. Thus, the export surplus of cotton would be JK' and not JK, the price of rice would increase to P'_e and not P_e, and its production would be P'_eH' rather than P_eH.

As will be shown later, Colombia's food production has been protected, while the nonfood agricultural exports have been taxed. With few exceptions, virtually all food commodities have been turned by the

design of policy into nontraded goods. The result of this policy is similar to that of a variable levy except that the latter has explicit guidelines for domestic prices.

General Equilibrium Framework

The relations between exchange rate and commercial policy are examined by using a model in which there are three types of goods—importable, exportable, and home (nontraded) goods. This model can be applied to the Colombian economy, with some simplifications. The export sector can be identified with the agricultural export sector, the import sector with the industrial sector, and home goods with the agricultural food-producing sector.

A long-standing theorem of international trade theory is that in a model with flexible prices and full employment, an import duty at the same rate as an export subsidy will leave the real variables in the system unchanged if trade is balanced initially. In a fixed exchange rate system, prices of imports and exports will rise by the same amount as the tariff and subsidy. The initial effect will be a rise in the prices of tradable goods relative to home goods. This will produce excess demand for home goods and their price will then rise until markets are cleared again and relative prices are restored to their initial positions. Another way to preserve equilibrium would be to keep the price of nontraded goods constant and revalue the domestic currency by the amount of the subsidy and tariff. This would leave relative prices and real equilibrium unchanged. It can be similarly argued that imposing an export tax and an import subsidy is equivalent to revaluing the domestic currency, and that the equilibrium is restored with a fall in the price of nontraded goods equal to the rate of revaluation or to the rate of the import subsidy and export tax.

To analyze such relations, a simplified model was used in which the main ingredients are the demand for imports, the supply of exports, and the prices of imports and exports in terms of home goods. Since the demand for imports is an excess demand function and the supply of exports is an excess supply function, the model can be expressed in terms of excess demand fu tions for final goods and explain the ir relationships of policies in terms of a sir supply and demand diagram.[13]

Letting P_m, P_x, and P_h be the dome prices of importable, exportable, and h goods; P_m^* and P_x^* the international price importable and exportable goods; and I real income of the community in term home goods, the excess demand functi for importable (M^e), exportable (X^e), home goods (H^e) are:

$$M(P_m/P_h,\ P_x/P_h,\ I) = M^e, \qquad (3.1)$$

$$X(P_m/P_h,\ P_x/P_h,\ I) = X^e, \qquad (3.2)$$

and

$$H(P_m/P_h,\ P_x/P_h,\ I) = H^e. \qquad (3.3)$$

The system is in full equilibrium wh $M^e = X^e = H^e = 0$; at that point, expendit equals income. When $H^e = 0$ and $M^e >$ there is a deficit in the trade account and total expenditure of the community is hig than its income. If $H^e = 0$ and $M^e < X^e$ th is a surplus in the trade account and expenditure of the community is below income. If $M^e = X^e = 0$ but $H^e > 0$, ther balance-of-payments equilibrium and excess of expenditure over income.

In a simplified version of the mo presented above, the excess demand for portable goods is assumed to depend o on the price of the imported good relative the price of nontraded goods, and excess supply of exportable goods is assun to depend only on the price of the expor good relative to the price of nontrac goods. Thus,

$$M(P_m/P_h,\ I) = M^e, \qquad (3.4)$$

$$X(P_x/P_h,\ I) = X^e, \qquad (3.5)$$

and

$$H(P_m/P_h,\ P_x/P_h,\ I) = H. \qquad (3.6)$$

Equations (3.6) and (3.7) mean that there a no cross-price effects between importat and exportable commodities. This mod can best be used to illustrate graphically t

[13] This model is presented elegantly in Dornbusch, "Tariffs and Non-Traded Goods," pp. 177-185.

basic relationships between commercial policy, exchange rates, and relative prices. The absence of cross-price effects permits work with one demand curve for imports and one supply curve for exports, rather than with shifting curves.[14]

To analyze the effects of policies between positions of full equilibrium, it is assumed that expenditure equals income and that the balance of payments is in equilibrium. Then,

$$P_m^* M(\ldots) = P_x^* X(\ldots) \qquad (3.9)$$

or

$$P^* M(\ldots) = X(\ldots), \qquad (3.10)$$

where

$$P^* = P_m^*/P_x^*.$$

If the country is a price taker in international markets, P_x^* and P_m^* are exogenously given. If E is the nominal exchange rate (number of units of domestic currency per unit of foreign currency) and s and t represent export subsidies and import tariffs respectively, then,

$$P_m = EP_m^*(1 + t), \qquad (3.11)$$

$$P_x = EP_x^*(1 + s), \qquad (3.12)$$

$$P_m/P_h = (E/P_h)\, P_m^*(1 + t) = eP_m^*(1 + t), \qquad (3.13)$$

$$P_x/P_h = (E/P_h)\, P_x^*(1 + s) = eP_x^*(1 + s), \qquad (3.14)$$

$$P = (P_m/P_h)/(P_x/P_h) = P^*(1 + t)/(1 + s) = P^* \cdot T, \qquad (3.15)$$

and finally,

$$P_m/P_h = (P_x/P_h) \cdot P^*(1 + t)/(1 + s) = (P_x/P_h) \cdot P^*T, \qquad (3.16)$$

where e is the real exchange rate (E/P_h), P is the domestic relative price between importable and exportable goods, and T the ratio of $(1 + t)$ to $(1 + s)$. From equation (3.16) it is seen that the domestic price of importable goods in terms of exportable goods is a function of the international price of importable goods and exportable goods and of import tariffs and export subsidies. The nominal or real exchange rates do not affect the domestic relative price unless their change leads to a change in t or s. When t = s, the relative domestic price is equal to the relative international price.

With the help of equations (3.13) and (3.14) and assuming $P_m^* = P_x^* = 1$, the model given by equations (3.6) to (3.8) can be represented as:

$$M = M(P_m/P_h, I) = M[e(1 + t), I] = M[E/P_h(1 + t), I], \qquad (3.17)$$

$$X = X(P_x/P_h, I) = X[e(1 + s), I] = X[E/P_h(1 + s), I], \qquad (3.18)$$

and

$$H = H[e(1 + t), e(1 + s), I]. \qquad (3.19)$$

This last representation stresses the effects of the exchange rate, the price of home goods, import tariffs, and export subsidies on the determination of imports and exports.

To begin with, the case in which there are no taxes on imports or subsidies on exports will be examined. When there is equilibrium in the balance of payments, then X = M and $P_m/P_h = P_x/P_h = E/P_h$. The price of importable or exportable goods relative to the price of home goods would be equal to the "real" exchange rate. Since the solution is a ratio, there could be an infinite number of combinations of values for the exchange rate and the price of home goods.

Beginning from an equilibrium position, the imposition of a tariff would increase the cost of importing and reduce the quantity demanded. A trade equilibrium would occur at a lower volume of exports. This would be true only if $P_x/P_h(E/P_h)$ falls, which could result from a reduction in the exchange rate, an increase in P_h, or both.

The model presented in equations (3.17) through (3.19) is represented graphically in

[14] See Larry A. Sjaastad, "Commercial Policy, 'True' Tariffs and Relative Prices," University of Chicago, Chicago, Ill., 1979 (mimeographed), for a graphic presentation of these interactions.

Figure 2 — The effects of an import tariff and an export subsidy on prices and quantities of traded goods

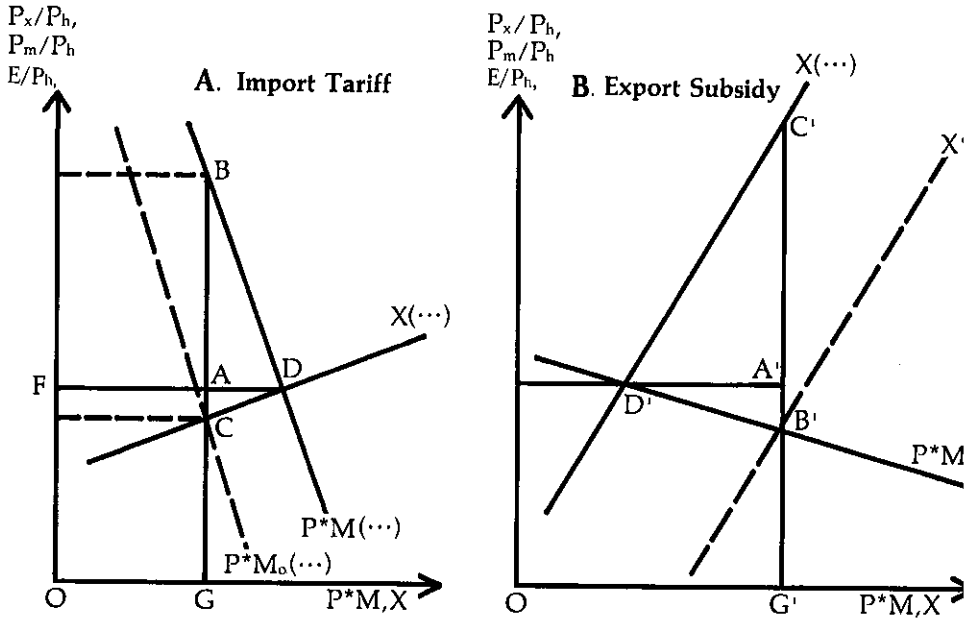


Figure 2, which illustrates the effects of an import tariff and an export subsidy.[15] The horizontal axis measures exports and imports in terms of exports (by equation [3.10]). The vertical axis measures P_m/P_h as well as P_x/P_h and E/P_h · $P^*M(\ldots)$ and $P^*M_0(\ldots)$ represent the excess demand for importables and $X(\ldots)$ and $X'(\ldots)$ the excess supply of exportables.

When an ad valorem import tariff equal to BC/CG is imposed, the demand for imports shifts from P^*m to P^*m_0 (Figure 2, Part A). The new level and value of imports and exports is OG. The price paid for imports rises to GB and that for exports falls to GC. Compared with the initial free trade situation, the price of importable goods relative to home goods rises by BA/AG percent, and the price of exportable goods relative to home goods falls by AC/AG percent. The tax affects imports and exports by different amounts.

When exports are subsidized by B'C'/B'G' (Figure 2, Part B), the export supply cu shifts from $X(\ldots)$ to $X'(\ldots)$, and the l level and value of imports and export OG'. The price paid for imports falls to I and that received for exports rises to C With respect to the initial free trade situat the price of importable goods relative home goods falls by A'B'/A'G' percent the price of exportable goods relative home goods increases by A'C'/A'G'. subsidy also affects imports and exports different amounts.

Figure 2 also illustrates clearly the re tion between exchange rate and commer policy. To explain this relation it is assun that fiscal and monetary policies hold price of home goods constant and that latter is equal to one. Under these conditi an increase in the exchange rate is equival to an increase in the relative price importable goods and exportable goods. Figure 2, Part A, for example, a shift in

[15] Though this is not a realistic model, it does serve to illustrate the incidence of trade taxes and subsidies. T assumption that there are no cross-price effects between the import and export sectors means that these two sect expand or contract at the expense of the nontraded goods sector.

volume of trade from FD to FA could be obtained by different combinations of exchange rates and commercial policies that would change the structure of relative prices. Such a shift would result from an exchange rate of CG and a tax of BC per unit of imports; by an exchange rate of AG, a tax of AB per unit of imports, and of AC per unit of exports; or by an exchange rate of BG and a tax of BC per unit of exports.

The graph also explains the real effects of exchange rate changes that are accompanied by corresponding changes in commercial policy. For example, if the exchange rate is GC, the government has to restrict imports to keep trade equilibrium. If the domestic currency is devalued to AG, restrictions on imports can be lifted and a free trade solution achieved. Thus, the policy of devaluation and lifting of restrictions has led to an increase in the relative price of exportable goods and to a decrease in that of importable goods.

The equilibrium depicted by the intersection of the curves $P^*M(\ldots)$ and $X'(\ldots)$ in Figure 2, Part B, can be produced by different combinations of exchange rates and export subsidies. At an exchange rate of B'G', exports will be equal to OG' only with a subsidy of B'C' per unit of export. An exchange rate of G'A', and subsidies of A'C' per unit of exports and of A'B' per unit of imports are required for a volume of trade of OG'. Finally, an exchange rate of G'C' and a subsidy of B'C' per unit of imports is necessary to achieve the equilibrium shown by B'.

This exercise illustrates two important points: a tariff on imports taxes exports, and a subsidy for exports subsidizes imports. The degree of taxation or subsidization will depend on the size of the taxes and subsidies and on how they are divided between importable and exportable goods.

Commercial policy is seldom applied as neatly as in Figure 2. It usually is a mixture of tariffs, export subsidies or taxes, differential exchange rates, quotas, and other non-tariff barriers that are applied in a discriminatory manner. This has been true in Colombia.

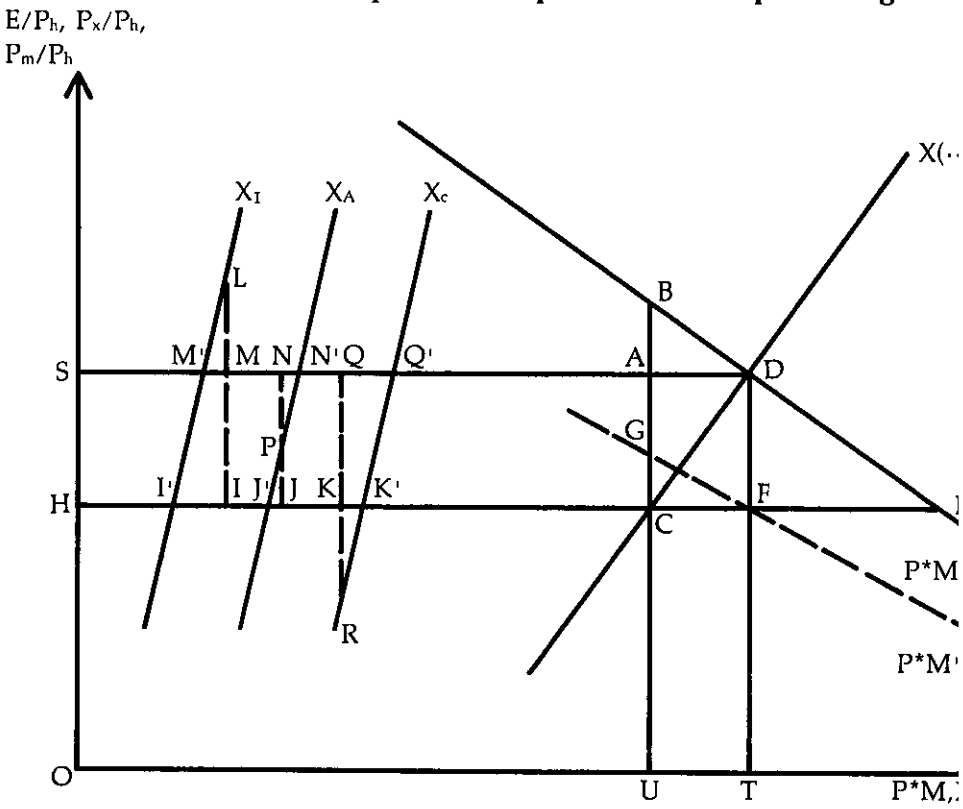
Colombia continues to be a major exporter of agricultural products. The nation also exports manufactured commodities and since the early sixties has had an export promotion system. Coffee exports have been explicitly taxed by lower exchange rates or taxes on exports. Most other agricultural exports were explicitly subsidized by higher exchange rates or direct export subsidies.[16] Figure 3 is used to analyze the effects of these exchange rate and commercial policies on the relative prices of importable and exportable goods.

The total supply of exports is $X(\ldots)$; the demand curve for imports is $P^*M(\ldots)$. The individual supply curves are X_I for industrial goods, X_C for coffee, and X_A for other agricultural products. The free trade exchange rate is OS and the volume of trade SD. Exports of industrial goods, coffee, and other agricultural goods are SM', SQ', and SN' respectively.

At an exchange rate of OH there is excess demand in the market for tradable goods. It can be eliminated only by a tariff of BC/CU or by licensing imports up to OU units. Either measure will raise the relative price of importable goods from AU to BU so that the price of importable goods will be higher and that of exportable goods lower than in the free trade situation. Exports of industrial goods, coffee, and other agricultural exports would fall to HI', HK', and HJ' respectively. However, exports of coffee have been taxed and exports of industrial goods and other agricultural exports subsidized, and the rate of subsidy is higher for the former than for the latter. Thus, the tax on coffee per unit of exports is KR, the subsidy per unit of agricultural exports would be PJ, and that per unit of industrial exports is LI. The net effect of overvalued domestic currency, import tariffs, import restrictions, and differential export subsidies on the prices

[16] The system of export promotion in Colombia was complex for some time. A distinction was made between major and minor exports. The latter received favorable treatment. The goods defined as minor exports changed little, but the goods defined as major exports sometimes included bananas, precious stones, and rawhides, in addition to coffee. Colombia's export promotion system is described and analyzed in several works. Among them are Jose D. Teigeiro and Anthony R. Elson, "The Export Promotion System and the Growth of Minor Exports in Colombia," *International Monetary Fund Staff Papers* 20 (July 1973): 419-471; Díaz-Alejandro, *Foreign Trade Regimes and Economic Development: Colombia*; Jorge García García, "A History of Economic Policies in Colombia: 1953-70" (Ph.D. dissertation, University of Chicago, 1976); and Ricardo Ffrench-Davis and José Piñera-Echenique, *Políticas de Promoción de Exportaciones: Colombia* (Santiago de Chile: Comisión Económica para América Latina-Naciones Unidas, 1978).

Figure 3— The effects of exchange rate changes and commercial poli on the relative prices of importable and exportable goods



received by producers of each exported commodity and importable goods can be seen in Figure 3. Exports of industrial commodities would be greater than if trade were free and those of coffee and other agricultural commodities would be lower. In other words, industrial exports would receive a net subsidy equal to LM per unit of export, coffee exports would be taxed by QR, and other agricultural exports would be taxed by NP, despite receiving a gross subsidy of PJ. In summary, the effect of these measures would be a net tax on agricultural exports and a net subsidy on exports of industrial goods.

When there is an import tariff of DF/FT, the demand for imports shifts inwards towards P*M'(. . .). At the exchange rate OH, a potential trade deficit of CF arises, and use of administrative controls of impor necessary to eliminate it. Thus, the econ authority grants import permits in amount of HC, and imports have bee stricted by CF. If the percentage by w imports have been reduced by administr restrictions and the elasticity of deman imports are known, the tariff equivalent of quantitative restriction can be calcul

This exercise emphasizes that the si gross subsidies alone is not enoug determine whether exports are being moted. It is also necessary to know much import restrictions have reduce relative price of exportable goods. T knowledge of the size of the tariff (BC) the proportion (AC/BC) of that tariff falls on exports is needed to establish net result of the different measures.[17]

[17] This point emphasizes that the gross subsidy can be lower if the net subsidy is higher. For this to happe overvaluation of the peso must be reduced so that an increase of the volume of exports leads to a fall in the re price of importable goods and a lower tariff. This situation can be seen in Figure 3 if line HE is raised gradually would permit line BU to move to the right and leads to a decrease of the price of importable goods.

4

INCIDENCE OF COMMERCIAL POLICY

This chapter presents a simple method of measuring the incidence of a given structure of tariffs and subsidies. The incidence of a given tariff structure is defined as the percentage change in the price of exportable goods relative to the price of home goods as a result of a unit percentage change in import tariffs; therefore, there is full incidence when the relative price of exportable goods falls by the amount of the tariff.

How to Estimate the Incidence of Commercial Policy

In the previous chapter, three markets were postulated—home goods, importable goods, and exportable goods—and some simplifying assumptions were used to explain how commercial policy affects relative prices.[18] That exercise highlighted the role that the market for home goods plays in bringing about general equilibrium of the system through changes in the structure of relative prices.[19] The framework for the estimation of the incidence of commercial policy on the structure of relative prices can be summarized as follows: Let the demand (H^d) for home goods be given by

$$H^d = H^d\,(P_m/P_h,\ P_x/P_h,\ I), \qquad (4.1)$$

and the supply of home goods (H^s) by

$$H^s = H^s\,(P_m/P_h,\ P_x/P_h,\ K,\ L,\ t), \qquad (4.2)$$

where K and L stand for productive factors and t for technology. General equilibrium is obtained when $H^d = H^s$. Displacement from equilibrium holding I, K, L, and t constant gives:

$$\hat{H}^d = \eta_m(\hat{P}_m - \hat{P}_h) + \eta_x(\hat{P}_x - \hat{P}_h) \qquad (4.3)$$

and

$$\hat{H}^s = e_m(\hat{P}_m - \hat{P}_h) + e_x(\hat{P}_x - \hat{P}_h), \qquad (4.4)$$

where a hat ($\hat{}$) indicates a percentage change. Equating (4.3) and (4.4),

$$\gamma_m(\hat{P}_m - \hat{P}_h) + \gamma_x(\hat{P}_x - \hat{P}_h) = 0, \qquad (4.5)$$

where

$$\gamma_m = \eta_m - e_m \text{ and } \gamma_x = \eta_x - e_x$$

are the elasticities of the excess demand function for home goods with respect to the relative price of importables and exportables.

In equation (3.16) $P_m/P_h = P_x/P_h \cdot P^* \cdot T$.

Assuming P^* to be constant,

$$(\hat{P}_m - \hat{P}_h) = (\hat{P}_x - \hat{P}_h) + \hat{T}. \qquad (4.6)$$

Replacing equation (4.6) in (4.5), the incidence of the tariff on the exportable sector is given by

$$\hat{P}_x - \hat{P}_h = -\omega\hat{T}, \qquad (4.7)$$

where

$$\omega = \gamma_m/(\gamma_m + \gamma_x).$$

This result is not surprising since it is a basic principle of public finance that the incidence of a tax depends on the relative size of the supply and demand elasticities. It can be seen that $\omega = 1$ when $\gamma_x = 0$, that is,

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[18] The method used to analyze the incidence of commercial policy is presented in detail in Larry A. Sjaastad, "The Incidence of a Uniform Tariff in Uruguay," University of Chicago, Chicago, Ill., 1980. (Mimeographed.)

[19] For a compact and brief presentation of the role the home goods market plays in the process of attaining general equilibrium, see Dornbusch, "Tariffs and Non-Traded Goods."

when the excess supply of exportable goods is perfectly inelastic, their price falls by the amount of the tariff.

Since

$$\hat{T} = (\hat{P}_m - \hat{P}_x),$$

this expression can be placed in equation (4.7) to give

$$d\ln(P_h/P_x) = \omega d\ln(P_m/P_x), \qquad (4.8)$$

where dln stands for the derivative of the natural logarithm of the variables in brackets. Assuming constant ω, after integration of equation (4.8),

$$\ln(P_h/P_x) = c + \omega \ln(P_m/P_x), \qquad (4.9)$$

which is the basic equation used for the estimation of ω. This parameter (ω) can be estimated using ordinary least squares (OLS). The information required is a price index for home goods and domestic price indexes for exportable and importable goods.

When distinction is made between export categories, equation (4.9) can be extended to take this situation into consideration. Thus, when there are L exportable commodities and one importable commodity, equation (4.5) can be expressed as

$$\sum_j^L \gamma_j(\hat{P}_j - \hat{P}_h) + \gamma_m(\hat{P}_m - \hat{P}_h) = 0 \quad (4.10)$$

and

$$\Sigma\gamma_j \hat{P}_j + \gamma_m \hat{P}_m = (\Sigma\gamma_j + \gamma_m) \hat{P}_h, \quad (4.11)$$

making

$$\gamma = \Sigma\gamma_j + \gamma_m$$

and

$$\omega_j = \gamma_j/\gamma, \ \omega^m = \gamma_m/\gamma. \qquad (4.12)$$

From equation (4.12) it follows that

$$\Sigma\omega_j + \omega^m = 1,$$

then

$$\hat{P}_h = \Sigma\omega_j \hat{P}_j + \omega_m \hat{P}_m. \qquad (4.13)$$

Equation (4.13) says that $\hat{P}_h$ can be expressed as a weighted average of percentage change in the prices of exporta goods ($j = 1, \ldots, L$) and importable goo Using any exportable commodity k "numeraire," equation (4.13) can be expres

$$\hat{P}_h - \hat{P}_k = \Sigma\omega_j(\hat{P}_j - \hat{P}_k) + \omega^m(\hat{P}_m - \hat{P}_k), \quad (4.$$

since $\Sigma\omega_j + \omega^m = 1$.

Upon integration,

$$\ln(P_h/P_k) = c + \Sigma\omega_j \ln(P_j/P_k) + \omega^m \ln(P_m/P_k). \quad (4.$$

Equation (4.15) can be used to estim the incidence parameter ω^m when differ categories of exports are considered. It c be easily extended to include import ca gories as well.

The incidence parameter ω^m is an el ticity that shows how much the price home goods relative to exportable goc will change when the price of importal goods relative to exportable goods chan by 1 percent. Thus, a value of 1 for indicates that the prices of importable goc and home goods will always change by t same proportion.

To estimate ω, monthly informati published by Colombia's central bank, Ban de la República, on price indexes of ho goods, exports, and imports for 1970-79 w used (see Figure 4). This information is bc aggregated and disaggregated (see Appen 1) and is not available before 1970.

Aggregate price indexes are available f home goods (P_h), importable goods (P_m), exports (P_x), exports excluding coffee (P_{xr} coffee exports (P_{xc}), and for categories home goods, imports, and exports accordi to the standard international trade classi cation (SITC).

