THE EFFECTS OF EXCHANGE RATE AND COMMERCIAL POLICY ON AGRICULTURAL INCENTIVES IN COLOMBIA

Jorge García García

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In most developing countries, agriculture 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/] Incentives to agriculture affect the economic performance of other sectors and vice versa.

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. The resulting disincentive to exports of agricultural goods has seriously hampered the development of agriculture and reduced its contribution to overall economic performance. However, relatively little attention has been paid to the effect of measures to protect and promote the non-agricultural sector on the development of agriculture.[2/] In addition, the analysis of agricultural policy has been quite narrow, focusing on microeconomic aspects of policies specific to particular agricultural products or inputs and neglecting the general equilibrium implications for agriculture of policies directed to other sectors.

This paper tries to bridge this gap for Colombia with a specific application; by studying the general equilibrium implications for agricultural incentives of overall exchange rate policies and of commercial policies geared to protect other sectors of the economy, industry in particular. It then compares the incentives for each crop arising from specific policies with those from general policies. First, the analytical model is used to examine the effects on the economy of exchange rates

and commercial policies, and of specific policies for selected crops. Second, the effects on relative prices of import tariffs and export subsidies are estimated. Third, the tariff equivalents of import restrictions are calculated, incentives between import-competing goods and different categories of export goods are studied, and the question of whether trade policies for specific crops offset or increase the negative effects on incentives to produce is considered. Finally, conclusions and implications of the analysis are presented.

Analytical Framework

The effects of exchange rate and commercial policy can be examined at different levels of aggregation. In this paper, general equilibrium tools are used to determine how the structure of protection changed the structure of relative prices between industry and agriculture and within agriculture compared to a free trade situation.

These relationships are examined by using a model in which there are three types of goods -- importables, exportables, and home (non-traded) goods. This model can be applied to the Colombian economy, with some simplifications. The exportables can be identified with the agricultural export sector, importables with the industrial sector, and home goods with services, and some potentially tradable food products, and industrial products that are not traded as a result of policy decisions.

A simplified model is used in which the main ingredients are the demand for imports, the supply of exports, the market for home goods, and the prices of imports and exports in terms of home goods. Because 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 functions for final goods. The interrelationships of policies can be explained using a simple supply and demand diagram.[3/]

Letting P_m, P_x, and P_h be the domestic price of importables, exportables, and home goods; P_m^* and P_x^*, the international prices of importable and exportable goods; and I, the real income of the community from home goods, the excess demand functions for importables (M^e), exportables (X^e), and home goods (H^e) are

$$M\ (P_m / P_h,\ P_x / P_h,\ I) = M^e, \qquad (1)$$

$$X\ (P_m / P_h,\ P_x / P_h,\ I) = X^e, \text{ and} \qquad (2)$$

$$H\ (P_m / P_h,\ P_x / P_h,\ I) = H^e. \qquad (3)$$

In a simplified version of this model, the excess demand for importable goods is assumed to depend only on the prices of the imported goods relative to the prices of the nontraded goods, and the excess supply of exportable goods is assumed to depend only on the price of the imported goods relative to the price of the nontraded goods. Thus,

$$M\ (P_m / P_h,\ I) = M_e, \qquad (4)$$

$$X\ (P_x / P_h,\ I) = X^e, \text{ and} \qquad (5)$$

$$H\ (P_m / P_h,\ P_x / P_h,\ I) = H^e. \qquad (6)$$

Equations (4) and (5) indicate that there are no cross-price effects between importable and exportable commodities. This model illustrates

the basic relationships between commercial policy, exchange rates, and relative prices. Assuming that there are no cross-price effects permits the use of one demand curve for imports and one supply curve for exports, rather than shifting curves.[4/] In the empirical application, this assumption is dropped.