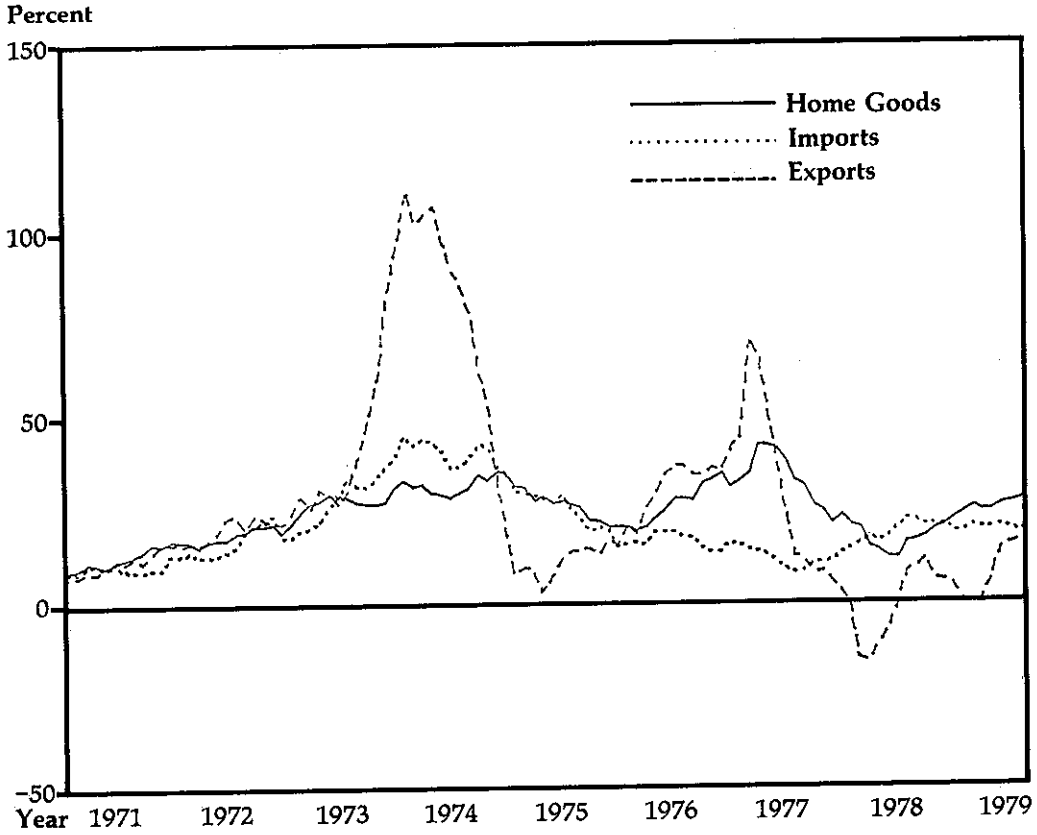
There are then two basic equations to estimated:

$$\ln(P_h/P_x)_t = a + \omega \ln(P_m/P_x)_j + U_t \qquad (4.1$$

and

$$\ln(P_h/P_{xnc})_t = a + \omega \ln(P_m/P_{xnc})_t + \omega' \ln(P_{xc}/P_{xnc})_t + U_t. \quad (4.1$$

Figure 4 — Percentage changes over 12 months in the prices of home goods, exports, and imports, 1971-79



The estimated value for ω is the global incidence parameter.

For a more detailed knowledge of the incidence of tariffs by categories of exports, export price indexes were constructed for the traditional (P_{xt}) and nontraditional (P_{xnt}) groups. Traditional exports are those from the primary product-producing sectors and include food and live animals, beverages and tobaccos, and crude materials excluding fuels. The traditional group was subdivided into coffee and noncoffee exports (P_{xtnc}) and price indexes were constructed for them (see Appendix 1). The nontraditional exports are mainly industrial products and are composed of groups 3-8 of the SITC—mineral fuels and related products (3), animal and vegetable oils and fats (4), chemical products (5), basic manufactures (6), machinery and transport equipment (7), and miscellaneous manufactured goods (8). Group (4) is not listed as exportable by Banco de la República.

The estimating equations for this new classification of exports are:

$$\ln(P_h/P_{xt})_t = a + \omega \ln(P_m/P_{xt})_t + \omega^1 \ln(P_{xnt}/P_{xt})_t + U_t \qquad (4.18)$$

and

$$\ln(P_h/P_{xtnc})_t = a + \omega \ln(P_m/P_{xtnc})_t + \omega^2 \ln(P_{xnt}/P_{xtnc}) + \omega^3 \ln(P_{xct}/P_{xtnc})_t + U_t . \qquad (4.19)$$

The last set of equations to be estimated are for two sets of nontraded commodities,

nontraded food goods (P_{hf}), and nonfood nontraded goods (P_{hnf}). The equations to be estimated with this new classification are basically the same as those for equations (4.15)-(4.19), except that now there are two sets of dependent variables, P_{hf} and P_{hnf}, divided by the relevant export price index, making eight equations for estimation.

Statistical Results

Estimates of ω are presented in Table 3.[20] The dependent variable for each equation is listed in the first column of the table and the estimated coefficient for each independent variable is found by looking at the corresponding cell under the relevant column heading. Contemporaneous values for all the values were used in estimating the equations. The problem of autocorrelation was solved using the Cochrane-Orcutt correction and a second-order autoregressive process. The period covered is March 1970 to October 1979 (116 observations).

The statistical results are good. There is no autocorrelation problem in any of the estimated equations as the Durbin-Watson statistics are, for practical purposes, equal to two, the adjusted R^2 ($\bar{R}^2$) is more than 0.8 for all but two equations, and the estimated value for the incidence parameter is significant at more than a 99 percent probability level.

The results obtained for the value ω indicate that the degree of incidence of commercial policy on exports is high. A tariff on imports or exports falls almost entirely on exportable goods, and a subsidy on exports goes entirely to exporters. The degree of incidence is the same for exports of agriculture and industrial commodities.

The estimated values for the incidence parameter in Table 3 are lower for equations 5-8 than for equations 9-12. This means that a tariff will increase the price of home goods by almost the full amount of the tariff, but the price of nonfood products will increase marginally more than the price of food products.

Although a reduced form equation been estimated instead of a complete ec tion system, the findings serve as a guid explore such aspects as demand elastici for home goods, sectoral factor proporti and elasticities of factor substitution, am others. As an example, the high value c suggests that the relationship between h goods and exportable goods is weak in l consumption and production. This can p to the possibility that there are large dif ences in factor proportions and low elas ties of factor substitution within the agri tural sector.

The implications of the above results economic policy are strong. However, to these results, the reader should be awar the limitations that exist when a simpli model like the one presented here is use estimate the incidence of a given ta structure on relative prices. These limitati arise from the assumptions used to de the estimating equations. The model sumes that resources, income, foreign pri technology, and elasticities are const and that there is no surplus in the cur account. These assumptions contrast sha with the findings of a high response of economy in reallocating resources to chan in relative prices.

To test whether the assumption of c stant resources, income, and technol affected the estimated value of ω, a pr variable embodying the process of gro resulting from increasing resources, inco and technological development was inc porated in the estimating equations. T proxy variable is the monthly consumpt of electricity by the industrial sector a total consumption by the country. The timating equation was

$$\Delta \ln(P_h/P_x)_t = a + \omega \Delta \ln(P_m/P_x)_t + b\Delta \ln ECI_t \text{ (or } ECT_t) + U_t, \qquad (4.$$

where ECT is the total consumption electricity, ECI is consumption by the dustrial sector, and Δ stands for first diff ences of the variables.

[20] This section is based on Jorge García García and Jorge Marquez-Ruarte, "The Incidence of Commercial Polic Colombia," Washington, D.C., 1980. (Mimeographed.)

Table 3—Estimates of the incidence parameter

Dependent Variable	Independent Variables									$\bar{R}^2$	SER	$\rho 1$	$\rho 2$	F	D.W.
	Constant	$\ln(P_m/P_x)$	$\ln(P_m/P_{xnc})$	$\ln(P_{xc}/P_{xnc})$	$\ln(P_m/P_{xt})$	$\ln(P_{xnt}/P_{xt})$	$\ln(P_m/P_{xtnc})$	$\ln(P_{xnt}/P_{xtnc})$	$\ln(P_{xc}/P_{xtnc})$						
$\ln(P_h/P_x)$	0.6121[a] (0.24)	0.9486[b] (0.029)	...	...	...	...	...	...	...	0.90	0.0141	1.214 (0.09)	−0.22 (0.09)	1,062.0	2.07
$\ln(P_h/P_{xnc})$	0.2981 (0.31)	...	0.9695[b] (0.045)	0.0467 (0.027)	...	...	...	...	...	0.80	0.0142	1.21 (0.09)	−0.22 (0.09)	229.4	2.06
$\ln(P_h/P_{xt})$	0.5950[a] (0.24)	...	...	...	0.9641[b] (0.044)	−0.0080 (0.042)	...	...	...	0.93	0.0142	1.21 (0.09)	−0.21 (0.09)	802.6	2.07
$\ln(P_h/P_{xtnc})$	0.2958 (0.27)	...	...	...	...	...	0.9737[b] (0.047)	−0.0086 (0.043)	0.0511 (0.029)	0.91	0.014	1.21 (0.09)	−0.22 (0.09)	381.3	2.06
$\ln(P_{hf}/P_x)$	0.7315[b] (0.26)	0.9291[b] (0.041)	...	...	...	...	...	...	...	0.81	0.020	1.20 (0.09)	−0.21 (0.09)	499.5	2.05
$\ln(P_{hf}/P_{xnc})$	0.4325 (0.39)	...	0.9409[b] (0.065)	0.0519 (0.039)	...	...	...	...	...	0.64	0.020	1.20 (0.09)	−0.21 (0.09)	105.0	2.05
$\ln(P_{hf}/P_{xt})$	0.7224[b] (0.25)	...	...	...	0.9650[b] (0.063)	−0.0303 (0.061)	...	...	...	0.87	0.020	1.21 (0.09)	−0.22 (0.09)	376.9	2.05
$\ln(P_{hf}/P_{xtnc})$	0.5655 (0.32)	...	...	...	...	...	0.9583[b] (0.067)	−0.0305 (0.06)	0.0418 (0.04)	0.82	0.020	1.21 (0.09)	−0.22 (0.09)	172.4	2.05
$\ln(P_{hnf}/P_x)$	0.1647 (0.16)	0.9681[b] (0.031)	...	...	...	...	...	...	...	0.89	0.016	1.07 (0.09)	−0.09 (0.09)	945.2	2.00
$\ln(P_{hnf}/P_{xnc})$	−0.2557 (0.28)	...	1.0101[b] (0.048)	0.0518 (0.029)	...	...	...	...	...	0.79	0.016	1.05 (0.09)	−0.07 (0.09)	215.6	1.99
$\ln(P_{hnf}/P_{xt})$	0.1596 (0.15)	...	...	...	0.9804[b] (0.048)	−0.0093 (0.047)	...	...	...	0.92	0.016	1.05 (0.09)	−0.07 (0.09)	713.4	1.99
$\ln(P_{hnf}/P_{xtnc})$	−0.4297[a] (0.21)	...	...	...	...	...	0.9997[b] (0.052)	0.0205 (0.047)	0.0738[a] (0.033)	0.89	0.015	1.16 (0.09)	−0.18 (0.09)	341.6	1.97

Notes: The figures in parentheses are the standard errors of the coefficients. P_m is the price index of imports; P_h is the price index of home goods; P_x is the price index for all exports; P_{xt} is the price index of coffee exports; P_{xnc} is the price index of all exports other than coffee; P_{hf} is the price index of food home goods; P_{hnf} is the price index of home goods not used as food; P_{xnt} is the price index of nontraditional exports; P_{xt} is the price index of traditional exports; and P_{xtnc} is the price index of traditional exports other than coffee.

[a] These figures are significant at 95 percent.

[b] These figures are significant at 99 percent.

The regression run to estimate equation (4.20) was made using a correction for first-order autocorrelation. The results are:

$$\Delta\ln(P_h/P_x) = \underset{(0.0018)}{0.0025} + \underset{(0.031)}{0.933^{*}}\Delta\ln(P_m/P_x) - \underset{(0.005)}{0.008^{**}}\Delta\ln ECI; \quad (4.21)$$

$\bar{R}^2 = 0.91$, D.W. = 2.068, RHO = 0.224.

$$\Delta\ln(P_h/P_x) = \underset{(0.032)}{0.002} + 0.92^{*}\Delta\ln(P_m/P_x) + \underset{(0.026)}{0.0161}\ \Delta\ln ECT; \quad (4.22)$$

$\bar{R}^2 = 0.89$, D.W. = 2.067, RHO = 0.186.

Figures marked by * are significant at the 99 percent level, and figures marked with ** are significant at the 90 percent level. The values in parentheses stand for the standard error of the coefficient.

The estimates of ω are stable; the coefficient for the variable industrial electricity consumption is significant at the 90 percent level, while the variable for total electricity consumption is not significant.

To avoid the misspecification that could come from assuming that there is no balance-of-payment surplus or deficit, the current account balance measured in 1970 pesos was added as an explanatory variable. The current account balance for period t was defined as the current account for month t plus the accumulated current account for the five preceding months. The current account for each month was defined as the difference between exports f.o.b. and imports c.i.f.

The estimating equations were:

$$\Delta\ln(P_h/P_x)_t = a + \omega\Delta\ln(P_m/P_x)_t + b(\Delta B/B)_t + U_t. \quad (4.23)$$

$$\Delta\ln(P_h/P_x)_t = a + \omega\Delta\ln(P_m/P_x)_t + b(\Delta B/B)_t + c\Delta\ln ECI_t + U_t. \quad (4.24)$$

$\Delta B/B$ is expressed as percentage change times 100.

To estimate equations (4.23) and (4.24), there was a correction for first-order autocorrelation. The results are:

$$\Delta\ln(P_h/P_x) = \underset{(0.002)}{0.002^{+}} + \underset{(0.03)}{0.928^{*}}\Delta\ln(P_m/P_x) + \underset{(0.000013)}{0.000014^{+}}\ (\Delta B/B);$$

$\bar{R}^2 = 0.89$, RHO = −0.21.

$$\Delta\ln(P_h/P_x) = \underset{(0.002)}{0.0022^{***}} + 0.931^{*}\Delta\ln(P_m + \underset{(0.000012)}{0.000014^{***}}(\Delta B/B) - \underset{(0.006)}{0.008^{***}}\Delta\ln ECI;$$

$\bar{R}^2 = 0.89$, RHO = −0.22,

where *, +, and *** mean that the coeffic are significant respectively at the 99, 85, 75 percent level of significance. Result the Durbin-Watson statistics are not rep here because the statistical package us correct for autocorrelation did not supp However, the Durbin-Watson statistic re ing from estimating ω with ordinary l squares shows a D.W. of 1.6, so that l likely the autocorrelation problem was corrected.

Regressions were also run with the rent account balance measured mon and accumulated over three and nine mor The current account variable so defined not as significant as the six months' accu lated balance, but the estimate for incidence coefficient was highly stable significant at the 99.9 percent level.

The assumption of fixed internatic prices can be another source of specifica error, particularly in the past decade w they were volatile. To correct for this probl the international price index of import goods relative to the international p index of exportable goods (P*) was adde an additional explanatory variable to basic estimating equation (4.9) expresse first differences. The period of estimat covered January 1970-October 1979. results of the regressions using OLS

$$\Delta\ln(P_h/P_x) = \underset{(0.001)}{0.002^{*}} + \underset{(0.027)}{0.939^{*}}\Delta\ln(P_m/P_x) - \underset{(0.10)}{0.0353}\Delta\ln P^{*}; \quad (4$$

$\bar{R}^2 = 0.91$, D.W. = 1.57.

Correcting for a first-order autoregressive term, the results are:

$$\Delta\ln(P_h/P_x) = \underset{(0.0013)}{0.002^{**}} + \underset{(0.029)}{0.949^{*}}\Delta\ln(P_m/P_x) - \underset{(0.095)}{0.072}\Delta\ln P^{*}; \quad (4.28)$$

$\bar{R}^2 = 0.90$, RHO $= -0.21$.

These results stress again the high stability and significance of the incidence parameter.

The assumption that elasticities are constant (constant ω) can be an additional source of error. This problem can be handled by choosing shorter estimation periods. The results obtained, but not reported here in full, show that the estimated coefficient for ω increased from 0.86 for February 1970-December 1974 to 0.97 for January 1975-September 1979; thus, the high estimated value for ω remains, independent of the period chosen. The increase in the estimated value for ω is not surprising, since coffee became a larger proportion of total exports in the second period as a result of a substantial rise in its international price, thus making the total supply of exports less elastic.

The most serious problem, however, has to do with the definition of the price index for home goods. As it is defined by the Banco de la República, this index leaves out services, an important part of the home goods sector. To account for them, the consumer price indexes for housing and miscellaneous services were taken to represent the home goods price index instead of the one given by Banco de la República. They were used separately and as the parts of a weighted average. The share of the housing and miscellaneous consumer price indexes in the total index are 26.23 and 22.50 percent, so that the weights to construct this new price index for home goods are 53.82 and 46.18 percent. These alternative price indexes were divided by the export price index as given by Banco de la República. The estimating equation (4.9) was used again as the basic one. The regressions were run for January 1970-December 1978 with the variables in first differences and a correction for a first-order autoregressive term. The results are:

$$\Delta\ln P1 = \underset{(0.0016)}{-0.002^{++}} + \underset{(0.03)}{0.951^{*}}\Delta\ln(P_m/P_x); \quad (4.29)$$

$\bar{R}^2 = 0.90$, RHO $= -0.179$.

$$\Delta\ln P2 = \underset{(0.002)}{-0.0022^{**}} + \underset{(0.039)}{0.951^{*}}\Delta\ln(P_m/P_x); \quad (4.30)$$

$\bar{R}^2 = 0.84$, RHO $= -0.12$.

$$\Delta\ln P3 = \underset{(0.001)}{-0.0024^{*}} + \underset{(0.033)}{0.949^{*}}\Delta\ln(P_m/P_x); \quad (4.31)$$

$\bar{R}^2 = 0.90$, RHO $= -0.21$.

P1, P2, and P3 stand for the relative price of housing, miscellaneous, and services (housing plus miscellaneous goods) to exportable goods. Figures marked by ++ are significant at the 95 percent level.

The estimate for ω coming out of equations (4.29) to (4.31) is highly significant and should dissipate any doubt about the significance of the previous estimates. Thus, housing and miscellaneous goods are the quintessence of nontraded commodities. So a more refined index built from price indexes for services given by the consumer price index and for other nontraded goods given by the Banco de la República is going to give the same results reported in this study.

The modifications of the initial estimating equations stress the robustness of the estimates of ω. The general conclusion is that the incidence of commercial policy in Colombia is high. This has important implications for the formulation and application of economic policy.

Implications for Economic Policy

Several generalizations should be kept in mind while examining the implications for economic policy of the above findings. A tariff on imports affects traditional (coffee and noncoffee) and nontraditional exports by the same amount. A tariff on imports

produces a smaller increase in the price of food than in nontraded nonfood goods, relative to all traditional (coffee and noncoffee) and nontraditional exports. An import duty would raise the absolute price of importable goods and home goods by almost the same amount as the tariff.

These findings have implications for the management of policies concerning the choices between agricultural and industrial development and export promotion and import substitution, stabilization policies, and exchange rate policy.

For Colombia, in the short run, the choice between agricultural and industrial development is actually a choice between export promotion and import substitution of finished and semifinished products. Most of Colombia's exports are agricultural goods and most of its imports are raw materials, intermediate goods, and capital goods for the industrial sector. However, in the medium and long run, a strategy of export promotion is compatible and complementary to a policy of industrialization and agricultural development.

A policy of import substitution of industrial goods is a policy of taxation of agricultural and industrial exports and of other unprotected industrial activities. A subsidy for exports equal to the import tax would only restore the Colombian economy to a free trade equilibrium; it would only offset the distortions introduced by taxing imports. Taxation of imports of finished and semifinished goods and of some capital good imports discourages agricultural and industrial exports and other potentially import-competing industrial activities. The discrimination against agriculture resulting from tariffs is enhanced if industrial exports are subsidized while agricultural exports are not. It will make the country more urban and less rural. Although the economy will move toward freer trade, industrial activities will expand at the expense of agricultural activities, particularly exportable goods. The price of agricultural commodities will fall relative to the price of industrial commodities, and a distortion in international markets will be eliminated by distorting the domestic market.

In Colombia the subsidy for industrial exports only offsets, in part, the ta exports that tariffs represent. This sug that resources used to produce indus exports come mainly from import-compe industrial activities. So a policy to pror industrial exports may be more than o by an import substitution policy. Therel measures designed to save foreign excha by promoting industrial exports may save it. This is because the foreign excha savings from exports will be used to im more finished and semifinished goods, wl production will have decreased. Thi more likely to result when the productio import-competing goods and industrial c modity exports uses imported raw mate and intermediate goods heavily.

From the parameters estimated in T 3, it can be concluded that a uniform t on imports of 20 percent represents a ta exports of 18 percent. If exports are ta directly at a rate of 16 percent, as co exports are, the total tax rate is 34 percer a system of differential exchange rate imposed so that some export products h an exchange rate 10 percent lower than official rate, the total tax on these expor 28 percent.[21] Similarly, when export su dies to agricultural commodities are el nated because these commodities hav comparative advantage in international r kets, taxes on those commodities increas

Since nontraditional exports have a l supply elasticity, a small tax on trade strongly affect their volume and grov This increases the dependency of fore exchange earnings on a reduced numbe primary products in which the country h strong comparative advantage. To diver and promote nontraditional exports, i necessary to lift or reduce trade barri tariffs and nontariffs. If only the indust sector is protected from import competit and its exports promoted, the burden of t trade regime will fall entirely on agricultu A cheap source of foreign exchange is th retired from the market by the taxati arising from this system of commerc policy.

In summary, a policy to promote indus by taxing imports and subsidizing industi exports at similar rates discourages agric

[21] This system has operated intermittently in Colombia since May 1977 for some agricultural exports, with a tax r between 7 and 10 percent.

[22] This was the argument used in September 1974 to reduce or abolish the subsidy on some agricultural exports l cotton.

tural exports and the generation of additional foreign exchange (true net foreign exchange savings). Therefore, a reduction in tariffs will not only promote industrial and agricultural exports, but will also lead to a true net increase in the supply of foreign exchange.

Modern literature on devaluation stresses that an exchange rate change is conducive to an equivalent change in the price of home goods but does not produce long-run changes in relative prices. Casual evidence suggests that this occurs in Colombia.[23] If this is true, the only way for Colombia to promote exports is by changing the price of exportable goods relative to home goods. This could be achieved by directly subsidizing exports, reducing import tariffs, or eliminating quantitative import restrictions. Therefore, a devaluation will promote exports only if it is accompanied by other measures that liberalize the foreign trade system. Many of the discussions on economic policy concern absolute instead of relative prices, but the reasoning in this chapter helps to explain the success of Colombia's export promotion and "crawling peg" systems of the late 1960s and the 1970s. By increasing the price of exportable goods relative to home goods and reducing the foreign exchange gap, a higher amount of imports was permitted. Increased imports led to reductions of the implicitly high tariff for some import-competing sectors (by reducing quantitative restrictions) and in the prices of importable and nontraded goods relative to exportable goods.

[23] García and Marquez-Ruarte, "Incidence of Commercial Policy."

5

DEMAND FOR IMPORTS

Estimates of price and income elasticities of total import demand in Colombia ranged from −0.31 to −1.20 for the former and from 0.21 to 1.23 for the latter in studies by Marwah, Musalem, Khan, Brillembourg, and Reyes et al.[24] Marwah estimated 44 structural equations for the Colombian economy using annual observations for 1951 to 1962. The equations for the external sector were for imports of capital goods, raw materials, intermediate goods, fuels, consumption goods, exports of coffee, and total export earnings. He did not estimate price elasticities for the aggregate demand for imports or supply of exports.

Musalem's estimates of the demand for imports—global, consumption, capital, raw materials, and intermediate goods—are a by-product of his attempt to estimate the demand for money in Colombia from 1950 to 1967.

Khan's estimates are part of a larger effort to estimate aggregate import and export demand functions for 15 less-developed countries using annual data for 1951 to 1969. He specifies equilibrium and disequilibrium import and export demands and uses two-stage least squares to allow for simultaneity and an autoregressive process in the error term to capture the importance of trade restrictions. He found that restrictions were not important in explaining changes in import demand.[25]

Brillembourg estimates aggregate demand for imports between 1951 and 1973, incorporating expenditure (instead of incor tariffs, price, and quantitative restricti (prior licensing imports/total imports) explanatory variables.

Reyes et al estimate import dem functions for capital goods and intermed and raw material goods, with price income as explanatory variables for years (not specified) during which quant tive restrictions were not in effect.

Parameter estimates from the five stuc are summarized in Table 4.

The aggregate import function to estimated in this study is of the form

$$M = f(P_m, P_h, S), \qquad (5$$

where

- M = M^*/P^*= real dollar value of impc per year,
- M^* = dollar value of imports per year,
- P^* = international price of importa goods,
- P_m = domestic price of importable goo
- P_h = price of nontraded commodities, a
- S = an activity variable expressed in r terms.

Equation 5.1 can be transformed to

$$M = g(P, S), \qquad (5$$

where

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[24] This chapter is based on Jorge García García, "The Demand for Imports in Developing Countries: A Case Study Colombia," International Food Policy Research Institute, Washington, D.C., 1980. (Mimeographed.)

The studies are: Kanta Marwah, "An Econometric Model of Colombia: A Prototype Devaluation Vie *Econometrica* 37 (April 1969): 231-232; Alberto Musalem, *Demanda por Dinero, Inflación y Balanza de Pagos: Experiencia de Colombia en la Postguerra* (Bogotá: Talleres Gráficos del Banco de la República, 1971), Table 9; Art Brillembourg, "Specification Bias in the Demand for Imports: The Case of Grancolombian Countries," Internatio Monetary Fund, Washington, D.C., 1975, Table 1 (mimeographed); Moshin S. Khan, "Import and Export Demand Developing Countries," *International Monetary Fund Staff Papers* 21 (November 1974): Table 1; and A. Reyes, Bernar Kugler, Manuel Ramírez, Eduardo Sarmiento, and Mauricio Rubio, *Un Modelo de Corto Plazo para la Econon Colombiana* (Bogotá: Corporación Centro Regional de Población, 1977), p. 84.

Empirical studies of the demand for imports in Colombia are surveyed in Fernando Montes, "El Control y Financiamento de las Importaciones," in Colombia, Banco de la República y Asociación Bancaria de Colomb *Financiamento Externo 1977* (Bogotá: Talleres Gráficos del Banco de la República, 1977), pp. 250-253.

[25] This is surprising since it is well known that import restrictions were important in Colombia in that period. S Díaz-Alejandro, *Foreign Trade Regimes and Economic Development: Colombia*; Garcia, "The Demand for Imports"; a International Monetary Fund, *Annual Report on Exchange Restrictions* (Washington, D.C.: IMF, various years).

Table 4—Price and income coefficients of demand for imports

Source/Category	Price	Income
Marwah		
Raw materials and intermediate goods	0.47321	0.0873
Construction materials	0.14006	0.02013
Fuels	. . .	0.07009
Consumption goods	0.18364	. . .
Musalem		
Total imports	−0.94[a]	1.13[a]
Consumption goods	−1.05[a]	−0.42[a]
Capital goods	−1.30[a]	1.38[a]
Raw materials and intermediate goods	−0.47	1.28
Khan		
Equilibrium	−0.758[a]	0.210[a]
Disequilibrium	−1.201[a]	0.294[a]
Brillembourg		
Model III	−0.31[a]	1.23[b]
Reyes et al		
Raw materials and intermediate goods	−0.81[a]	0.74[a]
Capital goods	−1.25[a]	0.75[a]

Sources: Kanta Marwah, "An Econometric Model of Colombia: A Prototype Devaluation View," *Econometrica* 37 (April 1969): 231-232; Alberto Musalem, *Demanda por Dinero, Inflación y Balanza de Pagos: La Experiencia de Colombia en la Postguerra* (Bogotá: Talleres Gráficos del Banco de la República, 1971), Table 9; Moshin S. Khan, "Import and Export Demand in Developing Countries," *International Monetary Fund Staff Papers* 21 (November 1974): Table 1; Arturo Brillembourg, "Specification Bias in the Demand for Imports: The Case of Grancolombian Countries," International Monetary Fund, Washington, D.C., 1975, Table 1; and A. Reyes, Bernardo Kugler, Manuel Ramírez, Eduardo Sarmiento, and Mauricio Rubio, *Un Modelo de Corto Plazo para la Economía Colombiana* (Bogotá: Corporación Centro Regional de Población, 1977), p. 84.

[a] Elasticity.

[b] Expenditure elasticity.

$$P = P_m/P_h.$$

Using equation (5.2) for estimation assumes away aggregation problems and measurement errors. It also is assumed that importers are on their demand function for imports, that they are price takers in international markets, and, by using current values of the variables, that they adjust completely within each year. In addition, the model assumes that either general quantitative import restrictions are not present or that they do not affect imports.

To attempt to estimate a demand for imports without recognizing the existence of severe quantitative restrictions can lead to serious misspecification. To account for this, the import demand function should incorporate a restrictions variable R so that equation (5.2) would be:[26]

$$M = h(P, S, R). \qquad (5.3)$$

An indicator for quantitative restrictions is needed because relevant information on the price effectively paid for imported commodities is not available. The specification of R is discussed later.

The basic functions (5.2) and (5.3) are used to estimate an import demand function for Colombia for different spans of time. No attempt is made to estimate a simultaneous equation model. The variables are:

[26] This variable was used for Colombia in Musalem, *Demanda por Dinero,* and Brillembourg, "Specification Bias." Khan, "Import and Export Demand" incorporates this variable by assuming that quantitative restrictions can be represented by an autoregressive term in the import demand function, but does not explain the economic meaning of negative or positive signs for such a term.

M^d = real imports (in U.S. 1970 dollars),
P = relative price of imports $= E_m(1 + \bar{t}) \cdot P^*_m/P_d$ (in 1970 pesos),
S = real output (Y) or absorption (A) (in 1970 Colombian pesos),
E_m = exchange rate for imports (pesos per dollar),
$\bar{t}$ = average duty paid on imports,
P_d = wholesale price index, since there is not a price index for nontraded commodities for the whole period,
P^*_m = U.S. export price index,
R = restrictions variable, to be defined later,
Y = gross national product (GNP), and
A = GNP + imports − exports.

Information on the value of imports usually is expressed in dollars and pesos. The c.i.f. dollar value of imports is used here. The deflator is the U.S. export price index instead of a weighted average of the export price index of Colombia's total imports. Use of this deflator will underestimate the estimated price elasticity of the demand for imports if the elasticity of the "correct" price index with respect to the proxy index is less than one; this seems to be true for Colombia.[27]

In the absence of nontariff restrictions on imports, the domestic price of importable goods (P_m) can be approximated l international price plus any surchar imports times the exchange rate. nontariff barriers are used to restrict i and their price equivalent is know should be added to obtain the total importing.[28] Thus, the price variable P be defined as

$$P = E_m(1 + \bar{t})\ P^*_m/P_d.$$

The exclusion of $\bar{t}$ and P^*_m tends to estimate the price elasticity, while the the wholesale price index as price d instead of the price index of nontraded tends to overestimate it. $\bar{t}$ and P^*_m are in to calculate P, and the wholesale pric is used as a deflator because a price i nontraded commodities is not availa the entire period under study. Also, t portunity cost of prior import depos been incorporated to give another m of the cost of importing in Colombi

The activity variables used to e the demand for imports are incon expenditure. Use of the former is ba the grounds that if a substantial frac total imports is raw materials, intern products, and capital goods, impo

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[27] Let the true import function be

$$M_t = M/P_t = (P_t)^{\alpha} Y^{\phi}$$

where M_t and M are the true real and nominal imports measured in foreign currency units, P_t is the true (corr index, and Y is the correct activity variable.

Let the incorrect price index (P_f) and incorrect activity variable (S) be related to the true variables in the f form:

$$P_t = P_f^{\phi},$$

and

$$Y = S^{\lambda},$$

then

$$M_t = (M/P_f)\ (P_f/P_t) = M_f \cdot (P_f/P_t),$$

and

$$M_f = (P_t)^{1-\alpha}\ (Y^{\phi})\ P_f = S^{\lambda\phi}\ P_f^{[\phi(1-\alpha)-1]}.$$

Expressing M_t and P_t as functions of the incorrect price and activity variables, the price and income elasti the demand for imports as measured by M_f are given by $\eta^f = \partial \ln M_f/\partial \ln P_f = \phi(1 - \alpha) - 1$ $= \partial \ln M_f/\partial \ln S = \lambda\phi$. Therefore, it can be concluded that η^f will not be biased if either $\phi = 1$ or $\alpha = 1$, and E be biased if $\lambda = 1$. When $\phi < 1$, η^f will be underestimated.

[28] The price index for Colombian imports is available on an annual basis from 1964 to 1974. A regressi annual price index for Colombian imports as given by Colombia, Banco de la República, *Indices de Comerci de Colombia: 1960-1974* (Bogotá: Talleres Gráficos del Banco de la República, 1976) on the annual U.S. exp index as given by International Monetary Fund, *International Financial Statistics Yearbook 1979* (Washingt 1979) produced the following results in

$$\ln PICI = \underset{(0.35)}{1.1069} + \underset{(0.07)}{0.771}\ \ln PIUSE;$$

$\bar{R}^2 = 0.88$, D.W. = 0.39, df = 13.

mainly a function of domestic output. However, the use of absorption is more consistent with the theoretical formulation of macroeconomic models for open economies.[29]

Imports in Colombia can be measured by actual (realized) imports and import registrations (approved import applications). Information available on import applications is limited.

In the absence of global quantitative restrictions, import registrations are a good indicator of the true demand for imports. If import restrictions are heavy, however, their significance as a measure of demand is reduced because they are then determined mainly by the economic authority. Import registrations can be made at small cost. They are not an obligation to import, which would entail greater costs. Therefore, registrations tend to adjust rapidly to changing conditions in both domestic and international markets. Since information on current international prices, exchange rates, tariffs, and economic activity are readily available, there should be only a small lag between the decision to import and asking for authorization to import. Depending upon the condition of international reserves, the lag between the application to import and the authorization to import can be small or large. It is determined by the Instituto Colombiano de Comercio Exterior (INCOMEX).

The value of import registrations will be fully reflected in imports if expectations at the time of registration are fulfilled. Otherwise, realized imports will differ from approved import applications. The use of registrations as a measure of imports has the advantage that the price deflators used—international and domestic—better reflect prices in international markets when the goods are ordered. Thus they reflect more closely the response of imports to current price changes.[30]

The above arguments should not be taken to mean that actual realized imports are not a good measure of the importing activity. Both measures are used to estimate the import demand function.

Global and generalized quantitative restrictions are used to eliminate excess demand for foreign exchange administratively. If the price variable used for estimation does not measure the true demand price for foreign currency, quantitative restrictions on imports should be taken into account.

For a long time Colombia has imposed global restrictions on imports. A reasonable measure of these restrictions is the percentage of approved import applications. This is the best indicator of restrictions if import applications are independent of the rate of approval; however, if the rate of approval is known, the actual "true" demand for imports will be known and no need to use such an index arises. When applications depend, among other things, on the rate of approval, the price elasticity will be biased.

In Colombia, information about import applications is incomplete, and it is hard to construct an index that truly reflects the restrictiveness of the system.[31]

The system of restrictions in Colombia groups commodities into three lists—free, prior licensing, and prohibited. The Board of Imports, which administers the system, denies or approves imports of commodities on the prior licensing list. The Board of Foreign Trade has the authority to shift commodities from one list to another. Thus, instead of using the rate of approval of applications, the ratio of imports in the free list to total imports could be used. This proxy index of restrictions is not a good indicator for restrictions when a large fraction of imports is prohibited and the rest are in the free list, since it may show a higher degree of liberalization than actually exists. Also, it tends to overstate restrictiveness when imports in the prior licensing list make up the bulk of imports but controls are loose.

The problem of restrictions can be handled in two ways; first leaving out observations for the years in which restrictions are thought to be strongest; second, using a dummy

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[29] For a discussion of the use of absorption as a relevant variable in the analysis of aggregate import demand functions, see Stephen P. Magee, "Prices, Incomes and Foreign Trade," in Peter B. Kenen, ed., *International Trade and Finance* (Cambridge: Cambridge University Press, 1975), p. 229.

[30] The use of registrations as a measure of imports is also related to the problem of understated lags. These lags make the response of imports to changes in exchange rates seem stronger than it is. See Magee, "Prices, Incomes, and Foreign Trade," pp. 211 and 216.

[31] Attempts are made to construct such an index in Garcfa, "History of Policies," Appendix 5.

variable that has a value of one for the years with restrictions and zero for the years in which global restrictions were weaker or nonexistent. The first procedure is chosen here. The choices of periods are based on the author's knowledge of developments in commercial policy.[32] Regressions for the alternative of leaving observations out were also run but the results are not reported here.

Colombia has had exchange and imports controls for a long time. They were particularly severe, though of variable intensity, between 1955 and 1970. Numerous attempts to liberalize foreign trade failed.[33] During the 1970s, quantitative restrictions were used to protect particular sectors rather than to solve balance-of-payment problems. This being so, one can argue that import data for the 1970s reflect an ex-ante demand for imports concept and should allow a correct estimate of an import demand function that incorporates restrictions (dummy variables) for part of the 1950s and most of the 1960s.

The functional forms of the estimating import functions are:

$$\ln M_t^d = a + b\ln P_t + c\ln S_t + u$$

and

$$\ln M_t^d = a + b\ln P_t + c\ln S_t + dD +$$

where

M_t^d = import registrations or act
ports in real terms (dollars) in
P_t = purchasing power parity a
cost of importing in period
tariffs (Z_t) and with tariffs
portunity cost of prior depo
S_t = activity variable, GNP (Y) or
tion (A); and
D = dummy variable.

All equations were estimated using o
least squares. The results are pr
below.

The first set of regressions per
corresponds to the estimated import f
(5.5) and the observations cover the
1953-78 period. The results are in Tal
general, the results are good. All the
cients have the expected sign and

Table 5—The demand for imports, 1953-78

Equation	Constant	Z	Z^1	Y	A	Observations	$\bar{R}^2$
1	3.991	−1.137	...	1.100	...	26	0.71
	(1.22)	(0.27)		(0.15)			
2	−2.506	...	−1.041	1.047	...	26	0.76
	(1.06)		(0.21)	(0.12)			
3	2.156	−0.930	...	...	1.198	25	0.68
	(1.62)	(0.26)			(0.18)		
4	−4.545	...	−0.894	...	1.177	25	0.73
	(1.40)		(0.20)		(0.15)		
5	0.084	−0.945	...	0.794	...	26	0.62
	(1.05)	(0.23)		(0.13)			
6	0.412	...	−0.872	0.753	...	26	0.67
	(0.91)		(0.18)	(0.10)			
7	−0.950	−0.760	...	...	0.831	25	0.55
	(1.40)	(0.22)			(0.16)		
8	−0.804	...	−0.737	...	0.817	25	0.62
	(1.22)		(0.17)		(0.13)		

Notes: The dependent variable for equations 1 - 4 is import registrations; for equations 5 - 8 it is actual imp
standard errors of the estimated coefficients are shown in parentheses.

[32] See Díaz-Alejandro, *Foreign Trade Regimes and Economic Development: Colombia*, Chapter 1; Garcia, "H
Policies"; Musalem, *Demanda por Dinero*; and International Monetary Fund, *Annual Report on Exchange Re*

[33] See Díaz-Alejandro, *Foreign Trade Regimes and Economic Development: Colombia*; Chapter 1; and Garcia, "H
Policies."

nificant at a level of 99 percent. Some problems of autocorrelation are present in equations (1) and (3), and equations (4) and (7) passed the Durbin-Watson test marginally at the 1 percent level of significance. It should be noted that the problem of autocorrelation is not present when the price variable is specified to include the opportunity cost of prior import deposits.[34] Also, the estimated price elasticity of demand is lower when Z' is used instead of Z. Both the price and income (expenditure) elasticities of the demand for imports in dollars are statistically different from zero but not from one. These are relatively high values compared with those of the other studies.

Although the results are satisfactory, the restrictions on imports during the 1950s and 1960s raise the question of whether the estimated coefficients reflect the relatively liberal system in the early 1950s and the liberalization of the 1970s rather than the response of imports to changes in income and prices for the entire period. Regressions using actual imports as dependent variables were run for 1953-70, 1959-70, and 1970-78 to clarify the nature of the response of imports to price and income variables and to determine whether restrictions were operative during the shorter periods. The results are:

for 1953-70,

$$\ln M = \underset{(2.77)}{2.724} - \underset{(0.37)}{0.7628}\ \ln Z + \underset{(0.31)}{0.5170}\ \ln Y,$$

$\bar{R}^2 = 0.22$, D.W. = 1.60;

for 1959-70,

$$\ln M = \underset{(2.81)}{4.4674} + \underset{(0.53)}{1.1167}\ \ln Z - \underset{(0.34)}{0.1027}\ \ln Y,$$

$\bar{R}^2 = 0.52$, D.W. = 1.94;

and for 1970-78,

$$\ln M = \underset{(5.33)}{7.2876} - \underset{(0.65)}{1.4366}\ \ln Z + \underset{(0.31)}{0.3216}\ \ln Y,$$

$\bar{R}^2 = 0.72$, D.W. = 2.36.

For the 1959-70 period of heavy restrictions on imports, the estimated price and income coefficients have the "wrong" sign. When observations for periods during which there was relative freedom to import are used, the estimated coefficients have the expected sign, but some are not significant. In view of this, import demand functions were estimated using a dummy variable to measure restrictions.

The dummy variable takes a value of one for the years 1956-65 and 1967 when the dependent variable is import registrations. It takes a value of one for the years 1957-65 and 1967 when actual (realized) imports are the dependent variable. Different starting years are used for the dummies because restrictions are reflected immediately on approvals. But there is some lag before the imports registered are actually imported. This effect was not present in 1967 because a strict import control system was established at the end of 1966 following a strong movement to liberalize imports in late 1965 and the first half of 1966.

The choice of the periods permits an estimate to be made of the average degree of restrictions on imports for the period in which they have been most severe. However, the selection made here tends to underestimate the duration and overall intensity of restrictions since some years in which restrictions were in operation have been classified as nonrestrictive.

The results are presented in Table 6. The coefficients have the expected sign and are significant at the 99 percent level. The $\bar{R}^2$ increases and the standard error of the regression falls by almost 50 percent. The estimated values for the price and income coefficients are lower than those of Table 5. Also, when the price variable includes the opportunity cost of prior import deposits, the size of the restrictions, as indicated by the value of the estimated coefficient for the dummy variables, decreases. The use of absorption instead of income reduces the estimated (absolute) value of the coefficients for the restrictions and price variables. When the dependent variable is actual imports instead of import registrations, the estimated coefficients are lower. The estimates in Table 6 show that imports respond quickly to price and income changes, and that the imports control system reduced the

[34] There is a problem with measuring this opportunity cost. It is given by three sources, each of which covers a different period and uses different indicators to measure the cost. See Table 19.

Table 6—The demand for imports with restrictions incorporated, 1953-78

Equation	Constant	Z	Z^1	Y	A	D	Observations	$\bar{R}^2$
1	0.603	−1.041	...	0.836	...	−0.320	26	0.88
	(0.92)	(0.17)		(0.10)		(0.054)		
2	−0.947	−0.796	...	...	0.850	−0.296	25	0.86
	(1.31)	(0.17)			(0.14)	(0.056)		
3	0.210	...	−0.885	0.784	...	−0.284	26	0.89
	(0.90)		(0.14)	(0.098)	...	(0.054)		
4	−0.920	...	−0.712		0.830	−0.265	25	0.86
	(1.27)		(0.15)		(0.13)	(0.056)		
5	2.440	−0.713	...	0.543	...	−0.260	26	0.82
	(0.84)	(0.16)		(0.10)		(0.049)		
6	2.534	−0.482	...	...	0.474	−0.259	25	0.80
	(1.12)	(0.15)			(0.12)	(0.047)		
7	2.561	...	−0.635	0.516	...	−0.235	26	0.83
	(0.79)		(0.14)	(0.091)		(0.049)		
8	2.491	...	−0.453	...	0.472	−0.239	25	0.81
	(1.08)		(0.13)		(0.11)	(0.048)		

Notes: The dependent variable for equations 1 - 4 is import registrations; for equations 5 - 8 it is actual imp
standard errors of the estimated coefficients are shown in parentheses.

demand for imports around 25 percent in years when it is thought to have been more severe.

The results of another set of regressions using a dummy variable that considered 1968 as a year of restrictions are not shown here. They were similar to those in Table 6, though the estimated price and elasticities tended to be lower. Sev gressions that included dummy v for fewer years also were made. All presented a higher coefficient for tions, and the overall fit was inferio of Table 6.

6

EXCHANGE RATES, COMMERCIAL POLICY, AND RELATIVE PRICES

During the last 30 years, Colombia has relied on differential exchange rates, tariffs, and quantitative restrictions to protect imports and on differential exchange rates and export subsidies to promote exports. These measures sometimes achieved the desired objectives. Most other times, they were needed to offset the negative effect on the balance of payments of fixed exchange rates and domestic inflation, thereby distorting the structure of relative prices of commodities and factors of production beyond what was probably initially desired. The combined effect of these measures was a tax on the export sector. The tax was higher for agricultural than for industrial exports and was heaviest on coffee. The relative price for exportable goods was lower than it would have been if trade were freer and if the national currency were realistically valued. The size of the subsidies for exports is much easier to calculate than is the size of the implicit tariff on imports resulting from quantitative restrictions. The implicit tariff from import restrictions can be calculated either by using information on domestic and international prices of commodities subject to import restrictions or it can be estimated indirectly by using information on the elasticity of demand for imports and the size of the restrictions on imports. The second way has been chosen here since information on domestic and international prices is not readily available by commodity.

Highlights of the foreign trade system of Colombia during 1953-78 follow.[35] Later, gross tariffs and subsidies, the tariff equivalent of import restrictions, and the net tax or subsidy on exports of different categories are calculated.

Exchange Rate Policy

A policy of fixed exchange rates with sporadic devaluations was pursued in 1953-67. Sometimes a "free" market coexisted with the official foreign exchange market. The foreign exchange proceeds of exports other than coffee, crude petroleum, rawhides, platinum, and bananas, and the purchase of foreign exchange to pay for some imports was left to this market. Beginning in March 1967, the peso was devalued almost daily so that the periodic crises in the balance of payments no longer occurred. The exchange rate was unified, except for the rate used to purchase the proceeds of crude oil exports. This was unified in 1975.

Commercial, Restriction, and Export Promotion Policies

Colombian tariffs for consumption goods were higher than those for intermediate and capital goods. This was effective for the industrial sector, which produced consumption goods and imported intermediate and capital goods. This structure is still in force, though the degree of distortion has been substantially reduced. In general, tariffs were not high enough to maintain equilibrium in the current account. This led to widespread administrative restrictions on imports.

Import restrictions have been a permanent tool of economic policy in Colombia, though their use has varied in intensity. There was relative freedom to import in 1953-55. This

[35] The development of the Colombian foreign trade system between 1950 and 1972 is described in Díaz-Alejandro, *Foreign Trade Regimes and Economic Development: Colombia* and García, "History of Policies." The structure of the export promotion system in Colombia is analyzed in Teigeiro and Elson, "Export Promotion System," pp. 419-471; Martha H. Cardona, "El Crecimiento de las Exportaciones Menores y el Sistema de Fomento de las Exportaciones en Colombia," *Revista de Planeación y Desarrollo* 9 (Abril-Septiembre 1977): 49-78; and Ffrench-Davis and Piñera-Echenique, *Políticas de Promoción*.

was substantially curtailed in 1956 and 1957 when many importable goods were prohibited and a bureaucratic apparatus was established to handle the system. The prohibited list was reduced in 1962, although import licensing was still in effect. From 1963 to the end of 1966, import policy was erratically managed, resulting in speculative runs at the end of 1966 when restrictions were stiffened again. Since 1968, restrictions have been gradually reduced. At present, import controls are used to protect particular sectors of the economy rather than to solve balance-of-payment problems.

The system of differential exchange rates adopted in 1953 was abolished in March 1967, except for crude petroleum. From 1957 to 1962 an export tax was levied, but in 1960 profits from minor exports were exempted from the income tax. These profits were assumed to be no more than 40 percent of the gross value of exports. This incentive was replaced in 1967 by a tax credit certificate (CAT), which was exempt from income taxes and whose value could reach 15 percent.

Another export incentive system, known as Plan Vallejo, was established in the late 1950s and is still in operation. Its principal provisions are that imports of raw materials, intermediate products, and capital equipment used in the production of industrial products that are exported may be exempt from prior license, advance import deposit, and tariffs. Teijeiro and Elson, and Cardona estimated that the financial value of this system is around 12 percent of the gross value of nontraditional (manufactured) exports.

Another element of the export promotion system is the use of special credit facilities which, in fact, are another subsidy for exports. One particular feature is the advance exchange surrender against which potential exporters could borrow foreign exchange in international markets to sell to the Central Bank and repay it with their export proceeds. The exchange risk resulting from the devaluation of the peso during the period in which the loan was outstanding was covered by the Central Bank. Another source of subsidized credit is the Fondo de Promoción de Exportaciones (PROEXPO), whose come from a 5 percent tax on impor percent before 1975). These funds ar mainly to finance exports of manufa products.[36]

Finally, the peso for certain agricu commodity exports was revalued in 1 means of an ingenious mechanism. Ex could sell their foreign exchange pr to the Central Bank at a discount, or r a certificate of exchange that was negotiable in the capital markets.

Coffee exports have been taxed d at varying rates throughout the period study, sometimes by differential exc rates, at other times by explicit export

Bias in the Trade Regime

The decisions of private produce consumers are determined by the r market prices of different activities. fore, an activity will be promoted or relative to others if the ratio of their is greater or less than one. Simil strategy of development has an i competing or export-promoting bias ratio of the price of imports to the p exports is greater or less than one;[37] i words, if the effective exchange rate f ports relative to that for exports is gre less than one, or if $(P_m/P_{lv})/(P_x/P_{lv}) = (P_m/P_x)$

The ratio of import and export exc rates can be a measure of the bi determining the exchange rate for im all taxes and other surcharges on i that implicitly raise the cost of imp should be included and import sub and other measures that reduce the c importing should be deducted. The exc rate for exports should be net of taxe include all subsidies, direct or indirec in one way or another can raise the received by exporters. While the rat tween the two rates measures bias, i nothing about the incidence of th crimination created by any particula tective structure. If:

[36] In fact only 25 percent of PROEXPO's financing goes to agricultural exports (excluding coffee). See Fo Promoción de Exportaciones, *Informe Presentado por la Dirección, 1967-77* (Bogotá: Gráficas Gloria, 1977), pp.

[37] See Bhagwati, *Foreign Trade and Development: Anatomy and Consequences*, Chapter 8.

E_m = nominal exchange rate for imports;
E_c = nominal exchange rate for coffee exports;
E_{xm} = nominal exchange rate for minor exports;
E = weighted exchange rate for all exports;
Z = nominal cost of importing, including tariffs;
Z^1 = nominal cost of importing, including tariffs and opportunity cost (the tariff equivalent) of the prior import deposits;
$\bar{t}$ = average ad valorem import tariff (revenues/imports);
i = average ad valorem tariff equivalent of the opportunity cost of prior import deposits;
S_T = export subsidy equivalent via tax credit certificate;
S_c = export subsidy equivalent via special credit facility;
S_i = export subsidy equivalent via drawback system or exemption of import duties on raw materials; and
α_c = share of coffee exports in total exports;

then

$$Z = E_m (1 + \bar{t});$$

$$Z^1 = E_{xm} (1 + \bar{t} + \bar{i});$$

$$E^1 = E_{xm} (1 + S_T);$$

$$E^2 = E_{xm} (1 + S_T + S_c);$$

$$E^3 = E_{xm} (1 + S_T + S_c + S_i); \text{ and}$$

$$E = \alpha_c E_c + (1 - \alpha_c) E^1.$$

The above definitions of exchange rates enable us to measure the "apparent" import-substituting or export-promoting bias of Colombia's foreign trade regime by main groups of commodities.

The variable Z measures the direct, observable cost of importing, while Z^1 adds to it the opportunity cost of prior import deposits. The variable E^1 is the exchange rate for all minor exports that received an export subsidy in the form of a tax credit certificate. Until the end of 1974 all minor exports received the same treatment on subsidies. Since 1975 industrial exports have been treated more favorably than agricultural exports. In 1977 the peso was revalued for exports of coffee, cattle and beef, cotton, and flowers. Thus E^1 is a lower limit for the minor exports exchange rate. The variable E^2 measures the exchange rate for exports that received special credit facilities in addition to the tax credit certificate, but were not industrial exports—for example, cotton. E^3 is the exchange rate for industrial exports which received the benefit of importing duty-free raw materials and intermediate goods used in the production of their export products. E is the average exchange rate for all exports and incorporates direct taxes and the income tax credit certificate for minor exports. This exchange rate may overestimate the true average exchange rate for the 1950s by a small margin since, by the weighting system used here, higher value is imputed to the exchange rate of some products that are classified as major exports (crude oil, bananas, and rawhides), but that actually received a lower rate.

To measure the bias of the system, any export exchange rate can be used as numeraire. The export exchange rate (E) is used here to establish the apparent bias of Colombia's foreign trade regime. The measured ratios of exchange rates are presented in Table 7.

The figures for the ratio of the nominal cost of importing to the export exchange rate indicate that Colombia has an import substitution bias that has raised the prices of importable goods relative to the prices of exportable goods by 15-35 percent. The ratio of the export exchange rates of agriculture and industry to the export exchange rate, which is greater than one, shows an export promotion bias.[38] These awkward results are explained by the export exchange rate for coffee. The ratio of the coffee exchange rate to the export exchange rate is less than one—that is, coffee exports were taxed. A comparison of the export exchange rates for agriculture with those for industry

[38] E^2/E is a better measure of the subsidies given to some agricultural exports that received special credit facilities, like the advance exchange surrender. Other facilities, like credit from PROEXPO, were open mainly to industry.