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,

$$P^* M(\ldots) = X(\ldots), \qquad (7)$$

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

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,

$$P_m / P_h = (E/P_h)\, P_m^* (1+t) = eP_m^* (1+t), \qquad (8)$$

$$P_x / P_h = (E/P_h)\, P_x^* (1+s) = eP_x^* (1+s), \qquad (9)$$

$$P = (P_m / P_x) = P^*.\ T, \quad \text{and} \qquad (10)$$

$$P_m / P_h = (P_x / P_h).\ P^*.\ T = P^*.\ (1+t)/(1+s) \qquad (11)$$

where e is the real exchange rate (E/P_h), P is the domestic relative price between importable and exportable goods, and T is the ratio of (1+t) to (1+s). Equation (10) shows that the domestic price of importables in terms of exportables is a function of their international relative price and of import tariffs and export subsidies. The nominal or real exchange rates do not affect the domestic relative price unless

a change in them leads to a change in t or s.

Using equations (8) and (9) and assuming $P_m^* = P_x^* = 1$, equations (4) through (6) can be represented as

$$M = (P_m / P_x, I) = M\,(e\,(1+t), I) = M\,(\frac{E}{P}\,(1+t), I), \qquad (12)$$

$$X = X\,(P_x / P_h, I) = X\,(e\,(1+s), I) + X(\frac{E}{P}\,(1+s), I), \qquad (13)$$

and $$H = H\,(e\,(1+t), e(1+s), I). \qquad (14)$$

These last equations stress the effects of the exchange rate and the price of home goods, import tariffs, and export subsidies on the determination of imports and exports.

The model presented in equations (12) through (14) is represented graphically in the first part of Figure 1, which shows the effects of an import tariff. As shown in equation (7), the horizontal axis measures exports and imports in terms of exports. The vertical axis measures P_m / P_h, P_x / P_h, and E/P_h. P* M (. . .) represents the excess demand for importables and X (. . .), 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 o. 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 differently.