Table 7—Observed tariffs and export subsidies, 1953-78

Year	Ratio of the Nominal Cost of Importing to the Average Export Exchange Rate		Ratio of the Exchange Rate by Export Category to the Average Export Exchange Rate			
	Z/E	Z^1/E	E_c/E (Coffee)	E_1/E (Agriculture)	E_2/E	(Ir
1953	1.27	1.29	0.98	1.05	1.05	
1954	1.26	1.28	0.99	1.04	1.04	
1955	1.14	1.16	0.93	1.29	1.29	
1956	0.91	0.94	0.83	1.47	1.47	
1957	1.08	1.14	0.89	1.35	1.35	
1958	1.27	1.37	0.90	1.32	1.32	
1959	1.21	1.29	0.88	1.36	1.36	
1960	1.35	1.45	0.92	1.18	1.18	
1961	1.12	1.21	0.84	1.37	1.37	
1962	1.00	1.06	0.85	1.37	1.37	
1963	1.19	1.40	0.83	1.35	1.35	
1964	1.18	1.29	0.84	1.38	1.39	
1965	1.01	1.18	0.70	1.52	1.55	
1966	1.40	1.53	0.80	1.36	1.39	
1967	1.24	1.35	0.83	1.28	1.33	
1968	1.23	1.34	0.85	1.24	1.28	
1969	1.20	1.31	0.84	1.20	1.21	
1970	1.21	1.33	0.86	1.23	1.26	
1971	1.18	1.29	0.83	1.20	1.25	
1972	1.16	1.22	0.81	1.17	1.24	
1973	1.17	1.23	0.81	1.17	1.20	
1974	1.14	1.24	0.79	1.15	1.17	
1975	1.19	1.26	0.85	1.12	1.18	
1976	1.23	1.24	0.88	1.14	1.22	
1977	1.29	1.29	0.90	1.15	1.23	
1978	1.27	1.27	0.91	1.15	1.22	

Source: The method used to derive these figures is explained in the text. Exchange rates are given in App Table 21.

Note: To obtain the tariff or subsidy, subtract one from the relevant figure.

shows that industrial and noncoffee agricultural exports were treated equally until 1959 but after 1960 industrial exports were favored.

Evidence that only coffee exports were discriminated against and all other exports were favored seems to be supported by a comparison of the nominal costs of importing with the export exchange rates for agriculture and industry. The reason for this apparent contradiction is that the nominal cost of importing measures the observed cost of importing and not the true price received by the import-competing activities. Import restrictions were so pervasive during the late 1950s and the 1960s that the figures in these two columns indicate only the lower boundary of the import subsitution bias and give misleading ideas of the ture of protection in Colombia.

The nominal cost of importing on part of the story. As will be shown bel import substitution bias in some ind sectors discriminated against the a tural and the industrial export secto other import-competing industrial s The nominal cost of importing is low b 70 percent of imports are of capital raw materials, and intermediate inpu by industry. Duties on these import low, but they were subject to severe qu rationing. Most imports used as inp agriculture were severely restricted high import duties because they we mestically produced.[39]

[39] Many believe that agriculture in Colombia was being either subsidized or treated the same as industry tractors entered almost duty free, without restrictions, and with an overvalued currency. See, for examp Enrique Araya and Carlos Ossa, *La Mecanización en la Agricultura Colombiana* (Bogotá: Asociación de Importa Maquinaria Agrícola, 1976), p. 15.

When a move to promote all minor exports equally was made during the 1953-60 period, noncoffee agricultural exports increased but industrial exports did not grow rapidly until after the export promotion reforms of 1959 and 1960. Starting in 1960, industrial exports were promoted more than noncoffee agricultural exports.[40]

Administrative import restrictions were the most important instrument to protect the import-competing sector of Colombia. A substantial portion of this protection cannot be estimated directly, but has to be estimated in some other way.[41]

"True" Import Tariffs and Export Subsidies

Two estimates of the "true" import tariff resulting from the application of tariffs and the system of import licensing were made. For the late 1950s and the 1960s, the results of the demand for imports are used. The "apparent" import tariff and export subsidies for the 1970s are calculated, with a somewhat different methodology, using domestic and international price indexes.

To estimate the tariff $\tilde{t}$ resulting from given quantitative import restrictions, only the percentage reduction in the quantity of imports induced by such a system and the price elasticity of the demand for imports are needed. This information is presented in Table 6.

The price coefficient from Table 6 is the demand elasticity. The dummy variable coefficient indicates the average percentage by which restrictions reduced imports from what they would have been at the ruling level of economic activity and cost of importing. Letting $\hat{\eta}$ denote the estimated demand elasticity and $(d\hat{Q}/Q)$ the coefficient of the dummy variable, the tariff equivalent of import restricitons is

$$\tilde{t} = (d\hat{Q}/Q) / \hat{\eta} \qquad (6.1)$$

The $\tilde{t}$ so estimated should be added to the calculated observed tariff $(Z/E - 1)$ to obtain the "true" tariff paid on imports. Also to determine whether export subsidies offset any part of the effect of the "true" import tax, the subsidy for each category has to be compared with this "true" tariff. If the net subsidy is positive, exports are promoted, otherwise they are taxed.

To calculate $\tilde{t}$, the logarithmic demand equations estimated with expenditure as the scale variable and Z as the price variable (cost of importing including import duties only) are used. Recalling that the estimated demand elasticities range between −0.71 and −0.45, and the estimated shift parameters (coefficient for dummy variable) between −0.27 and −0.24, and using equation (6.1), it is found that $\tilde{t}$ ranges between 37 and 54 percent. In other words, the price that could have been effectively charged for one unit of foreign exchange exceeded that actually charged by 37 to 54 percent. This is the transfer from the rest of the economy to

[40] A feature of these developments is that some industrial products that are strongly protected from foreign competition form a large part of industrial exports. See Gonzalo Giraldo, "Estructura de la Protección Arancelaria y Para-ancelaria en Colombia después de las Reformas," *Revista de Planeación y Desarrollo* 11 (Mayo-Agosto 1979), Tables 4 and 5.

[41] A study by Hutcheson of effective protection in Colombia in 1969 uses domestic and international prices to measure the scarcity premium of import licenses and the net rates of protection granted to different activities. He finds that the effective rate of protection for agricultural activities was negative but the effective rate for industrial activities was positive. See Thomas L. Hutcheson, "Incentives for Industrialization in Colombia" (Ph.D. dissertation, University of Michigan, 1973). Another study finds that a weighted average of the nominal tariff schedule by sector was 35 percent in 1972 and 29 percent in 1974, the weight being the share of each sector's imports in total imports. See Luis Jorge Garay, Manuel Martinez, and Ricardo Villareces, *Análisis de la Estructura de Control a las Importaciónes en Colombia*, tomo 2 (Bogotá: Fundación para la Educación Superior y el Desarrollo, 1974). Tables 16 and 17. In December 1976 a simple arithmetic average of the tariff schedule was 28.9 percent; see Colombia, Departamento Nacional de Planeación, *Estructura de la Protección según el Arancel Colombiano y el Arancel Externo Mínimo Común en Junio y Diciembre de 1976*, Documento DNP-1433-UEI (Bogotá: Departamento Nacional de Planeación, 1977), p. 99. The same arithmetic average was 26 percent in the second half of 1979 (Giraldo, "Estructura de la Protección," Table 3). The average nominal tariff for the whole schedule in 1970 was 70 percent. See Roberto Junguito and Carlos Caballero, *Situación y Perspectivas de la Economia Colombiana en Relación con el Proceso de Integración Andino* (Bogotá: Fundación para la Educación Superior y el Desarrollo, 1974), Table 3.

those private importers who were granted the privilege of importing.[42]

Now that the size of the import premium has been established, the net effect on prices of actual tariffs, import restrictions, and export subsidies can be determined. In 1956-67 the import premium is added to the observed tariff but in 1968-78 it is not. The average (arithmetic) observed tariff is derived from the figures for Z/E in Table 7 and the average (arithmetic) export subsidies and taxes are derived from the figures for E_c/E, E_1/E, and E_3/E in that same table. This information is summarized in Table 8.

Table 8 shows that the discrimination against the export sector in the 1970s was substantially less than in the 1950s and 1960s, despite the large gross subsidies granted to exports during these early years. The net rate of tax on agricultural noncoffee exports for the 1950s and 1960s ranged between 20 and 37 percent compared to 4 percent in the 1970s. Coffee has always been taxed (in net terms) but the rate fell from 68 and 85 percent in the 1950s and 1960s to around 36 percent in the 1970s. In contrast, the net tax on exports from the industrial sector was between 10 and 27 percent in the 1950s and 1960s and became a subsidy of 10 percent in the 1970s. This explains why industrial exports increased so rapidly after 1967 despite a reduction in the observed rate of the subsidy (Table 7).

This analysis indicates that agricultural exports were and are still being taxed, with coffee bearing the main burden. On the other hand, several branches of industry have been protected by import tariffs and export subsidies. During the 1950s and 1960s this protection was primarily intended to promote import substitution. In the 1970s more emphasis was given to the promotion of exports of industrial goods, while less emphasis was placed on import substitution. However, the system of export promotion favored some industrial import-competing

Table 8—Summary of import tari export subsidies, 1956-

Premium, Tariff, or Subsidy	1956-67	1
	(percent)	
Import premium	37 to 54	
Nominal tariff[a]	16	
"True" import tariffs	53 to 70	
Export subsidies		
Agriculture		
Coffee	−15	
Other	33	
Industry	43	
Net Subsidy		
Agriculture		
Coffee	−68 to −85	
Other	−20 to −37	
Industry	−10 to −27	

[a] Derived from the column for Z/E of Table

activities discriminated against in the and 1960s, as the upward adjustments real exchange rate increased protecti them.[43]

These findings indicate that polic sions provided an incentive to move res out of agricultural exports and into i able goods and nontraded goods, a tural and nonagricultural.

Another method of estimating the tariffs on imports and subsidies on e during the 1970s uses the domestic indexes of imports and exports, the national price indexes of Colombia's i able and exportable goods, and the exc rates for imports, coffee exports, an coffee exports.[44] Thus if P_j^* and respectively, the international and do price index of commodity j,[45] and E_j nominal exchange rate for that comm the tariff index for that commodity is d by:

[42] The reader should remember that a lower limit is put on the estimated size of the tariff. In fact, the opp costs of prior import deposits and of the waste of resources that importers incurred as a result of the (proba transaction costs required to obtain import licenses are not counted. By taking the average of the real excha (PPP), real imports, and real GNP, the estimated annual transfer to importers between 1956 and 1967 ranges 3.2 and 4.6 percent of the average real GNP.

[43] See Hutcheson, "Incentives for Industrialization."

[44] This material is based on García García and Marquez-Ruarte, "Incidence of Commercial Policy."

[45] An explanation of how the international price indexes for importable goods and exportable goods were d given in Appendix 1.

$$1 + t_j = (P_j/EP_j^*). \qquad (6.2)$$

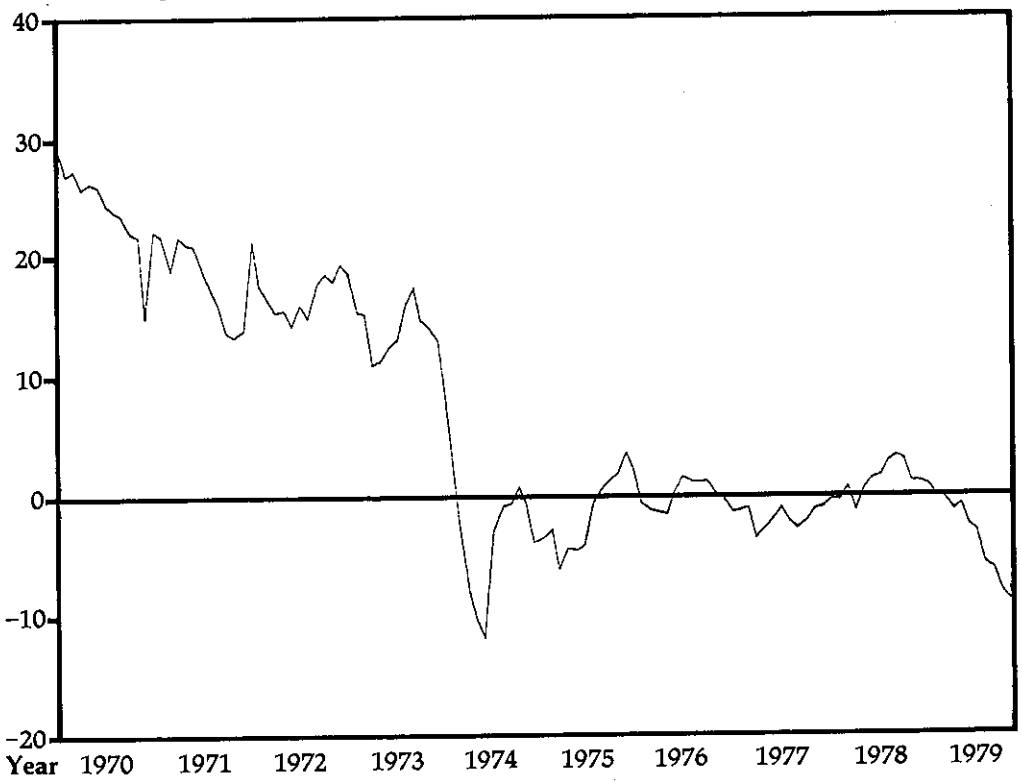
As equation 6.2 gives an index, the apparent tariff for each period can be obtained by applying the appropriate index number to the tariff for the base year. The same procedure is followed to obtain the apparent subsidy for exportable goods.

The results are shown in Figures 5 and 6, in which tariffs and subsidies are measured as 12-month deviations from the tariff or subsidy in the base year. The vertical axis in each chart measures the relation $\hat{t}_j = (t_j - t_{76})/(1 + t_{76})$ for import tariffs and $\hat{S}_j = (S_j - S_{76})/(1 + S_{76})$ for export subsidies. To obtain t_j and S_j, which measures the implicit apparent tariff and subsidy, one only needs to know t_{76}, S_{76}, $\hat{t}_j$, and $\hat{S}_j$. (The monthly values for t_j and S_j are shown in Appendix 3, Table 14.)

Figure 5 shows that the average tariff fell steadily from 1970 to mid-1974, then rose until it stabilized at the end of 1974. The average tariff paid in the base year, 1976, according to the Customs Bureau is 16 percent; at the beginning of 1970 the measured apparent tariff reached 50 percent. So tariffs and other trade restrictions were considerably reduced in the last decade. Although some sectors are still protected by tariffs and quantitative restrictions, their number is dwindling.[46]

Figure 5— Apparent import tariff, 1970-79

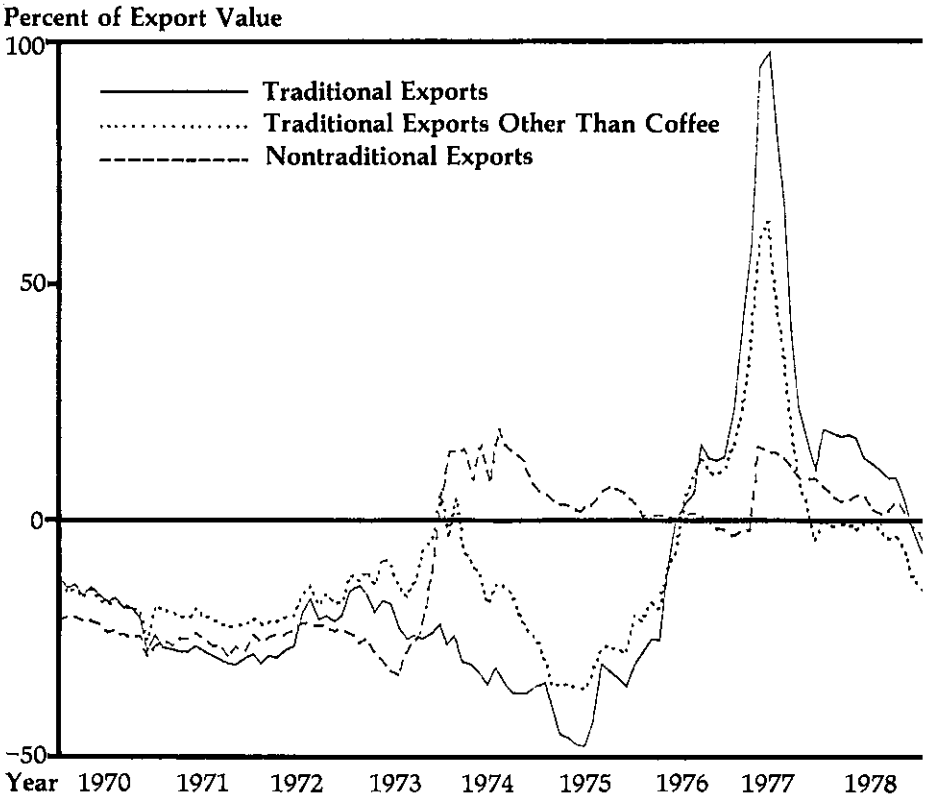
Percent of Import Value



Note: The apparent import tariff ($\hat{t}_j$) is measured as $\hat{t}_j = (t_j - t_{76})/(1 + t_{76})$, where t_{76} is the tariff in 1976. Base t_j is equal to 0 in 1976.

[46] For example, restrictions on imports of some textiles that could compete with Colombian textiles have not been lifted.

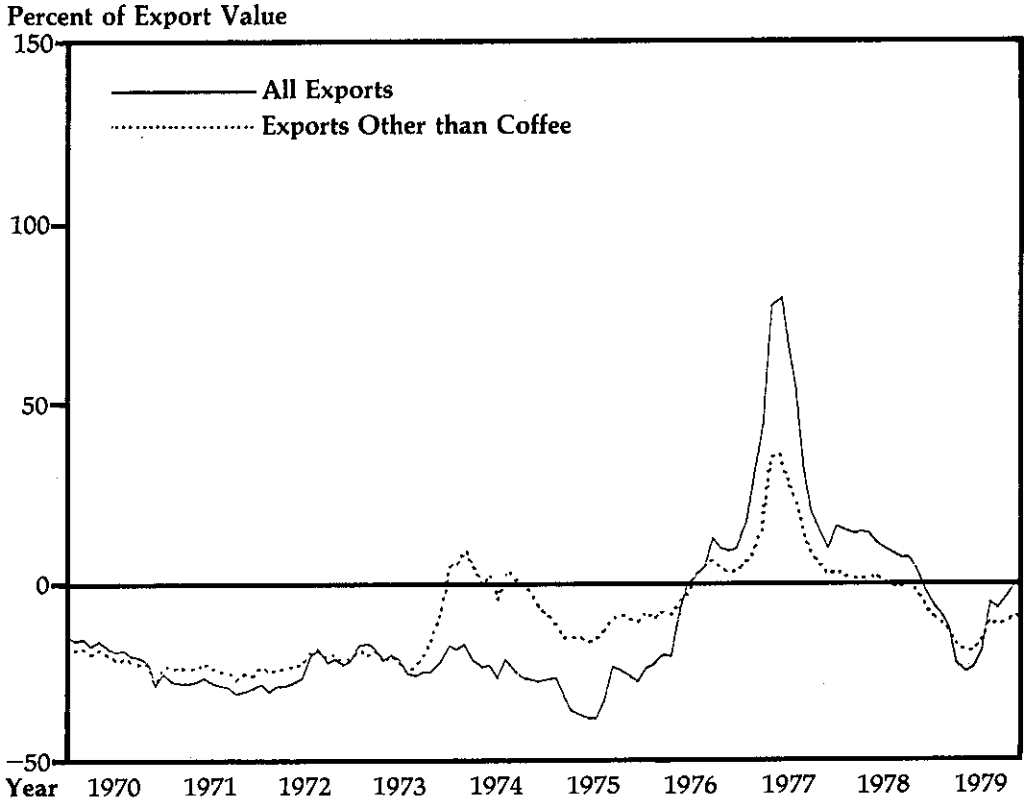
Figure 6 — Apparent export subsidies for traditional exports, trad exports other than coffee, and nontraditional exports, 1970-79



Note: The apparent import subsidy $\hat{s}_j$ is measured as $\hat{s}_j = (s_j - s_{76})/(1 + s_{76})$, where s_{76} is the tariff in 1976 equal to 0 in 1976.

Two problems arise in connection with the interpretation of variation in export subsidies shown in Figure 7. First, it was difficult to construct an index of foreign prices for each export category, so only one was used for all Colombian exports. there are no published figures of subsidies for the categories show specific number cannot be assigne subsidy of each category.

Figure 7—Apparent export subsidies for all exports and for exports other than coffee, 1970-79



Note: The apparent import subsidy $\hat{s}_j$ is measured as $\hat{s}_j = (s_j - s_{76})/(1 + s_{76})$, where s_{76} is the tariff in 1976. Base $\hat{s}_j$ is equal to 0 in 1976.

7

HAS FOOD PRODUCTION BEEN PROTECTED?

A consistent goal of agricultural policy in Colombia has been to obtain self-sufficiency in agricultural production in general and in food production in particular as well as a stable and increasing food supply to consumers. The importance of this goal is emphasized by the fact that as recently as 1972, 80 percent of the households spent 45 percent or more of their incomes on food.[47] Self-sufficiency has been achieved largely because of the natural resource base of the country and the design of policies to protect food production. In addition, the great diversity of food products grown in the country contributes to stability in the growth of food production.

Only 12 products supply slightly more than three fourths of the protein and calories in the average diet.[48] The ratio of availability to production (in tons) for these products was 0.99 for 1950-75.[49] The annual value of imports and exports of raw food products constituted less than 5 percent of either total imports or total exports in 1960-77. Most food imports are wheat.[50]

Production of food grew 3.0 percent per year in 1950-75 but 3.6 percent per year in 1960-75. The variability of food production around the trend was 3.7 percent for 1950-75 and only 2.1 percent for 1960-75. The absolute variability fell from 322 thousand tons per year in 1950-75 to 295 thousand tons per year in 1960-75.[51] Natural conditions make it relatively easy to adjust to s in trend production of one commod out causing strains in overall supp

Food output per capita fell 1.0 per year in the 1950s, but rose 0.4 pe year in the 1960s. Although the rate 0.5 percent in the 1970s, output per the end of the decade was the same beginning of the 1950s. The unsat rate of growth per capita probabl traced to the negative effects trad had on exports and the rate of g income.

Domestic and Internation Prices

Domestic and international p meat, milk, rice, wheat, sugar, corn palm oil, and cotton have been com determine whether these produc been protected or taxed by restric their imports and exports. The inter c.i.f. prices are evaluated at the export exchange rate (E). The c prices are those received by prod paid by consumers. Whenever the the domestic to the international p particular product is higher than c product is being protected. The rate of protection is the excess of over one.[52] These price ratios are s

[47] Colombia, Departamento Administrativo Nacional de Estadística, *Ingresos y Gastos de los Hogares e* (Bogotá: División de Edición del DANE, 1977), Table 4.1.

[48] These products are potatoes, milk, plantains, brown block sugar, sugar, rice, meat, wheat, cassava, corn and beans. See García García, "Es Importante la Seguridad," Table 1.

[49] Ibid., Table 2.

[50] See International Bank for Reconstruction and Development, *Economic Growth of Colombia: Problems an* (Baltimore, Md.: Johns Hopkins University Press, 1972), Table 14-5; and Colombia, Departamento N Planeación, *Política Agropecuaria y el Sistema de Alimentos: Diagnóstico*, tomo 2, Documento de Trabajo DN (Bogotá: Departamento Nacional de Planeación, 1979), Annex Tables 17 and 18.

[51] The variability is measured as the standard error of the trend regression line (García García, "Es Im Seguridad," pp. 135-136).

[52] It can be argued that since only the nominal rate of protection is measured and since only the eff matters for production, this statement is correct only if the nominal rate of protection for purchased inp traded is lower than the nominal rate of protection for the final product. However, the nominal rate of pro fertilizers, particularly urea, was about the same as for final agricultural food products. Exportable goo doubt, taxed in this way because they were paid at low exchange rates and their inputs had to be boug above the international ones. In addition, the imports of some, such as coffee, were taxed explicitly. Othe cotton, had to be sold in the domestic market at prices lower than international ones.

Table 9.[53] When interpreting them, it should be noted that some domestic prices are for producers, others are for wholesalers, and still others are for consumers. In addition, the ratio of the import exchange rate to the export exchange rate is shown to indicate the amount of adjustment required to find the nominal rate of protection resulting when the international price is evaluated at the import exchange rate.

Table 9 shows that some agricultural activities have been protected from foreign competition for most of the 25 years under analysis. Others were protected only during the 1950s and 1960s, and others were taxed. The highest periods of protection were the late 1950s and the 1960s, when the peso was considerably overvalued. When the overvaluation of the peso was reduced, the protection fell on all these activities and became negative for some, such as sorghum, soybeans, rice, barley, and sugar, thus giving a subsidy to domestic consumption. To establish whether each particular commodity was taxed or protected as a result of the combination of microeconomic policies and the overvaluation of the peso, the individual nominal rates of protection are compared with the measure of overvaluation.

The analysis of this report indicates that the "true" import tariff was somewhere between 53 percent and 70 percent in the 1950s and 1960s (Table 8) and 20 percent in the 1970s. It also indicates that coffee exports were taxed 15 percent and other exports received a gross subsidy of between 33 percent and 43 percent in the 1950s and 1960s, and between 16 and 30 percent in the 1970s. The high share of coffee exports in total exports suggests that, in the aggregate, exports were taxed at a rate of 12 percent in the 1950s and 1960s and 7-8 percent in the 1970s.[54] For simplicity, it is assumed that exports were taxed at a rate of 10 percent for the whole period. Therefore, the distortion in prices, or the rate of overvaluation of the peso, was around 70 percent in the 1950s and 1960s, and 30 percent in the 1970s. It is likely that the estimates of the amount of price distortions introduced by the foreign trade regime are underestimated. Nevertheless, Table 9 provides a basis for determining which food products were overprotected relative to a free trade situation.

The trade policies followed during 1953-78 imposed a tax on sorghum, soybeans, barley, and cotton. Their production was far smaller than it would have been with free trade.

The rates of nominal protection for corn and rice in the 1950s and 1960s were lower than the rate of overvaluation of the peso. This is much clearer for rice than for corn. In the early 1950s, however, both products received net rates of protection. The pattern of protection was different in the 1970s when technological development in the production of rice led to a large decrease in the price of rice. In fact, the trade policy followed toward potential rice exports imposed a tax on rice production in addition to the tax from the overvaluation of the peso. The nominal protection for corn production, despite its variation during the decade, did not offset such overvaluation, and output had too little incentive to expand.

A third group of products—milk, vegetable oil, and wheat—clearly belongs to the category of truly importable goods. In other words, the ratio of their domestic prices to international prices has always been above the measured rates of overvaluation of the peso. The figures in Table 9 do not support the notion that domestic producers can compete effectively with foreign suppliers. If imports of milk and vegetable oil were allowed to enter freely, the country would probably become a larger importer of these two products. Wheat is the only major food product imported during the whole period covered in this study.

The nominal protection for sugar was higher than the rate of overvaluation for

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[53] To interpret these ratios, several considerations should be kept in mind. When the domestic price is the producer's price, as it is for wheat, corn, sugar, barley, and milk, the ratio shows the protection granted to production. This assumes that port-to-consumer costs for imports equal farm-to-consumer costs for domestic products. When the domestic price is the wholesale price, as it is for rice and vegetable oils, some adjustment has to be made to measure the protection granted to the domestic producer. These adjustments have not been made here. Lastly, when the domestic price is the price paid by the consumer, as it is for meat, the margin of adjustment is higher than when the domestic price is the wholesale price. No correction has been made for this either.

[54] These rates are found by weighting the taxes and subsidies of Table 7 by the share of each group of exports in total exports.

Table 9—Ratios of import to export exchange rates and of domestic to international prices, selected agricultural products, 1953-78

Year	Import Exchange Rate/ Export Exchange Rate	Producer/International Prices							Wholesale/ International Prices		Consumer/ International Prices	
		Sorghum	Soybeans	Milk	Wheat	Corn	Sugar	Barley	Vegetable Oil	Rice	Meat	Cotton Fiber[a]
1953	1.05	n.a.	n.a.	n.a.	2.24	1.48	1.79	n.a.	n.a.	1.77	n.a.	1.14
1954	1.04	n.a.	n.a.	n.a.	2.85	2.08	1.91	n.a.	n.a.	1.97	n.a.	1.25
1955	0.92	n.a.	n.a.	n.a.	2.53	2.00	1.78	n.a.	n.a.	1.39	3.03	0.73
1956	0.74	n.a.	n.a.	n.a.	2.12	1.77	1.39	n.a.	n.a.	1.50	2.87	0.57
1957	0.92	n.a.	n.a.	n.a.	2.49	1.95	1.24	n.a.	n.a.	1.58	2.59	0.77
1958	1.17	n.a.	1.45	2.37	2.37	1.31	1.82	n.a.	n.a.	1.13	1.98	0.52
1959	1.06	n.a.	1.78	1.85	2.59	1.56	2.33	n.a.	n.a.	1.20	2.22	0.68
1960	1.15	n.a.	1.35	2.17	2.34	1.69	2.13	1.51	n.a.	1.52	2.28	1.26
1961	0.96	n.a.	0.99	2.35	2.15	1.77	2.12	1.62	n.a.	1.99	2.18	0.93
1962	0.87	n.a.	1.05	1.95	1.74	1.20	2.10	n.a.	n.a.	1.05	2.23	0.90
1963	1.06	n.a.	1.17	1.65	1.74	1.55	0.82	1.54	2.73	1.04	2.12	1.00
1964	1.05	n.a.	1.52	2.08	2.15	1.95	1.24	1.71	2.99	1.41	1.83	1.11
1965	0.88	1.27	1.17	1.93	2.05	1.32	2.50	0.97	2.00	1.55	1.42	0.83
1966	1.14	1.25	1.14	2.60	2.17	1.45	3.12	1.32	2.98	1.66	1.97	1.17
1967	1.07	1.05	1.13	2.37	1.76	1.58	2.43	1.28	2.08	1.37	1.92	1.02
1968	1.07	1.54	1.21	2.95	1.85	1.56	2.55	1.22	2.56	1.26	1.55	0.93
1969	1.05	1.23	1.25	2.86	1.88	1.31	1.35	1.18	2.63	1.09	1.54	0.89
1970	1.07	1.12	1.29	2.69	1.81	1.32	1.54	1.12	2.56	1.06	1.20	0.93
1971	1.05	1.07	1.11	1.76	1.30	1.33	0.96	1.12	2.64	1.05	1.01	0.84
1972	1.02	1.34	0.94	1.44	1.47	1.58	0.59	0.57	2.56	0.83	0.89	0.74
1973	1.02	0.94	0.54	1.88	0.74	1.25	0.47	0.65	1.53	0.52	0.80	0.76
1974	1.03	0.77	0.74	1.57	0.85	0.87	0.17	0.68	1.52	0.54	0.73	0.71
1975	1.07	0.90	0.97	1.25	1.34	1.06	0.30	1.06	1.49	0.65	1.63	0.95
1976	1.11	1.02	1.07	1.41	1.40	1.21	0.63	0.98	1.88	0.83	1.79	1.00
1977	1.14	1.65	1.22	1.93	2.03	2.30	1.37	n.a.	1.61	1.13	1.95	1.02
1978	1.15	n.a.	n.a.	1.67	n.a.	1.82	n.a.	n.a.	n.a.	0.95	n.a.	0.95

Sources: These figures were derived from data in Tables 21, 24, and 25. The column for cotton is taken from Jorge García García, "Aspectos Económicos del Cultivo del Algodón en Colombia: Políticas de Precios de Comercio Exterior y de Crédito entre 1953 y 1978," International Food PolicyResearch Institute, Washington, D.C., 1979, Table 11. (Mimeographed.)

Notes: The international prices are c.i.f. except where noted. n.a. means not available.

most of the 1950s and the first half of the 1960s, and so stimulated production. However, in the 1960s the country started exporting sugar. One possible explanation for this apparently awkward result is that sugar producers restricted domestic sales in order to have supplies for export to maximize profits in domestic and foreign markets. Exports continued during the 1970s, but the domestic price was less than the international price. Although Colombia seems to have a clear comparative advantage in sugar production, the policy of restricting sugar exports helped keep domestic prices lower than international prices.

The domestic price used for meat in Table 9 is the consumer price while the international price is on a c.i.f. basis. The two prices are not strictly comparable since the latter should include all the marketing costs from the port of entry to the final consumer. If a 50 percent marketing margin is added arbitrarily to the international price, then it seems that meat production before 1965 was protected, sometimes by a substantial margin, as in the second half of the 1950s.[55] Colombia exported cattle until 1953, then was out of the export market for almost 10 years. During this period, Colombia would have imported cattle or meat if domestic production had not been protected. Meat exports started after 1962, and there was a close correspondence between domestic and international prices in the second halves of both the 1960s and the 1970s. In the first half of the 1970s the domestic price was less than the international price. The country has a competitive edge as an exporter of meat, but apparently much technological development is necessary if this advantage is to be maintained.[56]

Several food products are not listed in Table 9 because there is no international market for them. These include cassava, potatoes, plantains, and beans. Their production was probably favored by the resulting distortions from commercial policies. As export activities in agriculture become less profitable, some resources would move to the production of these foods, among others. Also, as the relative prices of other food products rose, people would try to buy more of the nontraded food products. Therefore, one would expect their output and price to be higher than it would have been in a free trade situation.

Price Distortions and Food Production

Empirical evidence for Colombia (Chapter 4) suggests that a tariff on imports has an important effect on exportable goods and may result in a major reallocation of resources. Since the agricultural export sector has been taxed, one would expect that a reduction in the output of agricultural exports would lead to an increase in the production of food, since some of the resources released probably would move into the food sector. However, the effect on food output would depend essentially on domestic supply and demand considerations, since the food sector has become essentially a nontraded sector by policy decision.

These interactions among sectors can be explained better with a simple example. Suppose that traditional (agricultural) exports are taxed, which reduces the domestic price received by the producers. For simplicity it is assumed that all resources released will then produce food. Thus, looking only at supply, there is a tendency for food output to increase and prices to decline. But if traditional exports and nontraded food are good substitutes in consumption, lower domestic prices of traditional exports will tend to reduce the demand, output, and prices of nontraded food. In summary, changes in production of nontraded food will depend on the relative size of the shifts in supply and demand.

The above example supports the point made in Chapter 3 that the effects of commercial policy on the output of food depend on the own-price elasticities of demand and supply of food and the cross-price elasticities of supply and demand of food and traditional

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[55] There is usually a 35 percent margin between wholesalers and consumers in the meat marketing chain. A gross 50 percent margin means that the margin left between producers and wholesalers is only 11 percent.

[56] A preliminary analysis of the problems of the livestock sector in Colombia is found in Jorge García García, "The Economics of the Livestock Sector in Colombia: 1957-1977," International Food Policy Research Institute, Washington, D.C., 1980. (Mimeographed.)

exports. These interactions are analyzed by means of a single comparative static model which uses information on the estimated value of the incidence parameter ω and on estimates done by other researchers on supply and demand elasticities for food.

In a model with three types of goods (importable goods, exportable goods, and food) in which the nontraded commodity is food, the comparative static change in the output of food caused by changes in relative prices introduced by import tariffs and export subsidies is given by

$$\hat{H} = -(t - s)\varepsilon_{hh}(\eta_{hx} + \eta_{hh} \cdot \gamma_{hx})/(\varepsilon_{hh} - \eta_{hh}), \quad (7.1)$$

where

$\hat{H}$ = percentage change in the output of food,
t = the uniform tariff on imports
s = the uniform subsidy on exports
η_{hx} = cross-price elasticity of demand between home goods and exportable goods,
ε_{hx} = cross-price elasticity of supply between home goods and exportable goods,
η_{hh} = own-price elasticity of demand (substitution effect only) for home goods,
ε_{hh} = own-price elasticity of supply of home goods, and
$\gamma_{hx} = \varepsilon_{hx}/\varepsilon_{hh}$.

(See Appendix 4 for a derivation of equation [7.1].)

Since the change in the output of food depends on both the size and the incidence of tariffs, it is convenient to show the relationship between the incidence parameter and the price elasticities of supply and demand for home goods. This is given by equation (7.2):

$$1 - \omega = (\eta_{hx} + \varepsilon_{hx})/(\varepsilon_{hh} - \eta_{hh}), \quad (7.2)$$

where

$$\eta_{hh} = -\eta_{hx} - \eta_{hm}$$

and

$$\varepsilon_{hh} = \varepsilon_{hx} + \varepsilon_{hm}.$$

Since the own-price elasticities of and demand can be expressed in te cross-price elasticities (equations [7. [7.4]), it can be concluded that the ch the output of food depends only on price effects between home goods a other two goods in the economy, exp goods and importable goods. Howe working purposes, the formulation of e (7.1) is kept.

The model used here has certain tions. It is essentially static and dc take into account technological chan growth. Thus, the "estimates" only how much larger or smaller produc food was because of the tariff, given a of food self-sufficiency and assumi food remained nontraded. The assu that food is nontraded can be defen the grounds that for the period unde food was by policy decisions turned commodity for which equilibrium was r by balancing internal demand with i supply. Also, as a practical poin technological change occurred serious price distortions in the econ Another serious limitation of the m the assumption that the effect o distortions on real income is insign But a reasonable expectation is that tions will reduce real income as wel potential demand and supply of food. fore, increases in output of food ar estimated and the reductions are estimated. Finally, more serious limi of the model are the assumptions th is no growth and that distortions affect the rate of accumulation of fa production. To overcome this limit dynamic model would be required, b is beyond the scope of this research. caveats should be kept in mind whe preting the results presented below.

[57] "...the production gains which occurred in Colombia's agriculture during the period 1950-71 wer primarily by expansion in the use of inputs and very little by efficiency improvements. In fact, for the cr about 95 percent of the increase in output was explained by the increase in inputs, and for the livestock sec 95 percent of the output increase was explained by expanded input utilization" (Orozco, "Sources of Ag Productivity," p. 140).

To measure the change in food output, the relations (7.1) and (7.2) are used. That change depends on the size of the distortions and on the price elasticities (equation [7.1]). Since some information is available on own-price elasticities and on the incidence of commercial policy, by using equation (7.2) inferences can be made about the values of the cross-price elasticities as long as the restrictions in equations (7.3) and (7.4) are met. In addition, since the estimated value of ω is less than one, the lower bound for the values of ε_{hx} and η_{hx} can be zero.[58] The choice of values for η_{hh} and ε_{hh} can now be made.

There are few estimates for the value of η_{hh} in Colombia. Most estimates available are for expenditures or income elasticities for urban centers. From them it has been inferred that the value of η_{hh} is 0.35 using some simplifying assumptions.[59] Albert Berry estimated the own-price elasticity of demand to be between 0.3 and 0.5 for 1950-67.[60] Given the available range of estimates and the empirical evidence for other countries, two limiting values for η_{hh}—0.35 and 0.65—have been taken.

Aggregate estimates for ε_{hh} are more precarious. Using partial equilibrium models, Junguito estimated that the supply response is large for some truly nontraded food products such as cassava and beans but much smaller for some others such as plantains and potatoes.[61] In the aggregate, one would expect that the supply response of total food output in a general equilibrium framework will be lower than in a partial equilibrium model. In this study estimates were made of the elasticity of supply of the 12 main food products of Colombia for 1950-76 and 1953-67. This value was found to be between 0.5 and 0.95 (see Appendix 2). It has been argued by Peterson, using information on an international cross-section basis, that the aggregate supply elasticity of agricultural products in the long run is much higher (between 1.25 and 1.65) than what has been estimated until now, which is closer to a short-run elasticity.[62] This is well above normal estimates. The alternative values adopted here for the supply elasticity of food output are 0.35 and 1.65. An extreme value of zero for ε_{hh} or η_{hh} is not used because the resulting prediction is that the output of food does not change.

Values for the size of taxes are those previously used—70 percent for 1956-67 and 30 percent for 1968-77. Finally, a value of 0.95 for ω has been used to calculate the potential size of the cross-price elasticities between home goods and exportable goods.

The calculated lower and upper bounds for the value of the change in the output of food are presented in Table 10. The higher the value of ε_{hh}(η_{hh}), given $\eta_{hh}(\varepsilon_{hh})$, the larger (smaller) the change in the output of food. The change in food output is not large compared to the size of the distortion because the high value of the incidence parameter imposes low values on η_{hx} and ε_{hx}.

The calculated change in the output of food can be positive or negative, depending upon whether food and exportable goods are more substitutable in production than in consumption. Thus, when the demand for food does not react to changes in the price of exportable goods, output of food is likely to increase, as some resources will move within agriculture toward the production of food. This is probably true in Colombia, since agricultural exports (raw materials and coffee) and food are not much related in demand, but are certainly related in supply. Consequently, output of food in Colombia could have been 0.12 to 2.27 percent higher in 1956-67 than it would have been in the absence of distortions and 0.05 percent to 1.0 percent higher in 1968-77. This analytical

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[58] This is a reasonable assumption since $\omega < 1$ implies that $(\eta_{hx} + \varepsilon_{hx}) > 0$, and in a world with three goods one would expect commodities to be substitutes in production and consumption, that is η_{hx}, $\varepsilon_{hx} > 0$.

[59] See Rafael Prieto, "Gasto e Ingreso Familiar Urbano en Colombia," *Ensayos Programa de Estudios Conjuntos sobre Integración Económica Latinoamericana*, Agosto 1977, pp. 45-121; and García García, "Es Importante la Seguridad" for the derivation of the price elasticity of food from the information provided by Prieto.

[60] See Albert Berry, "The Growth Process: Increase in Traditional Inputs, Technological Change and Price Changes in Colombian Agricultural Development: A Broad View," n.p., n.d. (Mimeographed.)

[61] He found that the long-run supply elasticity for cassava and beans was higher than 2.3, but was only 0.3 for potatoes and 0.6 for plantains. See Roberto Junguito, "Precios Agrícolas, Producción y Asignación de Recursos: La Experiencia Colombiana," *Coyuntura Económica* 10 (Abril 1980): Table 5.

[62] Willis Petersen, "International Farm Prices and the Social Cost of Cheap Food Policies," *American Journal of Agricultural Economics* 61 (February 1979): 12-22.

Table 10—Change in the output of food

η_{hh}	ε_{hh}	η_{hx}	ε_{hx}	γ_{hx}	$\hat{H}$ t–s = 70 percent	$\hat{H}$ t–s = 3
					(percent)	
−0.35	1.65	0.10	0.00	0.00	−5.77	−2
	1.65	0.00	0.10	0.0606	+1.22	+0
−0.35	0.35	0.0035	0.00	0.00	−0.12	−0
	0.35	0.00	0.0035	0.01	+0.12	+0
−0.65	1.65	0.115	0.00	0.00	−5.77	−3
	1.65	0.00	0.115	0.06969	+2.27	+0
−0.65	0.35	0.05	0.00	0.00	−1.23	−0
	0.35	0.00	0.05	0.14285	+2.27	+0

exercise indicates that if nothing else changes, protection of the agricultural food sector permitted production of food to increase not more than 2.3 percent over what it would have been in a free trade situation.

This conclusion should be qualified in relation to the assumption in this analysis that the size of the distortion does not affect real income, the factor markets, or growth. The 70 percent price distortions make this a strong assumption. It would be expected that distortions of this size would reduce output and income below their potential levels, thereby inducing lower output of food, importable goods, and exportable goods. The long-run effects of these distortions could be serious. Not only would output fall, but the incentives to save, invest, and adopt new technologies would be hampered considerably, reducing future output of food and income. In fact, a simulation model made by de Melo for Colombia using information for 1969 on distortions of prices in commodity markets indicates that the change in real income from the elimination of distortions can be between 4 and 5 percent of GNP.[63] Therefore the results obtained here are at best an optimistic view of the effects of price distortions on the production of food. The following tabulation suggests that the trade policies of Colombia have influenced growth of GNP, incc capita, and agricultural and food ou the 1953-67 and 1968-78 periods:

	1953-67 1
Total GNP	4.4
Per capita GNP	1.3
Agricultural output	3.1
Total food output	2.7
Per capita food output	−0.6

The policy of self-sufficiency i that the stimulus to increase food pro had to come from domestic demanc ever, this was slowed by the low grov of income which probably arose fr price distortions introduced by th policies. If food production had riser in 1953-67 as in 1968-78, it would ha 11 percent higher in 1967 than it rea This would have reversed the trend capita production, which fell at an rate of 0.58 percent between 1953 an

The limitations of this comparativ framework for predicting the effect c production of price distortions indu trade policies emphasize the need for in interpreting the results. Howev findings still serve as a useful genera until a truly dynamic framework applied.[64]

[63] Jaime A. P. de Melo, "Estimating the Costs of Protection: A General Equilibrium Approach," *Quarterly J Economics* 92 (May 1978): 209-27.

[64] For a model of agricultural growth with a dynamic framework, see Yair Mundlak, *Intersectoral Factor Mo Agricultural Growth*, Research Report 6 (Washington, D.C.: International Food Policy Research Institut

8

CONCLUSIONS

Clearly policies to encourage self-sufficiency have had a pervasive effect on Colombian agriculture. To summarize, in Colombia 90 percent of a tariff on imports falls on the export sector, both on the traditional exports—agricultural and mining products—and on industrial exports. This means that a uniform tariff of 30 percent on all imports leads to a reduction of 27 percent in the price of exportable goods relative to home goods. In the same manner, an export subsidy of 50 percent represents an increase of 45 percent on the price of exportable goods relative to home goods.

The system of restricting imports through licensing reduced imports by 24-32 percent below what they otherwise would have been between 1956 and 1967. No estimates of the tariff equivalent of import restrictions were made for the 1967-78 period, but it is known that some restrictions were still present.

The estimated implicit tariff resulting from the application of quantity restrictions to imports between 1956 and 1967 ranged from 37 percent to 54 percent. Adding the average duties actually paid, 16 percent, increases the overall tariff to 53-70 percent.

Both the calculated tariff and the actual import tariff for 1968-78 are estimated to be 20 percent. This is an underestimation, especially through the early 1970s, when quantity restrictions were still in force. An alternative estimate for the 1970s only, made by another method, indicates that implicit tariffs were about 50 percent in 1970 but fell drastically in 1973, stabilizing at 16 percent beginning in early 1975.

The gross taxes or subsidies on exports, measured with respect to a weighted average of the coffee exchange rate and the minor exports exchange rate, inclusive of income tax credits, were:

- Coffee exports were taxed 16 percent for the whole period;
- Other agricultural exports received, on the average, a gross subsidy of 33 percent between 1956 and 1967, and 16 percent between 1968 and 1978; and
- Exports of industrial goods received average gross subsidies of 43 percent from 1956 to 1967 and 30 percent from 1968 to 1978.

As measured by the nominal rate of protection (domestic price/international price minus one), many potentially tradable agricultural commodities were highly protected in the 1950s and 1960s, but protection rates fell in the 1970s, sometimes turning into a tax. The nominal rate was particularly high for food products. During the 1950s and 1960s it reached more than 100 percent for milk, wheat, sugar, and vegetable oil. The rate for corn was more than 50 percent and for barley and rice it was more than 30 percent. The rate for meat reached 100 percent in the late 1950s, but dropped to between 20 and 50 percent in the 1960s. Of these products, only corn, milk, wheat, and vegetable oil clearly received nominal protection in the 1970s, their rates ranging between 25 and 50 percent. Nominal rates of protection have been negative for sugar, barley, rice, and meat since the beginning of the 1970s. The nominal rate of protection for sorghum and soybeans has been less than 10 percent most of the time. It was negative for cotton, with a few exceptions, from the 1950s to the first half of the 1970s.

Net Incentives

Export products were discriminated against in the 1950s and 1960s. In the 1970s, however, exports of manufactured commodities were subsidized to such an extent that the gross subsidy more than offset the overvaluation of the peso. Exports of agricultural products have been taxed, on a net basis, during the period under analysis. Thus, subsidies did not offset the overvaluation of the Colombian peso. This means that the production of bananas, coffee, cotton, tobacco, and flowers, among others, was discouraged, probably to a large extent.

During the 1950s and 1960s many potentially tradable food products, imports of

which were prohibited or restricted, were protected; their measured nominal rates of protection outweighed the overvaluation of the peso. Although the effective rate of protection is a better measure of net incentive, the share of purchased inputs such as fertilizers and pesticides in the cost of production was too small to affect the conclusions of this study. Moreover, in the 1960s the main purchased input, urea, had a nominal rate of protection equal to or lower than that of many of these products.

During the 1970s sugar, barley, and rice showed negative nominal rates of protection, in some cases reaching 50 percent. The 20 percent overvaluation of the peso in the 1970s was in effect another tax in addition to that imposed by export restrictions.

Several nontraded food commodities—cassava, potatoes, plantains, and other roots—are indirectly affected by the incentives granted by trade policies. Transport costs of these products are a real barrier to trade. As long as other food imports are not allowed to enter, the rise in the relative price of potentially importable food products is an incentive for consumers to increase consumption of nontraded foodstuffs and, hence, an incentive to produce them. If they do not compete for the use of land with importable foods, their output will increase.

The effects of incentives on food production are not clear cut because the analytical model used to derive them is essentially static. Apparently price distortions from protection had little effect on food production, which probably increased only 1.2 percent over what it would have been otherwise. However, because the effect of the distortion is permanent, the real income of the community probably decreased, consequently reducing the demand and supply of food. A crude approximation indicates that the policy pursued between 1953 and 1967 could have reduced food output by 10 percent from what it would have been in 1967.

Implications for the Design of Economic Policy

The importance of an export promotion strategy and the depressing effect a tariff has on exports points to the need for a low tariff level. For example, a uniform tariff of 30 percent on all imports constitutes a tax equivalent of 27 percent on all exp
means that exports with high supply
ties will be unable to compete in inte
markets. In this context, the simu
promotion of nontraditional (ir
exports and import substitution in
ization are not compatible, because r
will move mainly between activities
ing exportable and importable goo
the industrial sector.

The joint policy of isolating the
tural food sector from international
and protecting domestic productic
portable goods is inconsistent with
aimed at promoting self-sufficie
cheap food. Research indicates tha
will raise the relative price of in
goods and food almost equally. Tl
the best way to lower food pric
reducing overall levels of protecti

A comparison of domestic ar
national prices shows the clear a
nonfood agricultural products ha
food in international markets. T
high rates of taxation of exports in t
and 1960s did not deter many
agricultural products from being e
whereas the market for most food
was cleared at prices higher than t
national ones. This substantial com
advantage is not a good reasor
agricultural exports. In fact, freer t
lead (as it did in the 1970s) to the
many export activities in agricul
industry that high tax rates wo
down.

Protection of a particular produ
a guarantee that its output will i
Wheat is an excellent counter
Despite protection, if other activities
more profitable, resources will mov
them. Thus, to maintain food self-sul
investments must be made in infra
and research on food commodities
other things. Although the privat
responds to market incentives, s
penditures will have to be made
government to increase food pr
and generate an export surplus.

Agricultural policies have to be
keeping in mind the general equ
implications of policies for other e
sectors and not by looking at the ef
policies for agriculture alone. A
equilibrium framework can lead to
ing conclusions and wrong or ina
policy recommendations.

Labor migration, the composition of agricultural output, and the process of adoption of technology cannot be understood unless reference is made to movements in the domestic terms of trade induced by commercial policy. Despite the protection granted to some agricultural activities, the policies of import substitution and overvaluation of the peso caused the domestic terms of trade for agriculture to deteriorate continuously until 1970. In the 1970s the downward trends in absolute and relative rural wage rates reversed; rural unemployment and the high rate of migration from the countryside to the cities dropped. A brief interpretation of some economic phenomena that took place between 1953 and 1978 provides an agenda for future research on Colombian agriculture. The discussion that follows is based on economic logic rather than strong empirical evidence and is not intended to be exhaustive.

Colombia's approach to foreign trade has had two well-defined phases: import substitution during 1953-67 and export promotion in 1967-78. The earlier period was characterized by significant distortion between domestic and international prices. These divergences were reduced considerably but not eliminated in the second period. These developments seem to have affected the country's economic performance. During the period 1953-67, GNP grew at an annual rate of 4.4 percent. The rate for 1967-78 was 5.9 percent. The annual rate of growth of income per capita was 1.2 percent in the earlier period and 3.2 percent in the latter. The pattern for agricultural and food output was similar. Total food output grew at annual rates of 2.7 percent in 1953-67 and 3.4 percent in 1967-78. Agricultural output rose 3.1 percent in the former period and 4.5 percent in the latter. Food output per capita declined until 1963, then increased.

The rate of migration from the countryside to the cities was high in the last three decades—5.4 percent per year between 1951 and 1964 and 3.7 percent between 1964 and 1976. Crude figures indicate that the rural real wage rate was almost constant during the 1950s and 1960s, but the ratio of rural to urban wages fell steadily until 1970, when it recovered rapidly. Distortions in relative commodity prices induced by commercial and exchange-rate policies caused changes in factor prices that contributed to the massive outflow. As opportunities for employment in agriculture dwindled and labor moved out of agriculture, the overall land/labor ratio tended to increase. This was an incentive for agriculture to become more land intensive, further reducing demand for labor.

Because of the limited size and growth of the domestic market, agriculture grew slowly, putting little pressure on existing resources. Therefore, given the resource endowment of the country, the increase in agricultural output was based mainly on the growth of inputs and little on adoption of new technology. Between 1950 and 1971, 95 percent of the increase in agricultural output is explained by the growth of inputs and only 5 percent by technological change. An export-oriented policy would have expanded the price and growth potential of exportable agricultural goods by increasing foreign demand. Demand for labor and land would have risen more rapidly and as land became more expensive, some technology would have been adopted. As the crop sector expanded its land base, the livestock sector probably would have adopted technologies requiring less land, thus raising productivity per hectare and per animal. This point is important for understanding how the labor employment potential of agriculture can be expanded through changes in output composition. Thus, it takes one man-year per hectare cropped to grow an export crop like cotton, whereas one man-year can easily take care of 200-300 hectares of land used for raising cattle. Therefore, by promoting the livestock sector and discouraging the crop sector, a considerable reduction in the demand for labor and in the employment potential of agriculture probably took place during the period 1953-78.

APPENDIX 1

DOMESTIC AND INTERNATIONAL PRICE INDEXES

Domestic Price Indexes

The source for the basic information is Colombia, Banco de la República, *Revista del Banco de la República*, Tables 8.1.1 and 8.1.3. It presents aggregate data for imported commodities, goods produced and consumed domestically (home goods), and exported commodities—including and excluding coffee. Disaggregated information is also provided for each of the nine groups classified according to the standard international trade classification (SITC) that form each major category. For the export group, information is provided only for the index with coffee included.

Using the above information plus the weights attached to each subcategory, price indexes were constructed for coffee exports, traditional exports with and without coffee, nontraditional exports, nontraded food commodities, and nontraded nonfood commodities. The weights for the indexes were obtained from Colombia, Banco de la República, *Metodología del Indice de Precios al por Mayor del Comercio en General: Base 1970 = 100* (Bogotá: Ediciones del Banco de la República, 1975), Appendixes 8 and 9. This information is reproduced in Table 11.

The weights for the noncoffee price index can be derived from Tal dividing the share of each section I (the share of all other exportable g the noncoffee exports price index [9.84/38.72]). Each price index was using the following procedure: let G price index for section I of group , I = OA, OB, 1, . . . , 8 and J = H, M, X. ' coffee, GOAX = (IX − 0.3872INCX where:

IX = price index of all expo
INCX = price index of noncoffee

For traditional exports including co price index is calculated as

ITX = (0.6128GOAX
+ 0.0984GOBX + 0.012
+ 0.0778G2X)

For traditional exports excluding co price index is calculated as

ITNCX = (0.984GOBX + 0.0128G
+ 0.0778G2

Table 11—Weights of commodity groups in the price index of home goods, i and exports

SITC Code	Section	Home Goods	Imports	E
			(percent)	
OA	Coffee	59.82	5.81	
OB	All other foods and live animals	. . .	. . .	
1	Beverages and tobacco	6.74	1.65	
2	Crude materials excluding fuels	5.21	6.70	
3	Mineral fuels, etc.	6.00	1.31	
4	Animal and vegetable oil and fat	0.69	1.92	
5	Chemical elements and compounds	4.62	13.22	
6	Basic manufactures	12.18	17.31	
7	Machines and transport equipment	1.73	48.47	
8	Miscellaneous manufactured goods	3.01	3.61	
	Total	100.00	100.00	1

Source: Colombia, Banco de la República, *Metodología del Indice de Precios al por Mayor del Comercio en Ge 1970 = 100* (Bogotá: Ediciones del Banco de la República, 1975), p. 22 and Appendix B.

For nontraditional exports the price index is calculated as

$$INTX = (0.0873G3X + 0.0123G5X + 0.0901G6X + 0.0036G7X + 0.0050G8X)/0.1983.$$

The nontraded food commodities price index is the index presented in Colombia, Banco de la República, *Revista del Banco de la República* for the food and live animals section of the nontraded group. For nontraded nonfood commodities, the price index is calculated as

$$INFH = (IH - 0.5982GOH)/0.4018,$$

where IH is the price index for home goods.

The information for each of the basic and derived price indexes and for the relative prices for the different categories used in the text is available from the author.

International Price Indexes

The international price indexes of importable and exportable goods used to obtain the implicit import tariff and export subsidy (see Table 12) were derived by calculating a weighted average import and export price index for each of Colombia's main trading partners. The export price index of each supplier is Colombia's import price index from that source. Similarly, the import price index of each of Colombia's customers is Colombia's export price index.

The weights correspond to the shares of Colombia's five main trading partners in total imports and exports. These shares in 1975 were:

	Exports	Imports
	(percent)	
U.S.A.	32.0	43.1
Germany	14.9	8.8
Japan	1.8	8.6
Netherlands	6.4	1.6
Venezuela	6.1	1.2
Total	61.2	63.3

The weights are:

	Exports	Imports
	(percent)	
U.S.A.	52.3	68.0
Germany	24.3	13.9
Japan	2.9	13.6
Netherlands	10.5	2.5
Venezuela	10.0	2.0
Total	100.0	100.0

The information for international prices and direction of trade comes from several issues of International Monetary Fund, *International Financial Statistics* and from International Monetary Fund, *Direction of Trade Yearbook 1978* (Washington, D.C.: IMF, 1978).

Table 12—International price indexes of imports and exports, 1970-79

Imports or Exports/ Year	January	February	March	April	May	June	July	August	September	October	November	December
Imports												
1970	44.8	45.6	45.3	45.6	45.7	45.6	46.1	46.2	46.5	46.6	46.6	46.6
1971	47.0	47.5	48.2	47.7	48.2	48.3	48.5	48.6	48.9	49.6	49.6	49.1
1972	49.3	50.7	51.5	51.7	51.7	52.2	52.0	52.4	52.8	53.3	53.6	53.6
1973	54.9	56.3	58.0	60.4	61.4	62.5	64.3	65.0	64.9	67.7	68.9	71.9
1974	75.2	82.0	85.9	90.6	92.4	93.6	95.0	96.5	97.2	98.5	99.1	101.1
1975	102.1	100.8	103.6	102.5	102.1	102.0	98.7	98.4	97.7	98.5	98.2	99.2
1976	100.0	101.1	101.6	102.0	102.3	102.8	103.6	104.3	104.9	105.4	105.7	106.5
1977	107.7	108.5	110.9	110.7	112.6	112.0	112.8	113.1	112.9	113.2	114.2	113.3
1978	116.4	117.0	120.3	120.1	119.9	121.2	121.7	122.7	122.6	125.0	125.7	125.7
1979	127.9	129.8	133.2	133.8	137.0	140.2	145.6	148.2	152.9	155.4	n.a.	n.a.
Exports												
1970	48.9	49.4	48.9	49.5	49.4	49.6	50.0	49.5	50.0	50.1	49.7	50.2
1971	51.1	51.4	51.8	51.9	52.0	51.5	52.0	52.4	53.1	53.6	53.1	54.1
1972	54.6	55.4	55.1	55.2	55.2	55.8	55.8	55.6	55.9	56.0	57.0	57.4
1973	57.9	60.3	61.9	63.3	65.0	67.5	70.9	71.3	71.3	73.6	72.7	73.7
1974	79.4	83.0	85.5	87.6	88.7	89.9	90.4	92.9	92.9	94.1	97.6	98.8
1975	101.3	102.6	102.8	101.5	102.0	101.3	99.7	97.8	97.6	98.5	99.2	99.7
1976	101.1	100.8	100.8	101.1	101.8	101.4	102.0	103.1	104.5	105.9	106.3	107.7
1977	108.3	108.2	108.9	110.0	110.4	110.1	110.6	109.9	110.1	110.6	111.7	114.4
1978	115.7	116.4	116.9	117.1	117.5	118.8	120.4	120.7	122.9	126.5	125.4	128.1
1979	131.1	131.7	133.2	135.4	135.5	138.4	143.8	144.7	145.1	147.4	n.a.	n.a.

Source: These figures were derived from information in International Monetary Fund, "International Financial Statistics Tape," Washington, D.C., March 1980.

APPENDIX 2

AGGREGATE SUPPLY ELASTICITY OF FOOD

Thirteen products were chosen to represent the aggregate supply of food in estimating the supply elasticity of food: meat, milk, plantains, bananas, potatoes, cassava, wheat, barley, rice, corn, sugar, brown sugar (panela), and beans. These products account for about 65 percent of the value of total agricultural output and more than 85 percent of the value of food output. They also provide more than 75 percent of the caloric and protein output of the country.

Food output is defined as its value measured at 1970 prices. The price of food is defined as the implicit price deflator for the 13 products considered, that is:

$$IPDF(t) = [\sum_{i=1}^{13} (Pi(t)\, Xi(t)]/[\sum_{i=1}^{13} Pi(1970)\, Xi(t)], \quad (A2.1)$$

where

Pi(t) = Price of i-th product in year t,
Xi(t) = Output of i-th product in year t, and
Pi(1970) = Price of i-th product in 1970.

Information on prices and output is presented in Appendix 5. To calculate the relative price of food, two sets of price deflators were used, one that uses the total implicit price deflator of GNP (IPDT) and the other, the implicit price deflator of the nonagricultural sector (IPDN), both of them as given by the national account figures. Two sets of relative prices were then defined:

$$RP1 = IPDF/IPDT; \quad (A2.2)$$

and

$$RP2 = IPDF/IPDN. \quad (A2.3)$$

Regressions of food output on these two relative prices were run. The estimating equations are:

$$\ln FO_t = a + b \ln RP1 + u_t \quad (A2.4)$$

and

$$\ln FO_t = a + b \ln RP2 + u_t. \quad (A2.5)$$

The results are presented in Table 13.

Table 13—Estimates of supply elasticity of food in Colombia, 1950-76

Period	Equation	Constant	RP1	RP2	$\bar{R}^2$	ρ	D.W.
1950-76	1	16.75	0.9424	...	0.981	0.34	1.755
		(1,434)	(25.6)				
1950-76	2	16.68	...	0.4478	0.984	0.98	1.727
		(81)		(4.71)			
1953-76	3	16.72	0.5282	...	0.986	0.98	1.587
		(101.2)	(5.59)				
1953-76	4	16.70	...	0.4445	0.984	0.99	1.405
		(78.2)		(4.86)			
1953-67	5	16.71	0.8298	...	0.96	...	1.62
		(1,155.8)	(17.2)				
1953-67	6	16.69	...	0.853	0.91	...	1.413
		(865.6)		(12.1)			

Note: The t-statistics of the estimated coefficients are shown in parentheses.

APPENDIX 3

APPARENT IMPORT AND EXPORT SUBSIDIES

This information was derived from domestic and international price indexes for categories of imports and exports and the nominal exchange rate as given in International Monetary Fund, *International Financial Statistics*.

Letting P_j and P_j^* denote the domestic and international price indexes of category j, and E the exchange rate, the apparent tariff or export subsidy (τ_j) is given by

$$1 + \tau_j = P_j/EP_j^*. \qquad \text{(A3.1)}$$

The information presented in Tal corresponds to the derivation,

$$t_j = (\tau_j - \tau_{76})/(1 + \tau_{76}),$$

and is provided for tariffs on import subsidies on exports. There are diff measures of apparent export subsidy be there are different domestic price in for exportable goods. There is, hov only one international price index for ex so the estimates of the export su should be taken with some caution.

Table 14—Apparent import tariffs and export subsidies, 1970-79

Tariff or Subsidy/ Year	January	February	March	April	May	June	July	August	September	October	November	December
						(percent)						
Apparent import tariff												
1970	29.1	26.9	27.3	25.8	26.1	25.9	24.5	23.8	23.5	22.0	21.7	15.1
1971	22.2	21.7	19.1	21.8	21.1	20.9	18.8	17.3	15.9	13.9	13.4	14.1
1972	21.4	17.8	16.6	15.5	15.7	14.4	16.1	15.0	17.9	18.7	18.1	19.6
1973	18.6	15.4	15.3	11.1	11.5	12.6	13.2	16.1	17.5	14.8	14.0	13.1
1974	8.5	3.0	−2.6	−8.1	−10.3	−11.8	−2.8	−0.8	−0.5	0.8	−0.5	−3.8
1975	−3.3	−2.8	−6.2	−4.3	−4.5	−4.1	−0.5	0.6	1.4	2.0	3.8	2.2
1976	−0.6	−1.3	−1.4	−1.5	0.4	1.8	1.2	1.2	1.3	0.3	−0.1	−1.3
1977	−1.1	−1.0	−3.5	−2.6	−1.9	−1.0	−2.1	−2.8	−2.2	−1.1	−1.0	−0.3
1978	−0.4	0.7	−1.4	0.4	1.4	1.7	2.9	3.3	3.0	1.0	1.1	0.7
1979	−0.1	−0.3	−1.3	−0.8	−2.6	−3.0	−5.8	−6.5	−8.2	−9.0		
Apparent export subsidy												
1970	−14.3	−15.8	−15.1	−17.2	−15.8	−17.5	−18.6	−18.0	−19.7	−20.2	−21.6	−28.0
1971	−24.8	−26.6	−27.3	−27.2	−27.1	−26.0	−27.3	−28.1	−28.7	−30.0	−29.7	−28.6
1972	−27.5	−29.3	−27.9	−27.9	−26.7	−25.8	−20.0	−17.7	−21.3	−20.7	−22.0	−20.7
1973	−16.7	−16.2	−17.6	−21.2	−19.5	−20.9	−24.6	−25.4	−24.4	−24.2	−21.1	−16.4
1974	−17.6	−16.1	−20.2	−22.4	−21.9	−25.8	−20.3	−23.6	−25.6	−26.3	−26.7	−26.2
1975	−25.8	−30.8	−34.7	−35.6	−37.1	−36.8	−32.4	−22.5	−23.7	−25.0	−26.6	−23.3
1976	−22.2	−19.5	−20.0	−7.5	0.0	2.7	5.0	13.2	10.3	9.8	10.1	18.2
1977	32.7	45.4	77.9	80.1	65.4	54.7	33.8	20.6	15.0	10.1	16.6	15.4
1978	14.6	14.8	14.5	11.5	9.9	8.4	7.2	7.6	3.8	−1.7	−5.8	−8.7
1979	−12.3	−22.2	−24.7	−23.2	−18.6	−5.2	−7.0	−3.5	−0.3	−2.8		
Apparent export subsidy on traditional noncoffee exports												
1970	−13.9	−15.7	−14.8	−16.6	−14.9	−16.8	−17.8	−17.4	−17.9	−18.6	−19.3	−25.5
1971	−18.1	−19.5	−19.7	−20.6	−20.8	−18.8	−20.7	−20.8	−22.0	−22.8	−22.5	−22.1
1972	−20.7	−22.1	−21.6	−21.5	−20.5	−20.3	−15.6	−14.0	−18.0	−15.7	−17.5	−17.3
1973	−11.6	−12.8	−10.8	−13.6	−8.0	−9.5	−14.2	−16.2	−12.4	−5.7	−4.3	6.5
1974	−3.6	4.8	−6.8	−9.3	−11.8	−17.7	−13.2	−14.1	−15.6	−20.5	−23.3	−24.9
1975	−29.3	−35.0	−34.3	−34.6	−35.2	−35.4	−31.5	−26.7	−26.7	−27.1	−28.0	−20.1
1976	−21.4	−17.3	−18.7	−10.4	−6.6	4.2	9.3	13.4	10.2	9.8	11.0	16.5
1977	23.6	36.6	58.6	62.4	46.5	36.2	19.6	8.1	2.7	−4.3	0.1	−1.3
1978	−1.1	−0.8	−2.3	−0.7	−0.6	−2.7	−4.2	−3.6	−6.5	−12.1	−14.7	−15.3
1979	−19.3	−26.9	−33.0	−32.1	−29.2	−19.8	−21.9	−19.8	−17.1	−22.2		

Table 14—Continued

Tariff or Subsidy/ Year	January	February	March	April	May	June	July	August	September	October	November	December
Apparent export subsidy on nontraditional exports												
1970	−21.0	−20.7	−20.4	−21.6	−21.5	−22.1	−23.7	−23.4	−24.3	−25.0	−24.5	−28.8
1971	−26.4	−25.6	−26.5	−24.9	−25.0	−23.8	−25.1	−26.7	−26.4	−28.9	−26.8	−27.5
1972	−24.1	−25.5	−24.7	−24.2	−24.0	−23.2	−21.7	−22.1	−22.3	−22.4	−23.5	−22.9
1973	−23.8	−25.8	−24.9	−27.7	−29.6	−31.9	−32.9	−27.7	−25.2	−21.8	−10.9	4.4
1974	14.6	14.5	15.4	8.8	16.4	8.1	19.7	15.9	14.7	13.1	9.1	6.5
1975	5.6	3.7	3.4	3.1	2.0	2.8	4.1	6.4	7.4	6.1	5.4	3.6
1976	0.7	1.3	0.9	0.9	0.4	1.3	1.5	0.9	−0.2	−1.9	−2.4	−3.4
1977	−2.3	−2.0	15.9	14.6	14.1	13.8	11.3	8.9	8.5	8.7	7.0	4.9
1978	3.9	4.1	5.2	5.2	1.8	1.0	1.9	3.9	1.2	−1.6	−3.6	−6.7
1979	−8.1	−8.0	−6.5	−7.2	−3.4	−2.4	−3.2	−2.1	−2.1	0.6		
Apparent export subsidy on noncoffee exports												
1970	−17.6	−18.4	−17.7	−19.2	−18.4	−19.6	−20.9	−20.6	−21.3	−22.0	−22.1	−27.2
1971	−22.5	−22.7	−23.3	−22.9	−23.0	−21.4	−23.0	−23.9	−24.3	−26.0	−24.8	−25.0
1972	−22.5	−23.9	−23.2	−22.9	−22.4	−21.8	−18.8	−18.3	−20.3	−19.2	−20.7	−20.3
1973	−18.0	−19.7	−18.3	−21.1	−19.4	−21.4	−24.1	−22.3	−19.1	−14.3	−7.8	5.4
1974	6.1	10.0	5.0	0.3	3.2	−4.0	4.2	1.8	0.4	−2.7	−6.2	−8.3
1975	−10.8	−14.5	−14.3	−14.6	−15.4	−15.2	−12.6	−9.2	−8.6	−9.5	−10.3	−7.5
1976	−9.7	−7.5	−8.3	−4.4	−2.9	2.6	5.2	6.8	4.7	3.6	3.9	6.0
1977	9.9	16.1	36.0	37.1	29.3	24.3	15.2	8.5	5.8	2.6	3.8	2.0
1978	1.6	1.8	1.7	2.4	0.7	−0.7	−1.0	0.4	−2.4	−6.5	−8.8	−10.7
1979	−13.4	−16.9	−19.0	−18.9	−15.5	−10.6	−12.0	−10.4	−9.2	−10.1		
Apparent export subsidy on traditional exports												
1970	−12.5	−14.5	−13.7	−16.0	−14.3	−16.3	−17.3	−16.6	−18.5	−18.9	−20.9	−27.8
1971	−24.3	−26.8	−27.5	−27.8	−27.6	−26.5	−27.9	−28.5	−29.3	−30.3	−30.5	−28.9
1972	−28.4	−30.3	−28.8	−28.9	−27.5	−26.5	−19.6	−16.6	−21.0	−20.2	−21.6	−20.1
1973	−14.9	−13.7	−15.6	−19.4	−16.8	−17.9	−22.5	−24.8	−24.2	−24.8	−23.9	−22.0
1974	−26.2	−24.2	−29.6	−30.7	−32.1	−34.8	−30.9	−34.1	−36.3	−36.8	−36.2	−34.9
1975	−34.2	−39.9	−44.9	−46.0	−47.5	−47.3	−42.1	−30.2	−32.0	−33.2	−35.1	−30.5
1976	−28.3	−25.0	−25.5	−9.8	−0.1	3.1	5.9	16.5	13.1	12.9	13.4	23.9
1977	42.0	58.0	94.3	97.5	79.0	65.6	39.7	23.7	16.7	10.5	19.2	18.2
1978	17.4	17.7	17.0	13.2	12.0	10.3	8.6	8.6	4.4	−1.8	−6.4	−9.2
1979	−13.4	−26.0	−29.5	−27.4	−22.6	−6.0	−8.0	−3.9	0.2	−3.7		

APPENDIX 4

METHODOLOGICAL NOTES

Chapter 4: The Estimation of ω Using Time-Series Techniques

The results of estimation of ω by the use of time-series techniques are presented for the equations that used aggregate price indexes. In Figure 4 the monthly rate of change of the prices of home goods, imports, and exports over 12 months was shown. The three series have little relation so that the estimates of ω can be regarded with confidence.

The variables to be analyzed, the relative price index of home goods and imports with respect to the price index of exports (with and without coffee), were defined in percentage change form $[Dx_t = (X_t - X_{t-1})/X_{t-1}]$. Letting PHC and PMC stand for the relative price of home goods and importable goods with respect to all export prices and letting PHN and PMN stand for the relative price of home goods and importable goods with respect to export prices excluding coffee, the simplest autoregressive model (with one lag and no moving averages) was run and the following found:

from February 1970 to January 1975,

$$DPHC_t = \underset{(0.1273)}{0.199879}\ DPHC_{t-1}; \qquad (A4.1)$$

from February 1970 to January 1975,

$$DMPC_t = \underset{(0.1229)}{0.333639}\ DPMC_{t-1}; \qquad (A4.2)$$

from February 1975 to October 1979,

$$DPHC_t = \underset{(0.1164)}{0.4734}\ DPHC_{t-1}; \qquad (A4.3)$$

from February 1975 to October 1979,

$$DPMC_t = 0.508424\ DPMC_{t-1}; \qquad (A4.4)$$

from February 1970 to September 1979,

$$DPHN_t = \underset{(0.0868)}{0.363992}\ DPHN_{t-1}; \qquad (A4.5)$$

from February 1970 to September 1979,

$$DPMN_t = \underset{(0.0827)}{0.460818}\ DPMN_{t-1}. \qquad (A4.6)$$

The standard errors of the estimated coefficients are shown in parentheses.

After this process was finished, the following was defined for each variable:

$$RDx_t = Ds_t - \rho Dx_{t-1}, \qquad (A4.7)$$

where ρ is the autocorrelation coefficient estimated in equations (A4.1) to (A4.6), and tested whether the residuals were not autocorrelated among them (residuals are white noise). The tests performed turned out to confirm the hypothesis that the residuals are white noise. Having done this, ω was estimated. The results are shown below:

From February 1970 to January 1975,

$$RDPHC = \underset{(0.1731)}{-0.034092} + \underset{(0.0687)}{0.868873}\ RDPMC, \qquad (A4.8)$$

$\bar{R}^2 = 0.736$, D.W. = 2.352.

From February 1975 to October 1979,

$$RDPHN = \underset{(0.1923)}{0.27448} + \underset{(0.0348)}{0.981137}\ RDPMN; \qquad (A4.9)$$

$\bar{R}^2 = 0.935$, D.W. = 2.607.

From March 1970 to September 1979,

$$RDPHN = \underset{(0.1311)}{0.144074} + \underset{(0.0466)}{0.978892}\ RDPMN; \qquad (A4.10)$$

$\bar{R}^2 = 0.795$, D.W. = 2.426.

Chapter 7: ω and the Production of Home Goods

Let H^s and H^d denote the supply and demand functions of home goods and let P_m denote the price of importable goods; P_x, the price of exportable goods; and P_h, the price of home goods. Then

$$H^s = H^s(P_m, P_x, P_h) \qquad \text{(A4.11)}$$

and

$$H^d = H^d(P_m, P_x, P_h). \qquad \text{(A4.12)}$$

Taking the total derivative of equation (A4.11),

$$dH^s = \partial H^s/\partial P_m \cdot dP_m + \partial H^s/\partial P_x \cdot dP_x + \partial H^s/\partial P_h \cdot dP_h \quad \text{(A4.13)}$$

and

$$dH^s/H^s = -\varepsilon_{hm} \cdot dP_m/P_m - \varepsilon_{hx} \cdot dP_x/P_x + \varepsilon_{hh} \cdot dP_h/P_h, \quad \text{(A4.14)}$$

where

$$-\varepsilon_{hi} = \partial H^s/\partial P_i \cdot P_i/H^s < 0;\ i = x, m,$$

and

$$\varepsilon_{hh} = \partial H^s/\partial P_h \cdot P_h/H^s > 0.$$

Subsituting $t = dP_m/P_m$, $s = dP_x/P_x$, and $d = dP_h/P_h$ in (A4.14),

$$dH^s/H^s = -\varepsilon_{hm} \cdot t - \varepsilon_{hx} \cdot s + \varepsilon_{hh} \cdot d. \quad \text{(A4.15)}$$

Taking the total derivative of equation (A4.12) and following the same steps as those followed from equations (A4.13) and (A4.15),

$$dH^d/H^d = \eta_{hm} \cdot t + \eta_{hx} \cdot s + \eta_{hh} \cdot d, \quad \text{(A4.16)}$$

where

$$\eta_{hi} = \partial H^d/\partial P_i \cdot P_i/H^d$$

and

$$i = x, m, h.$$

In a general equilibrium framework in which the resources of an economy are given, the production of one commodity can be expanded only at the expense of other known from the homogeneity postu that when $d = t = s$,

$$-\varepsilon_{hm} - \varepsilon_{hx} + \varepsilon_{hh} = 0 = -\gamma_{hm} - \gamma_{hx} + 1, (.$$

where $\gamma_{hm} = \varepsilon_{hm}/\varepsilon_{hh}$ and $\gamma_{hx} = \varepsilon_{hx}/\varepsilon_h$ the demand equation, the homogeneit tulate establishes that

$$\eta_{hm} + \eta_{hx} + \eta_{hh} = 0 = \lambda_{hm} + \lambda_{hx} + 1, \quad (.$$

where

$$\lambda_{hm} = \eta_{hm}/\eta_{hh} \text{ and } \lambda_{hx} = \eta_{hx}/\eta_{hh}$$

When income equals expenditure librium in the home goods markets g tees equilibrium in the trade accoun from equations (A4.15), (A4.16), and (

$$d = \{1 - [(\eta_{hx} + \varepsilon_{hx})/(\varepsilon_{hh} - \eta_{hh})]\} \cdot t + [(\eta_{hx} + \varepsilon_{hx})/(\varepsilon_{hh} - \eta_{hh})] \cdot s \quad (.$$

and

$$d = \omega t + (1 - \omega)s, \qquad (.$$

where

$$\omega = 1 - (\eta_{hx} + \varepsilon_{hx})/(\varepsilon_{hh} - \eta_{hh}) = 1 - 1/[1 + (\varepsilon_{hm} + \eta_{hm})/(\eta_{hx} + \varepsilon_{hx})]. (.$$

Since $\varepsilon_{hh} > \varepsilon_{hx}$ and $|\eta_{hh}| > \eta_{hx}$, $0 \leq \omega \leq 1$. To obtain the change in the of home goods due to a price chang and d are replaced in equation (A4.15), equations (A4.17), (A4.20), and (A4.21

$$dH^s/H^s = (t - s)[\varepsilon_{hx}\omega - \varepsilon_{hm}(1 - \omega)]. \qquad (.$$

Making use of equations (A4.16) and (. and substituting in equation (A4.22),

$$dH^s/H^s = \frac{-(t - s)\ \varepsilon_{hh}(\eta_{hx} + \eta_{hh} \cdot \gamma_h}{(\varepsilon_{hh} - \eta_{hh})} \qquad (.$$

It can be seen that the change output of home goods will be of the op sign of the distortion $(t - s)$. When η_1 then both sides of equation (A 4.23) zero since $\eta_{hx} = 0$.

With respect to the change in demand due to a price change, using equations (A4.16), (A4.18), and (A4.20), it appears that

$$dH^d/H^d = (t - s)[\eta_{hm}(1 - \omega) - \eta_{hx}\omega]. \quad (A4.24)$$

From equations (A4.22) and (A4.24) it can be seen that they are equal to zero when $t = s$ or when $\varepsilon_{hm}(1 - \omega) - \varepsilon_{hx}\omega = 0$ and $\eta_{hm}(1-\omega) - \eta_{hx}\omega = 0$ respectively, that is, when

$$\omega = \varepsilon_{hm}/(\varepsilon_{hm} + \varepsilon_{hx}) = 1/(1 + \varepsilon_{hx}/\varepsilon_{hm}), \quad (A4.25)$$

or

$$\omega = \eta_{hm}/(\eta_{hm} + \eta_{hx}) = 1/(1 + \eta_{hx}/\eta_{hm}). \quad (A4.26)$$

Equations (A4.22) and (A4.23) help make understandable what happens to the production of home goods when ω takes limiting values as one or zero. Only the case in which $\omega = 1$ will be analyzed. For ω to be equal to one it is required that $\eta_{hx} + \varepsilon_{hx} = 0$ (from equation [A4.21]). Therefore, because $\eta_{hx}\varepsilon_{hx} \geq 0$, $\omega = 1$ implies that $\eta_{hx} = \varepsilon_{hx} = 0$. Given this, it can be concluded that, for a given small distortion in relative prices, the production of home goods does not change when $\omega = 1$.

Table 15—Output of main food products, 1950-78

Year	Meat	Milk	Plantains	Bananas	Potatoes	Cassava	Wheat	Barley	Rice	Corn	Sugar	Brown Sugar	Beans	Total
							(1,000 tons)							
1950	251.5	1,220.0	943.0	374.0	360.0	768.0	102.0	50.0	241.0	620.0	156.0	646.0	40.0	5,771.5
1951	257.6	1,238.0	940.0	388.0	550.0	870.0	130.0	56.0	297.0	845.0	198.0	625.0	50.0	6,444.6
1952	254.5	1,271.0	960.0	400.0	600.0	870.0	140.0	61.0	329.0	928.0	197.0	599.0	55.0	6,664.5
1953	240.5	1,264.0	987.0	450.0	610.0	870.0	145.0	65.0	272.0	770.0	190.0	610.0	52.0	6,525.5
1954	236.7	1,300.0	1,014.0	466.0	650.0	871.0	146.0	65.0	295.0	775.0	241.0	621.0	50.0	673.7
1955	243.5	1,333.0	1,049.0	496.0	580.0	674.0	147.0	52.0	320.0	736.0	253.0	651.0	69.0	6,605.5
1956	279.0	1,489.0	1,091.0	518.0	624.0	700.0	140.0	70.0	342.0	748.0	261.0	611.0	50.0	6,923.0
1957	301.9	1,587.0	1,100.0	502.0	682.0	700.0	110.0	60.0	350.0	718.0	234.0	550.0	72.0	6,966.9
1958	297.2	1,681.0	1,130.0	509.0	566.0	700.0	140.0	75.0	380.0	823.0	264.0	510.0	60.0	7,135.2
1959	280.3	1,753.0	1,220.0	553.0	785.0	720.0	145.0	101.0	422.0	858.0	277.0	550.0	55.0	7,719.3
1960	284.6	1,753.0	1,255.0	557.0	653.0	680.0	142.0	106.0	450.0	866.0	329.0	569.0	40.0	7,684.6
1961	306.5	1,762.0	1,275.0	572.0	551.0	650.0	142.0	101.0	474.0	758.0	362.0	773.0	44.0	7,770.5
1962	337.4	1,785.0	1,292.0	519.0	872.0	780.0	162.0	108.0	585.0	754.0	402.0	699.0	48.0	8,343.4
1963	363.6	1,833.0	1,309.0	581.0	572.0	800.0	90.0	118.0	551.0	782.0	368.0	650.0	44.0	8,061.6
1964	373.0	1,864.0	1,346.0	560.0	867.0	700.0	85.0	110.0	600.0	988.0	428.0	581.0	42.0	8,544.0
1965	374.0	1,973.0	1,384.0	653.0	762.0	800.0	110.0	90.0	672.0	871.0	485.0	560.0	40.0	8.774.0
1966	345.1	2,020.0	1,423.0	721.0	760.0	840.0	125.0	95.0	680.0	850.0	537.0	648.0	35.0	9,079.1
1967	371.5	2,080.0	1,590.0	764.0	800.0	850.0	80.0	95.0	662.0	850.0	597.0	788.0	38.0	9,565.5
1968	356.5	2,140.0	1,600.0	770.0	950.0	900.0	125.0	85.0	786.0	800.0	663.0	808.0	48.0	10,031.5
1969	403.3	2,200.0	1,640.0	677.0	850.0	1,000.0	80.0	75.0	695.0	940.0	709.0	1,004.0	48.0	10,321.3
1970	440.6	2,300.0	1,690.0	583.0	913.0	1,200.0	54.0	87.0	702.0	877.0	672.0	737.0	39.0	10,294.6
1971	460.6	2,200.0	1,517.0	593.0	869.0	1,990.0	53.0	107.0	852.0	819.0	744.0	786.0	49.0	11,039.6
1972	434.5	2,450.0	1,562.0	600.0	823.0	2,008.0	69.0	98.0	997.0	806.0	824.0	866.0	61.0	11,598.5
1973	375.4	2,460.0	1,653.0	621.0	1,031.0	1,998.0	72.0	82.0	1,515.0	739.0	810.0	932.0	57.0	12,345.4
1974	395.4	2,028.0	1,679.0	743.0	1,012.0	2,126.0	59.0	87.0	1,540.0	792.0	895.0	965.0	58.0	12,379.4
1975	467.6	2,096.0	1,792.0	705.0	1,320.0	2,021.0	39.0	1,22.0	1,614.0	723.0	970.0	998.0	90.0	12,957.6
1976	485.1	2,229.0	1,852.0	522.0	1,516.0	1,846.0	45.0	71.0	1,560.0	884.0	935.0	834.0	68.0	12,847.1
1977	444.8	2,303.0	1,842.0	575.0	1,609.0	1,960.0	39.0	81.0	1,307.0	753.0	854.0	818.0	75.0	12,660.8
1978	446.4	2,489.0	2,192.0	644.0	1,755.0	2,200.0	34.0	131.0	1,627.0	861.0	1,033.0	894.0	79.0	14,385.4

Sources: For beef output the registered number of heads slaughtered was multiplied by 180 to obtain the amount of meat produced. The sources for slaughter were Caja de Crédito Agrario, *El Ganado Vacuno en Colombia* (Bogotá: Caja de Crédito Agrario, 1971); Luis Lorente, *La Producción de Ganado de Carne en Colombia* (Bogotá: Banco Ganadero, 1978), Table 11; and Colombia, Departamento Administrativo Nacional de Estadística, *Boletín Mensual de Estadística*, Febrero 1980, p. 80. For milk output until 1971, U.S. Department of Agriculture, Economic Research Service, *Agricultural Production and Trade of Colombia*, ERS-Foreign 343 (Washington, D.C.: USDA, 1973), p. 108; for 1972, Food and Agriculture Organization of the United Nations, *1974 FAO Production Yearbook*, vol. 28 (Rome, FAO, 1975); for the years after 1972, Instituto de Mercadeo Agropecuario, "Información Básica para las Metas del Programa de Comercialización 1979," tomo 2, IDEMA, Bogotá, 1978, Table 1. (Mimeographed.) For the other products until 1975, Colombia, Departamento Nacional de Planeación, *Indicadores Físicos Nacionales del Sector Agropecuario: 1950-76*, Documento de Trabajo UEA-DPA-002 (Bogotá:

Table 16—Agricultural gross value added and implicit price deflators for agriculture, gross national product, and the rest of the economy, 1953-77

Year	Value Added				Price Deflators					
					Agriculture				Rest of the Economy	Total GNP
	Crops	Livestock	Other	Total	Crops	Livestock	Food	Total		
	(billion 1970 pesos)				(1970 = 100)					
1953	10.3	5.9	1.9	18.2	20.5	19.5	11.4	19.7	18.1	18.5
1954	10.4	6.1	2.2	18.8	25.9	21.6	12.9	23.7	19.3	20.6
1955	10.2	6.9	2.2	19.4	23.1	22.7	12.7	22.5	19.9	20.6
1956	10.6	7.2	2.1	20.4	27.8	22.4	15.8	25.2	21.0	22.2
1957	11.4	7.5	2.2	21.2	32.6	25.7	18.3	29.3	24.7	26.0
1958	11.8	7.8	2.3	21.8	33.5	30.0	20.5	31.6	28.7	29.5
1959	12.6	7.9	2.2	22.8	32.5	35.8	23.4	32.9	31.0	31.4
1960	12.2	8.4	2.3	23.0	34.4	39.8	25.9	35.6	33.6	34.3
1961	12.7	8.5	2.6	23.9	37.8	40.0	29.8	38.1	36.6	37.0
1962	13.1	9.0	2.5	24.7	38.4	40.9	32.1	39.2	39.6	39.5
1963	12.8	9.7	2.4	25.0	49.8	45.9	40.1	48.2	48.8	48.8
1964	13.8	9.9	2.5	26.3	66.4	54.0	54.2	60.7	54.9	56.5
1965	13.7	9.9	2.6	26.3	65.6	62.8	60.7	64.3	60.6	62.2
1966	14.3	9.9	2.9	27.2	73.9	74.7	70.6	73.4	69.9	71.2
1967	15.1	10.1	3.2	28.5	76.8	82.8	78.3	78.2	76.2	77.2
1968	16.2	10.8	3.3	30.5	84.8	86.3	88.2	84.7	83.7	84.2
1969	16.3	11.6	3.5	31.6	92.2	90.4	93.5	91.7	90.4	91.1
1970	17.0	12.2	3.7	33.0	100.0	100.0	100.0	100.0	100.0	100.0
1971	17.4	12.5	2.8	33.8	110.4	113.9	120.9	111.1	110.2	110.4
1972	18.5	13.1	4.1	35.7	128.7	137.3	148.5	130.4	123.5	125.2
1973	19.4	13.6	4.1	37.2	168.9	183.8	192.9	171.0	147.2	152.8
1974	20.6	14.7	4.5	39.9	204.8	229.5	253.8	212.0	189.8	195.0
1975	21.9	16.0	4.3	42.3	264.2	248.7	341.4	257.0	228.8	235.6
1976	22.1	16.7	4.1	43.1	349.4	316.1	392.8	330.4	279.3	291.3
1977	22.8	16.9	4.2	44.0	505.0	410.2	...	461.2	347.0	373.2

Sources: Colombia, Banco de la República, División de Cuentas Nacionales, unpublished data. The price deflator for food was calculated by the author using the procedure described in Appendix 2.

Table 17—Share of agriculture, livestock production, and coffee production agricultural value added and gross national product, 1950-77

Year	Share of Agriculture in GNP	Share of Livestock Production		Share of Coffee Production
		Agricultural Value Added	GNP	Agricultural Value Added
		(percent)		
1950	35.1	38.8	13.6	25.8
1951	33.8	34.0	11.5	27.9
1952	34.5	32.8	11.3	29.1
1953	31.7	32.7	10.4	29.2
1954	30.7	32.7	10.0	27.9
1955	30.3	35.5	10.8	24.7
1956	30.1	36.2	10.9	26.2
1957	31.2	35.7	11.2	29.2
1958	31.4	35.7	11.2	28.6
1959	30.6	34.8	10.7	28.8
1960	29.7	36.5	10.8	26.0
1961	29.2	35.8	10.5	27.5
1962	28.6	36.6	10.5	25.2
1963	28.0	38.9	10.9	25.2
1964	27.8	37.7	10.5	25.4
1965	26.9	37.7	10.1	24.1
1966	26.3	36.6	9.6	23.7
1967	26.6	35.6	9.5	21.7
1968	26.6	35.5	9.4	21.1
1969	25.9	36.9	9.5	20.4
1970	25.3	37.0	9.4	18.3
1971	24.5	37.0	9.1	16.8
1972	24.1	36.6	8.8	16.9
1973	23.4	36.6	8.6	17.8
1974	23.6	36.9	8.7	15.0
1975	24.1	38.0	9.2	15.1
1976	23.5	38.9	9.1	n.a.
1977	22.9	38.5	8.8	n.a.

Sources: The shares of agriculture in GNP and livestock production in agricultural value added and GNP derived from data supplied by Colombia, Banco de la República. The shares of coffee in agricultural added and GNP are from Fundación para la Educación Superior y el Desarrollo, *Economía Co Colombiana* (Bogotá: Fondo Cultural Cafetero, 1979), Table 1-1.

Note: n.a. means not available.

Table 18—Imports, exports, gross national product, absorption, and population, 1953-78

Year	Imports		Exports			GNP	Absorption	Population
				Realized				
	Registrations	Realized	Registrations	Total	Coffee			
			(U.S. $ million)			(million 1970 pesos)		(millions)
1953	537.53	546.70	531.45	605.50	492.10	57,680	70,821	12.07
1954	675.27	671.70	570.57	669.10	550.10	61,491	78,472	12.34
1955	664.38	669.40	533.16	596.70	486.40	64,207	82,232	12.97
1956	505.63	657.20	475.98	551.70	413.10	66,705	80,936	13.59
1957	447.40	482.60	449.43	511.10	390.20	68,027	79,073	14.03
1958	308.24	399.90	409.26	460.70	354.80	69,708	76,771	14.48
1959	401.56	415.40	417.92	473.00	360.90	74,716	80,616	14.94
1960	482.05	518.60	382.03	464.60	333.60	77,645	87,320	15.42
1961	518.59	557.10	373.71	434.80	307.90	82,041	93,349	15.91
1962	455.14	540.30	401.34	463.20	331.80	86,542	97,684	16.42
1963	528.03	505.00	362.90	446.00	302.90	89,307	100,730	16.94
1964	518.99	586.30	463.34	548.10	394.00	94,708	111,600	17.48
1965	477.25	453.50	443.38	537.80	343.90	98,156	108,420	18.04
1966	639.13	674.20	438.90	507.60	328.20	103,670	122,530	18.47
1967	524.80	496.90	431.59	509.80	321.50	107,620	117,920	18.96
1968	630.47	643.30	507.96	558.20	351.50	114,800	130,480	19.46
1969	762.17	685.30	560.86	607.40	343.90	122,180	139,070	20.00
1970	930.15	843.00	664.45	742.90	466.80	130,361	132,490	20.53
1971	794.68	929.60	629.39	708.20	399.20	137,889	142,160	21.09
1972	911.29	858.90	820.17	873.80	429.50	148,630	150,240	21.67
1973	1,225.60	1,061.50	1,176.20	1,231.50	597.00	159,195	158,750	22.34
1974	1,788.50	1,597.20	1,415.60	1,416.90	624.80	168,787	174,030	22.98
1975	1,502.60	1,494.80	1,442.60	1,465.00	674.50	175,226	172,410	23.64
1976	2,006.20	1,701.80	1,773.70	1,745.20	977.40	183,296	184,260	24.33
1977	2,688.60	2,028.00	2,312.50	2,432.70	1,525.80	192,187	19,687	25.05
1978	3,450.40	2,927.60	2,941.70	3,060.40	1,993.90	209,368	210,934	25.64

Sources: The figures for import and export registrations are from Colombia, Banco de la República, *Revista del Banco de la República,* vols. 26-52 (Bogotá: Talleres Gráficos del Banco de la República, 1953-79). The figures for coffee up to 1969 are from Colombia, Banco de la República, *Informe Anual del Gerente a la Junta Directiva 1968 y 1969, Segunda Parte* (Bogotá: Talleres Gráficos del Banco de la República, 1969). The figures for coffee after 1969 and the figures for realized imports are from International Monetary Fund, *International Financial Statistics,* May 1976 and January 1980. The figures for GNP and absorption until 1969 are from Colombia, Departamento Nacional de Planeación, "La Economía Colombiana, 1950-1975," *Revista de Planeación y Desarrollo* 9 (Octubre-Diciembre 1977), Table 3.21; the figures after 1969 are from Colombia, Banco de la República, Departamento de Investigaciones Económicas, "Cuentas Nacionales de Colombia 1970-79 y Análisis Preliminar para 1980," Bogotá, 1980. (Mimeographed.)

Table 19—Import tariffs and export subsidies, 1953–78

Year	Import Tariffs		Export Subsidies		
	Total Duty Paid/ Total Imports	Total Duty Paid Plus Opportunity Cost of Prior Import Deposits/ Total Imports	Subsidy from Tax Credit Certificates	Subsidy from Special Credit Facilities	Subsid Plan V for Ind Exp
1953	0.210	0.224	...	...	
1954	0.218	0.233	...	...	
1955	0.238	0.258	...	...	
1956	0.225	0.275	...	...	
1957	0.175	0.239	−0.040	...	
1958	0.085	0.167	−0.020	...	
1959	0.146	0.225	−0.020	...	
1960	0.174	0.264	−0.020	...	0.1
1961	0.166	0.260	0.139	...	0.
1962	0.142	0.227	0.143	...	0.
1963	0.131	0.326	0.144	...	0.(
1964	0.127	0.235	0.144	0.007	0.(
1965	0.150	0.335	0.144	0.026	0.
1966	0.225	0.338	0.144	0.022	0.
1967	0.163	0.266	0.171	0.040	0.
1968	0.154	0.262	0.151	0.034	0.
1969	0.154	0.254	0.143	0.015	0.
1970	0.140	0.249	0.149	0.027	0.
1971	0.126	0.233	0.154	0.041	0.
1972	0.142	0.195	0.164	0.060	0.(
1973	0.145	0.210	0.159	0.031	0.(
1974	0.110	0.201	0.166	0.014	0.(
1975	0.116	0.181	0.057	0.055	0.(
1976	0.117	0.124	0.055	0.067	0.(
1977	0.133	0.133	0.125	...	0.(
1978	0.104	0.104	0.120	...	0.(

Sources: The ratio of total import duties paid to total imports is, until 1971, from Jorge García García, "A Hi Economic Policies in Colombia: 1953-70" (Ph.D. dissertation, University of Chicago, 1976); and lished data from the Dirección General de Aduanas. After 1971 it is derived from Banco de la Re *Revista del Banco de la República,* vol. 45-52 (Bogotá: Talleres Gráficos del Banco de la República, 1 and the peso value of imports from International Monetary Fund, *International Financial Statistics Y 1979* (Washington, D.C.: IMF, 1979). The opportunity cost of prior import deposits until 1966 Alberto Musalem, *Demanda por Dinero, Inflación y Balanza de Pagos: La Experiencia de Colomb Postguerra* (Bogotá: Talleres Gráficos del Banco de la República, 1971); from 1966 to 1971 it is from Teigeiro and R. Anthony Elson, "The Export Promotion System and the Growth of Minor Ex Colombia," *International Monetary Fund Staff Papers* 20 (July 1973): 419-471; and from 1971 to 1 from Martha H. Cardona, "El Crecimiento de las Exportaciones Menores y el Sistema de Fom las Exportaciones en Colombia," *Revista de Planeación y Desarrollo* 9 (Abril-Septiembre 1977): Ta and A12. The figures for the subsidy from tax credit certificates until 1959 are from information in "History of Policies"; the figures after 1959 are from Teigeiro and Elson, "Export Promotion S and Cardona, "Crecimiento de las Exportaciones Menores." The figures for the subsidies from credit facilities and the Plan Vallejo are also from Teigeiro and Elson, "Export Promotion Syste Cardona, "Crecimiento de las Exportaciones Menores." The values for 1977 and 1978 are a

Table 20—Exports of main commodities, 1953-78

Year	Coffee	Crude Oil	Bananas	Tobacco	Live Cattle	Cotton	Sugar	Hides and Skins	Other Products	Total
					(U.S. $ million, f.o.b.)					
1953	492.3	76.3	11.5	2.6	0.7	0.0	0.0	2.1	20.1	605.6
1954	550.2	75.8	13.2	2.5	0.0	0.0	0.0	2.9	24.5	669.1
1955	487.4	61.5	16.8	2.1	0.0	0.0	0.0	1.5	27.4	596.7
1956	413.1	69.9	28.1	3.0	0.0	0.0	0.6	2.5	34.4	551.6
1957	388.8	76.3	26.2	2.9	0.0	0.0	0.2	1.4	15.3	511.1
1958	354.5	66.6	15.5	2.0	0.0	0.0	0.0	1.3	20.8	460.7
1959	361.2	73.3	13.9	2.0	0.0	0.0	0.0	1.2	21.4	473.0
1960	332.2	80.0	13.7	2.4	0.0	12.7	0.0	0.6	22.0	464.6
1961	307.8	68.2	14.1	4.0	0.0	10.6	5.2	1.1	23.5	434.5
1962	332.0	60.6	10.6	5.7	0.2	15.7	7.4	2.0	29.2	463.4
1963	303.0	77.2	13.3	7.2	0.1	9.4	5.5	1.8	29.2	446.7
1964	394.2	75.0	12.4	9.4	0.2	6.3	3.3	4.5	42.8	548.1
1965	343.9	88.2	18.6	7.2	6.3	8.0	7.6	4.8	54.5	539.1
1966	328.3	71.7	20.0	5.6	6.0	2.2	8.3	3.9	61.6	507.6
1967	322.4	61.2	25.0	4.4	1.3	15.4	11.3	3.7	65.2	509.9
1968	351.4	36.3	24.7	4.9	1.5	28.1	14.9	6.2	90.3	558.3
1969	343.9	56.7	19.7	7.3	5.7	32.7	17.7	7.5	116.3	607.5
1970	466.7	58.6	18.1	7.2	17.2	30.7	14.0	4.7	59.8	677.0
1971	395.4	51.2	14.7	9.2	16.1	46.9	15.7	6.0	89.1	644.3
1972	429.6	31.4	13.7	9.9	13.7	78.9	28.4	16.6	212.4	834.6
1973	596.9	25.7	15.4	15.3	2.7	79.3	30.2	20.2	391.6	1,177.3
1974	622.3	4.5	25.4	19.2	3.1	114.6	72.2	8.0	543.1	1,412.4
1975	671.8	0.0	31.6	12.8	32.6	128.5	95.1	6.3	486.5	1,465.2
1976	967.7	0.0	40.5	25.5	29.1	59.4	24.1	8.3	467.8	1,745.2
1977	1,525.8	0.0	n.a.	n.a.	n.a.	96.8	2.1	n.a.	n.a.	2,432.7
1978	1,993.9	0.0	n.a.	n.a.	n.a.	45.6	19.2	n.a.	n.a.	2,956.1

Sources: For 1953-69, Colombia, Banco de la República, *Informe Anual del Gerente a la Junta Directiva 1968 y 1969, Segunda Parte* (Bogotá: Talleres Gráficos del Banco de la República, 1969), p. 172. For 1970-76, Colombia, Departamento Administrativo Nacional de Estadística, *Anuarios de Comercio Exterior* (Bogotá: División de Edición del DANE, various years). For 1977 and 1978, International Monetary Fund, *International Financial Statistics Yearbook 1979* (Washington, D.C.: IMF, 1979).

Note: n.a. means not available.

Table 21—Exchange rates for imports and exports, 1953-78

Year	Imports	Coffee Exports	Minor Exports	Cost of Importing		Effective for Minor Exports			All Exports
				With Tariffs	With Tariffs and Prior Deposits	With Tax Credit	With Tax Credit and Special Credit Facilities	Industrial Exports	
				(pesos per dollar)					
1953	2.50	2.34	2.50	3.02	3.06	2.50	2.50	2.50	2.37
1954	2.49	2.37	2.50	3.04	3.08	2.50	2.50	2.50	2.40
1955	2.50	2.53	3.51	3.09	3.14	3.51	3.51	3.51	2.71
1956	2.50	2.84	5.00	3.06	3.18	5.00	5.00	5.00	3.38
1957	3.79	3.66	5.80	4.45	4.70	5.56	5.56	5.56	4.11
1958	6.37	4.90	7.37	6.92	7.44	7.22	7.22	7.22	5.43
1959	5.84	4.91	7.69	6.69	7.16	7.53	7.53	7.53	5.53
1960	6.60	5.31	6.90	7.75	8.35	6.76	6.76	7.56	5.72
1961	6.59	5.77	8.28	7.69	8.31	9.43	9.43	10.34	6.83
1962	6.58	6.42	9.11	7.51	8.07	10.41	10.41	11.36	7.55
1963	8.97	7.05	10.00	10.14	11.90	11.44	11.44	12.36	8.45
1964	9.00	7.30	10.41	10.15	11.12	11.91	11.98	12.90	8.59
1965	9.81	7.84	14.76	11.28	13.10	16.89	17.26	18.81	11.10
1966	12.92	9.05	13.50	15.83	17.30	15.44	15.74	17.26	11.30
1967	14.09	10.96	14.51	16.39	17.85	16.99	17.57	19.12	13.18
1968	16.03	12.85	16.30	18.50	20.25	18.76	19.31	20.96	15.03
1969	17.22	13.92	17.35	19.88	21.60	19.83	20.09	21.91	16.48
1970	18.35	14.78	18.49	20.92	22.93	21.25	21.74	23.74	17.19
1971	20.08	16.00	20.00	22.61	24.77	23.08	23.90	26.18	19.09
1972	22.01	17.56	21.85	25.14	26.32	25.44	26.74	28.44	21.56
1973	23.81	18.97	23.63	27.26	28.83	27.38	28.09	29.63	23.30
1974	27.10	20.97	26.05	30.09	32.56	30.37	30.73	32.27	26.22
1975	31.20	24.88	30.92	34.82	36.86	32.68	34.38	36.64	29.08
1976	34.97	27.89	34.31	39.06	39.33	36.20	38.49	40.10	31.54
1977	36.92	29.27	35.53	41.83	41.83	37.30	39.97	41.74	32.26
1978	39.25	31.29	37.39	43.33	43.33	39.26	41.87	43.74	34.07

Sources: The exchange rates for imports and coffee exports are derived from the May 1976 and January 1980 issues of International Monetary Fund (IMF), *International Financial Statistics*. The 1978 figure for coffee exports is estimated. The exchange rates for minor exports from 1953 to 1959 are from the September 1955 and May 1957 issues of IMF, *International Financial Statistics*; *Pick's Currency Yearbook*; and Colombia, Banco de la República, *Revista del Banco de la República*, vols. 26-52 (Bogotá: Talleres Gráficos del Banco de la República, 1953-79). The figures from 1960-71 are from Jose A. Teigeiro and R. Anthony Elson, "The Export Promotion System and the Growth of Minor Exports in Colombia," *International Monetary Fund Staff Papers* 20 (July 1973): 419-471; the figures for 1972-76 are from Martha H. Cardona, "El Crecimiento de las Exportaciones Menores y el Sistema de Fomento de las Exportaciones en Colombia," *Revista de Planeación y Desarrollo* 9 (Abril-Septiembre 1977): Table A12; and the figures for 1977 and 1978 are from Colombia, Banco de la República, *Revista del Banco*, vols. 26-52. The figures for the cost of importing are derived from information on

Menores" and from assumed values for subsidies in 1977 and 1978. Finally, the exchange rate for all exports is a weighted average of the exchange rates for coffee exports and for minor exports, including direct subsidies, the weights being the shares of coffee and other exports in total exports.

Note: For a review of the policies adopted for minor exports after 1959, see Teigeiro and Elson, "Export Promotion System"; and Cardona, "Crecimiento de las Exportaciones Menores." From January 1953 to May 1955 most nontraditional exports were paid for through the certificate market. Afterwards, foreign exchange from exports other than coffee, crude oil, rawhides, and platinum could be sold on the free market. Beginning in June 1957, proceeds from minor exports were paid for at the certificate market rate. In March 1958 they could again be sold in the free (capitals) market.

Table 22—Urban and rural wages, 1953-77

Year	Rural		Urban	
	Nominal	Real	Nominal	Real
	(pesos per day)			
1953	2.88	14.40	5.00	25.00
1954	3.00	13.51	5.17	23.30
1955	3.18	14.32	5.44	24.50
1956	3.28	13.96	6.08	25.87
1957	3.60	13.09	7.76	28.22
1958	4.25	13.62	8.80	28.21
1959	4.66	13.83	9.60	28.49
1960	5.12	14.34	11.04	30.92
1961	5.86	15.14	12.72	32.87
1962	6.59	16.35	13.48	33.45
1963	8.34	16.26	18.06	35.30
1964	10.04	16.62	20.87	34.55
1965	10.77	16.65	22.73	35.13
1966	12.52	16.58	25.90	34.31
1967	13.30	16.30	29.20	35.79
1968	14.74	16.83	30.85	35.22
1969	16.27	17.36	33.63	35.89
1970	17.21	17.21	38.77	38.77
1971	19.38	17.33	43.49	38.90
1972	24.99	19.63	48.45	38.06
1973	32.22	20.75	53.49	34.44
1974	41.54	21.37	64.72	33.29
1975	53.39	22.30	79.06	32.90
1976	67.75	23.50	98.60	34.20
1977	89.17	22.95	122.02	31.40

Sources: The figures on wages are from Colombia, Ministerio de Agricultura, *La Productividad Agropecuaria en Colombia,* tomo 2 (Bogotá: Ministerio de Agricultura, 1979), p. 56.

[a] 1970 is the base year for calculating the real wage.

Table 23—Price indexes, 1953-78

Year	Colombian Wholesale	U.S.A.		Co
		Imports	Exports	
1953	19.20	76.50	86.50	10
1954	20.50	75.50	88.30	14
1955	20.80	76.30	88.10	11
1956	22.90	79.10	89.00	13
1957	28.90	81.80	90.70	11
1958	32.60	81.00	86.20	9
1959	35.70	81.00	84.70	8
1960	37.20	81.70	86.00	7
1961	39.60	83.20	84.80	7
1962	40.70	82.70	82.80	7
1963	51.40	82.50	83.50	7
1964	60.40	83.30	85.60	8
1965	65.30	86.00	86.50	8
1966	76.70	88.60	88.90	8
1967	82.00	90.30	89.60	7
1968	87.10	91.60	90.60	7
1969	92.90	94.60	93.40	7
1970	100.00	100.00	100.00	10
1971	111.50	103.30	105.20	8
1972	131.30	106.20	113.00	9
1973	168.70	124.10	133.10	12
1974	229.50	157.60	200.10	13
1975	287.90	177.30	216.30	14
1976	353.80	183.70	223.70	27
1977	448.20	191.00	242.60	42
1978	527.20	210.50	263.20	32

Sources: The indexes for Colombian wholesale pr are from Colombia, Banco de la Repúbl *Revista del Banco de la República,* vols. 26 (Bogotá: Talleres Gráficos del Banco d República, 1953-79). The other indexes from International Monetary Fund, *Inte tional Financial Statistics Yearbook 1* (Washington, D.C.: IMF, 1979).

Table 24—Domestic price of selected food commodities, 1953-78

Year	Producer									Wholesale		Consumer	Producer					Wholesale Bogotá
	Sorghum	Soybeans	Bananas	Tobacco	Milk	Wheat	Corn	Sugar	Barley	Vegetable Oil	Rice	Meat	Potatoes	Beans	Brown Sugar	Cassava	Plantains	Meat
					(pesos per ton)							(pesos per kilogram)	(pesos per ton)					
1953	n.a.	n.a.	140	1,175	349.00	630	240	361	401	n.a.	1,128	n.a.	278	980	256	107	138	2,226
1954	n.a.	n.a.	145	1,370	308.00	710	330	371	391	n.a.	1,032	n.a.	319	1,140	243	173	180	2,660
1955	n.a.	n.a.	150	1,360	356.00	650	300	387	409	n.a.	928	2.42	211	1,070	217	193	185	2,629
1956	n.a.	n.a.	150	1,370	547.50	680	350	392	416	n.a.	1,040	2.38	312	1,360	235	198	188	2,587
1957	n.a.	n.a.	175	1,870	452.00	760	430	653	493	n.a.	1,472	3.63	311	1,440	423	215	221	2,852
1958	n.a.	850	250	1,870	500.00	870	385	856	603	n.a.	1,480	4.26	370	1,440	500	200	230	3,210
1959	n.a.	1,050	290	1,900	558.50	940	450	951	642	n.a.	1,456	5.40	304	1,400	460	250	265	3,825
1960	n.a.	800	306	1,989	608.00	880	474	951	630	n.a.	1,760	5.97	350	2,000	392	303	224	4,490
1961	n.a.	850	325	2,009	651.00	975	629	1,046	648	n.a.	2,030	6.10	504	2,777	277	378	305	4,457
1962	n.a.	900	364	2,706	673.00	952	526	1,172	652	n.a.	1,850	6.19	291	2,006	541	338	368	4,360
1963	n.a.	1,200	425	3,000	895.00	1,052	794	1,430	815	5,690	2,000	6.89	730	2,419	993	398	459	4,695
1964	n.a.	1,600	578	4,067	1,053.00	1,394	1,040	1,530	898	6,875	2,580	8.23	1,054	4,151	1,133	755	672	5,538
1965	857	1,700	653	4,858	1,305.00	1,525	903	1,450	1,045	6,770	3,540	10.05	612	3,477	885	658	698	6,897
1966	846	1,850	682	5,060	1,364.00	1,755	1,104	1,630	1,358	8,990	3,880	12.95	983	3,662	1,003	691	801	8,756
1967	900	1,930	749	5,488	1,675.50	1,756	1,203	1,650	1,320	7,090	3,900	14.32	876	4,494	854	795	747	9,540
1968	1,363	2,167	707	5,801	1,782.00	1,955	1,294	1,860	1,450	7,260	4,070	14.63	822	5,230	1,127	955	747	10,348
1969	1,243	2,397	758	5,732	1,823.50	2,059	1,319	1,870	1,690	9,040	3,820	14.77	1,258	4,994	1,423	891	670	10,370
1970	1,336	2,945	905	5,896	1,874.00	1,933	1,490	2,454	1,828	12,880	3,910	15.36	1,087	4,774	1,487	891	762	10,963
1971	1,378	3,050	964	7,267	1,985.20	1,933	1,696	2,080	1,909	13,710	4,400	17.77	1,042	9,259	1,384	1,361	1,033	12,785
1972	2,059	3,202	1,000	8,300	2,285.60	2,514	2,170	2,350	1,910	13,630	4,370	22.62	1,447	9,251	2,242	1,467	1,228	16,074
1973	2,781	4,246	742	15,246	2,573.70	2,795	3,330	2,660	3,002	15,600	5,610	30.55	2,047	9,209	3,198	1,319	1,362	21,911
1974	3,175	6,067	1,062	16,416	3,091.00	4,496	3,364	3,270	3,727	29,920	8,700	36.27	2,215	13,608	2,921	2,155	1,893	25,837
1975	3,599	6,936	1,473	23,200	4,018.60	6,466	4,103	4,390	5,631	20,740	8,900	40.90	4,042	18,544	5,421	3,252	2,847	28,000
1976	4,108	8,552	1,606	20,163	5,838.50	6,500	4,853	5,610	5,754	26,700	9,020	51.48	2,954	20,451	7,040	3,139	3,364	36,415
1977	5,743	12,106	n.a.	n.a.	7,340.60	7,515	7,894	8,730	7,059	31,120	13,500	74.02	n.a.	n.a.	n.a.	n.a.	n.a.	29,533
1978	n.a.	n.a.	n.a.	n.a.	8,161.40	n.a.	7,000	n.a.	7,444	n.a.	14,500	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.	n.a.

Sources: The producer prices of sorghum and soybeans are from Colombia, Departamento Nacional de Planeación, *Política Agropecuaria y el Sistema de Alimentos: Diagnóstico,* tomo 2, Documento de Trabajo DNP-UEA-013 (Bogotá: Departamento Nacional de Planeación, 1979), Annex Table 16. The producer prices of bananas and tobacco are from unpublished data from Colombia, Banco de la República, División de Cuentas Nacionales. The producer prices of milk are from Salomón Kalmanovitz, *El Desarrollo de la Ganadería en Colombia: 1950-72 (Separata)* (Bogotá: División de Edición del Departamenta Administrativo Nacional de Estadística, 1978); and unpublished data from Colombia, Banco de la República, División de Cuentas Nacionales. For wheat, the producer prices are from L. Jay Atkinson, *Changes in Agricultural Production and Technology in Colombia,* Foreign Agricultural Economic Report No. 52 (Washington, D.C.: U.S. Department of Agriculture, 1969), Table 46; and Colombia, Ministerio de Agricultura, *Diagnóstico de Trigo: Primera Parte* (Bogotá: Ministerio de Agricultura, 1979), p. 65.

Table 24—Continued

The producer prices of corn are from Atkinson, *Changes in Production and Technology;* and Colombia, Departamento Nacional de Planeación, *Política Agropecuaria.* The producer prices of sugar are from the same two sources, but the data from Atkinson, *Changes in Production and Technology* were converted to sugar equivalents by multiplying the price of sugarcane by 31.7. The producer prices of barley are from unpublished data from Bavaria, División de Investigación y Fomento Agrícola. The wholesale prices of vegetable oil are from Colombia, Departamento Nacional de Planeación, *Series de Precios del Sector Agropecuario: 1950-76* (Bogotá: Departamento Nacional de Planeación, 1978); and the wholesale prices of rice are from Roberto Junguito, "Perspectivas del Arroz en Colombia y La Política Agrícola," Bogotá, n.d., Table 9 (mimeographed); and Grant Scobie and Rafael Posada, *El Impacto de las Variedades de Arroz con Altos Rendimentos en América Latina con Enfasis Especial en Colombia* (Cali: Centro Internacional de Agricultura Tropical, 1977), Table 14. For meat, the consumer price is from Luis Lorente, *La Producción de Ganado de Carne en Colombia* (Bogotá: Banco Ganadero, 1978); and Colombia, Departamento Administrativo Nacional de Estadística, *Indice de Precios al Consumidor, 1954-Junio 1977* (Bogotá: División de Edición del DANE, 1977).

The producer prices of potatoes, beans, brown sugar, cassava, and plantains are from Salomón Kalmanovitz, *Desarrollo de la Agricultura en Colombia* (Medellín: Editorial La Carreta, 1978), Table 4.1. Lastly, the wholesale prices for meat in Bogotá are prices for first class meat. The prices until 1965 are from Colombia, Departamento Administrativo Nacional de Estadística, *Anuario General de Estadística* (Bogotá: División de Edición del DANE, various years); from 1966 to 1969, from Banco Ganadero, *Informe y Balances 1969* (Bogotá: Banco Ganadero, 1969); and Lorente, *La Producción de Ganado.* Table 2 afterwards.

Note: n.a. means not available.

Table 25—International price of selected agricultural commodities, 1953–78

Year	Butter[a]	Beef[b]	Barley	Corn[c]	Rice[d]	Wheat[e]	Sugar[f]	Palm Oil[g]	Coffee[h]	Sorghum[i]	Soybeans[i]	Bananas[j]	Tobacco[k]	Conversion Factor, c.i.f./f.o.b.
	(U.S. cents per pound)		(U.S. dollars per ton)			(U.S. dollars per bushel)	(U.S. cents per pound)	(U.S. dollars per ton)	(U.S. cents per pound)	(U.S. dollars per metric ton)		(U.S. cents per pound)		
1953	n.a.	15.94	n.a.	60.2	236.77	n.a.	3.41	226.52	59.92	n.a.	n.a.	7.40	50.66	1.130
1954	n.a.	15.64	n.a.	58.3	193.12	n.a.	3.26	224.60	79.93	n.a.	n.a.	7.60	51.80	1.130
1955	n.a.	19.36	n.a.	48.8	218.23	n.a.	3.24	240.30	64.38	n.a.	n.a.	7.50	51.50	1.130
1956	n.a.	15.32	n.a.	51.6	182.98	n.a.	3.48	245.81	73.97	n.a.	n.a.	7.60	53.40	1.130
1957	n.a.	14.91	n.a.	47.6	200.62	1.79	5.15	259.04	63.94	n.a.	n.a.	8.00	54.90	1.130
1958	29.89	17.55	n.a.	47.6	213.85	1.62	3.50	232.04	52.34	n.a.	95	7.40	56.90	1.130
1959	41.42	19.38	n.a.	46.1	194.00	1.58	2.97	248.02	45.22	n.a.	94	6.60	59.30	1.130
1960	38.12	20.28	64.50	43.3	178.57	1.58	3.14	228.18	44.89	n.a.	92	6.50	58.20	1.130
1961	32.03	18.15	51.66	45.9	132.28	1.60	2.91	232.04	43.62	n.a.	111	6.30	61.50	1.130
1962	37.49	16.31	n.a.	51.4	207.23	1.75	2.98	216.24	40.77	n.a.	100	6.00	62.20	1.130
1963	40.83	17.27	56.34	54.7	205.03	1.76	8.50	222.39	39.55	55.38	110	7.60	58.00	1.107
1964	42.34	23.40	54.74	55.8	189.60	1.84	5.87	239.45	48.80	54.26	110	7.70	65.46	1.116
1965	41.51	28.37	86.07	55.0	182.98	1.62	2.12	272.52	48.49	54.26	117	7.20	59.40	1.121
1966	37.65	25.76	80.08	59.4	182.98	1.72	1.86	235.64	47.43	52.84	126	7.00	73.49	1.133
1967	36.98	21.46	68.00	49.9	187.39	1.79	2.03	223.45	41.94	56.59	112	7.20	73.00	1.153
1968	32.14	28.02	70.59	49.1	191.80	1.71	1.98	168.83	42.60	52.57	106	6.94	75.89	1.124
1969	32.14	25.51	76.69	53.9	187.39	1.59	3.37	184.16	44.94	53.76	103	7.24	79.12	1.140
1970	33.48	33.14	84.00	58.4	189.60	1.50	3.75	260.05	56.66	61.45	117	7.54	80.61	1.130
1971	47.16	40.16	78.00	58.4	191.80	1.68	4.53	261.14	49.01	58.89	126	6.37	73.49	1.142
1972	54.19	51.84	136.00	56.0	216.05	1.90	7.43	217.25	55.71	62.75	140	7.33	80.03	1.135
1973	44.24	71.16	172.00	98.0	396.83	3.81	9.63	377.54	72.66	109.68	291	7.48	83.53	1.156
1974	53.06	83.97	187.00	132.0	555.56	4.90	29.96	669.02	77.86	140.11	277	8.35	95.51	1.116
1975	72.10	38.87	163.60	119.6	418.87	4.06	20.50	429.11	81.62	123.97	220	11.11	103.78	1.111
1976	76.51	41.28	168.60	112.4	308.64	3.62	11.57	406.63	156.72	116.03	231	11.70	105.80	1.110
1977	84.22	52.86	n.a.	95.3	332.89	2.81	8.10	538.42	241.59	97.96	279	12.34	115.07	1.110
1978	109.48	n.a.	n.a.	100.7	399.03	3.48	7.81	600.33	n.a.	106.64	268	13.00	124.06	1.110

Sources: International Monetary Fund, *International Financial Statistics Yearbook 1979* (Washington, D.C.: IMF, 1979), pp. 75-77, 455; and Colombia, Departamento Nacional de Planeación, *Política Agropecuaria y el Sistema de Alimentos: Diagnóstico,* tomo 2, Documento de Trabajo DNP-UEA-013 (Bogotá: Departamento Nacional de Planeación, 1979), Annex Table 16 for barley.

Note: n.a. means not available.

[a] New Zealand (London).
[b] Argentina (frozen).
[c] Yellow No. 2, U.S. Gulf ports.
[d] United States (New Orleans).
[e] United States (U.S. Gulf ports).
[f] Caribbean (New York).
[g] Malaysia (Europe).
[h] Colombia (New York).
[i] U.S. (Rotterdam).
[j] Latin America (U.S. ports).
[k] United States (all markets).

Table 26—International and domestic prices of fertilizers and nutrients, 196(

Year	Fertilizers f.o.b.			Nutrients				
				International c.i.f.			Domestic	
	Urea[a]	Superphosphate[b]	Potash[c]	Urea	Superphosphate	Potash	N	P_2O_5
	(U.S. dollars per ton f.o.b.)			(pesos per ton)				
1960	93.26	n.a.	28.50	1,512	n.a.	354	n.a.	n.a.
1961	90.51	n.a.	30.00	1,465	n.a.	372	n.a.	n.a.
1962	94.13	n.a.	30.00	1,521	n.a.	372	n.a.	n.a.
1963	72.25	43.00	30.00	1,560	2,135	496	2,978	3,006
1964	90.50	43.00	32.50	1,976	2,159	544	2,978	3,150
1965	95.75	47.25	29.50	2,289	2,598	541	3,195	3,450
1966	89.25	47.25	27.50	2,840	3,458	671	4,087	3,403
1967	79.25	47.00	25.50	2,799	3,818	690	4,304	3,366
1968	65.50	37.50	24.00	2,565	3,378	721	4,630	3,826
1969	56.00	39.00	22.00	2,390	3,828	720	4,348	3,416
1970	48.25	42.50	31.50	2,175	4,421	1,088	4,348	4,666
1971	46.00	43.00	32.50	2,293	4,930	1,242	5,108	4,453
1972	59.25	67.50	33.50	3,217	8,431	1,395	5,609	4,400
1973	94.75	100.00	42.50	5,669	13,762	1,950	9,782	9,450
1974	315.75	308.00	60.50	20,759	46,574	3,049	14,934	15,763
1975	197.67	205.00	81.33	14,895	35,529	4,698	16,760	20,450
1976	111.67	91.50	55.50	9,423	17,758	3,590	15,217	18,083
1977	127.42	97.92	51.17	11,420	20,064	3,494	14,290	21,820

Sources: International Monetary Fund, *International Financial Statistics Yearbook 1979* (Washington, D.C. 1979); and Monómeros Colombo Venezolanos, "Elementos para un Programa de Fertilizant Colombia," Bogotá, 1977, Table 2.4.2. (Mimeographed.)

Notes: The international c.i.f. price of a nutrient is obtained by converting the f.o.b. price of fertilizer eva at the import exchange rate. The fertilizer/nutrient conversion factors used were 2.1739 (1/0.46) fo 5 (1/0.2) for phosphate, and 1.6666 (1/0.6) for potash; n.a. means not available.

[a] Any origin, Europe.

[b] U.S. Gulf ports.

[c] Canada.

Table 27—Apparent consumption of fertilizers, 1953-78

Year	Nitrogen	Phosphorus	Potassium	Total	Year	Nitrogen	Phosphorus	Potassium
				(1,000 tons)				
1953	n.a.	n.a.	n.a.	...	1966	45.3	45.3	31.8
1954	n.a.	n.a.	n.a.	...	1967	47.9	48.0	29.9
1955	7.3	26.2	15.8	49.3	1968	44.9	45.7	31.5
1956	7.7	31.4	10.1	49.2	1969	54.0	49.1	33.4
1957	10.8	49.9	10.2	70.9	1970	64.0	48.0	32.0
1958	10.1	36.7	20.2	67.0	1971	78.0	65.0	41.0
1959	7.2	26.7	11.4	45.3	1972	109.0	65.0	46.7
1960	10.9	36.5	13.9	61.3	1973	125.7	74.9	54.0
1961	15.0	47.4	18.6	81.0	1974	122.7	73.2	52.7
1962	15.3	43.6	20.1	79.0	1975	100.0	59.6	42.9
1963	22.5	45.4	24.6	92.4	1976	n.a.	n.a.	n.a.
1964	42.4	55.0	34.9	132.3	1977	n.a.	n.a.	n.a.
1965	29.3	33.8	21.8	84.9	1978	n.a.	n.a	n.a.

Sources: For 1955-69, International Bank for Reconstruction and Development, *Economic Growth of Colomb lems and Prospects* (Baltimore, Md.: Johns Hopkins University Press, 1972), Table 14-17. For the res years, Colombia, Oficina de Planeacion del Sector Agropecuario, *Cifras del Sector Agropecuar* (Bogotá: Ministerio de Agricultura, 1978); and Colombia, Oficina de Planeacion del Sector Agrope *Insumos Agropecuarios* (Bogotá: Ministerio de Agricultura, 1977), p. 92.

Note: n.a. means not available.

Table 28—Total consumption of electricity and consumption by industry, 1970-78

Year	January	February	March	April	May	June	July	August	September	October	November	December
						(1,000 kilowatts)						
						Industrial Consumption						
1970	133,031	131,244	153,536	119,442	153,297	133,349	169,982	134,460	172,493	129,836	168,320	147,754
1971	143,551	147,232	165,471	145,933	185,099	142,566	179,664	148,331	196,884	151,631	190,872	153,609
1972	168,020	155,306	198,379	160,026	197,265	167,435	201,928	161,157	208,753	172,125	215,000	166,676
1973	169,104	201,378	213,658	188,026	221,396	185,451	230,870	204,135	245,377	191,261	248,792	189,613
1974	220,039	199,105	235,291	193,150	240,886	199,253	234,633	204,660	255,114	204,167	261,787	207,973
1975	226,694	203,832	241,242	208,781	252,375	187,438	239,550	199,556	258,655	216,542	264,822	218,034
1976	231,082	226,962	279,139	222,373	273,981	239,904	283,174	237,211	289,948	235,127	297,262	239,035
1977	257,031	216,383	275,030	222,681	278,152	226,799	272,378	222,137	300,753	235,220	299,952	244,296
1978	272,215	248,523	280,274	245,778	310,394	259,952	315,243	258,669	308,704	262,197	346,464	272,864
						Total Consumption						
1970	437,369	447,968	445,433	428,856	445,109	444,817	480,054	459,365	489,758	446,057	481,973	487,487
1971	452,157	467,978	478,667	480,023	525,499	473,169	518,659	510,373	542,444	522,993	556,849	525,500
1972	535,531	514,008	556,415	554,703	593,219	603,538	607,601	581,171	640,850	604,480	687,009	608,584
1973	627,161	600,080	650,294	636,116	693,890	696,599	700,673	704,109	690,047	654,198	708,094	646,955
1974	683,416	664,219	681,888	687,192	726,191	728,656	729,172	736,245	745,818	720,585	737,024	750,133
1975	720,249	713,649	694,348	715,385	736,389	693,901	704,194	724,510	752,413	738,067	743,407	745,231
1976	740,478	781,761	780,386	762,455	789,492	817,494	859,925	854,214	829,207	860,115	832,836	811,748
1977	809,734	751,542	690,029	717,562	735,527	819,710	807,259	894,605	867,102	865,184	882,397	835,012
1978	804,828	823,457	861,611	847,695	866,518	878,922	875,636	898,713	889,819	957,195	916,759	921,977

Source: Colombia, Banco de la República, Departamento de Investigaciones Económicas, División de Cuentas Nacionales, unpublished data.

Note: These figures include consumption in Armenia, Barranquilla, Bogotá, Bucaramanga, Cali, Cartagena, Cúcuta, Honda, Ibagué, Manizales, Medellín, Pereira, Popayán, and Tunja.

Table 29—Monthly exports and imports, 1970–77

Year	January	February	March	April	May	June	July	August	September	October	November	December
							(million pesos)					
1970												
Exports	990	1,007	1,120	996	957	1,133	687	817	1,252	620	835	927
Imports	1,063	1,040	934	1,227	1,168	1,351	1,430	1,367	1,575	1,502	1,432	1,494
1971												
Exports	714	717	1,165	944	1,017	1,148	535	1,267	1,184	1,124	1,085	1,051
Imports	1,467	1,473	1,461	1,566	1,523	1,516	1,635	1,797	1,757	1,430	1,450	1,440
1972												
Exports	1,059	1,062	1,218	1,240	1,244	1,527	1,497	1,442	1,556	1,217	1,533	2,131
Imports	1,381	1,403	1,576	1,408	1,595	1,466	1,342	1,643	1,822	1,641	1,611	1,916
1973												
Exports	1,487	1,712	2,606	1,971	1,748	2,011	1,539	1,950	2,432	2,162	1,788	2,899
Imports	1,661	1,805	1,848	1,674	2,074	1,849	2,197	2,151	2,121	2,425	2,837	2,519
1974												
Exports	2,080	2,768	3,293	2,298	3,007	3,903	2,245	2,078	2,369	2,037	2,986	3,664
Imports	2,844	2,681	3,040	3,052	3,292	3,348	3,866	3,582	4,488	3,741	3,784	4,002
1975												
Exports	2,773	3,107	2,367	2,726	2,740	3,192	3,163	3,163	3,094	3,593	3,782	4,525
Imports	4,940	4,091	3,680	4,610	3,885	3,024	3,392	3,354	4,090	4,250	3,677	3,012
1976												
Exports	3,464	3,814	4,862	4,297	4,148	6,030	4,080	5,768	3,643	4,068	4,834	6,902
Imports	2,466	5,810	3,636	5,197	4,510	4,054	4,288	5,991	6,468	5,524	5,217	4,622
1977												
Exports	7,309	6,418	7,689	6,738	8,526	5,699	3,330	4,645	8,131	5,404	5,525	10,734
Imports	3,692	4,260	5,115	4,702	5,574	7,183	6,930	5,666	6,038	5,640	6,551	7,877

Source: International Monetary Fund, "International Financial Statistics Tape," Washington, D.C., April 15, 1981.

Note: The export figures are f.o.b. and the import figures are c.i.f.

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