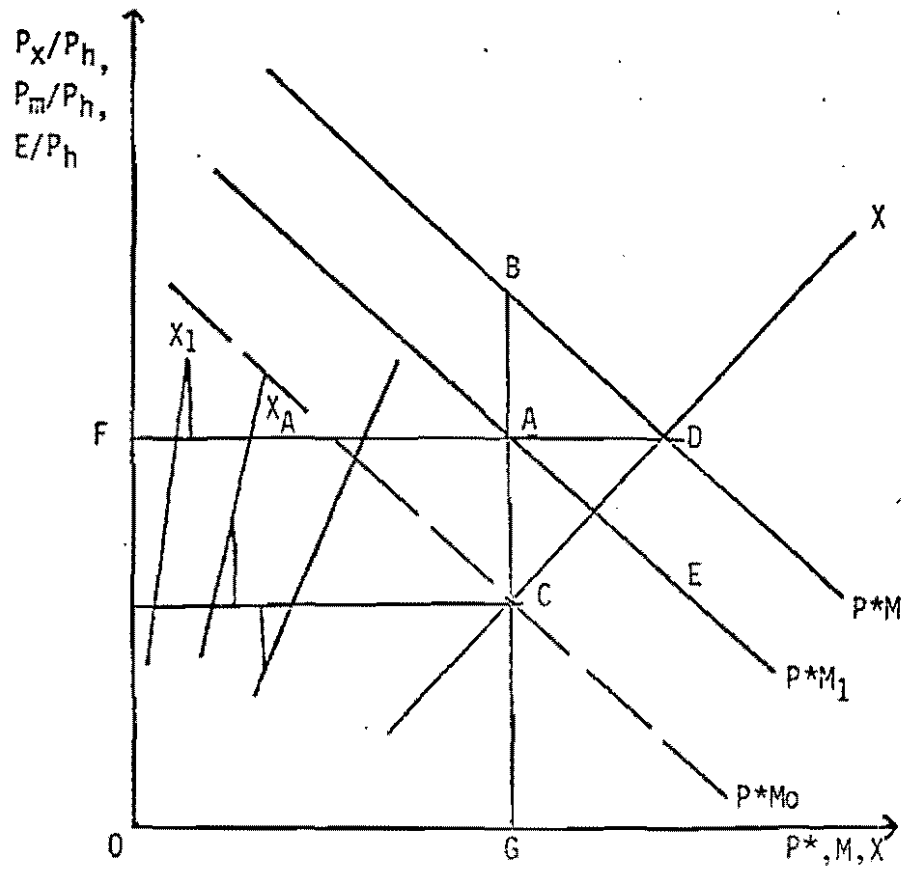

Figure 1A

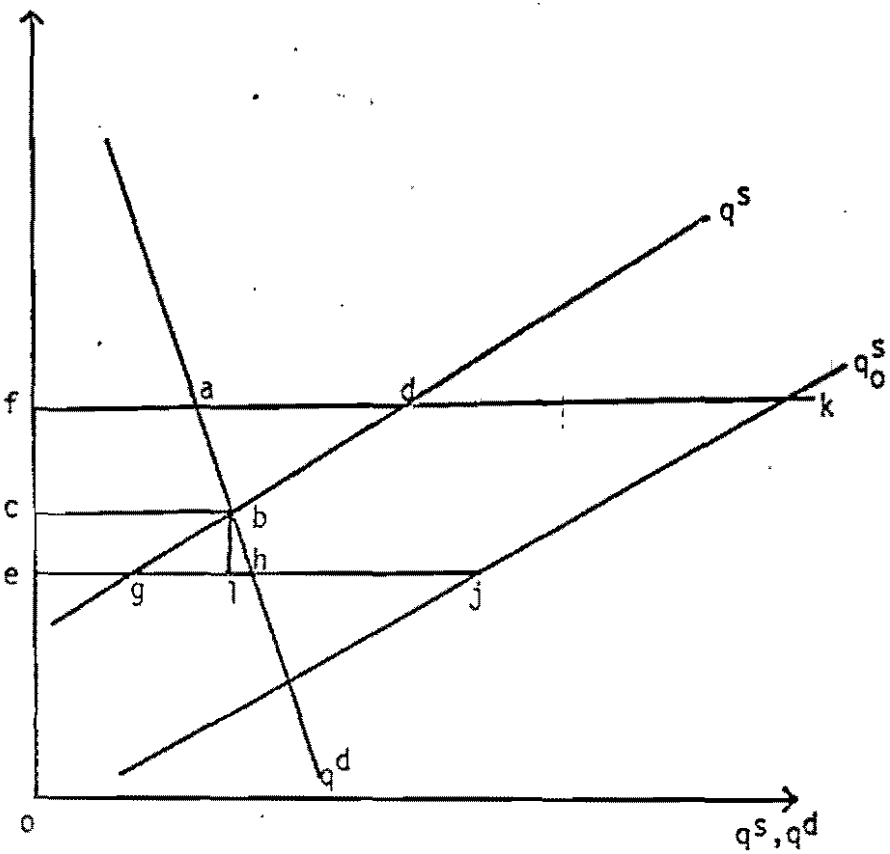

Figure 1B

Figure 1A also illustrates the relation between exchange rate and commercial policy. To explain this relationship, it is assumed that fiscal and monetary policies hold the price of home goods constant and that the latter is equal to one. Under these conditions, an increase in the exchange rate is equivalent to an increase in the relative prices of importable and exportable goods. In Figure 1A, for example, a shift in the volume of trade from FD to FA could be obtained by changing the combinations of exchange rates and commercial policies, which 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, and of AC per unit of exports; or by an exchange rate of BG and a tax of BC per unit of exports.

The figure 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 CG, the government has to restrict imports to keep trade in balance. If the domestic currency is devalued to AG, restrictions on imports can be lifted and a free trade solution is achieved. Thus, the policy of devaluation and the lifting of restrictions has led to an increase in the relative price of exportable goods and to a fall in that of importable goods.

This exercise demonstrates a well-known important point: a tariff on imports also taxes exports, and a subsidy for exports also subsidizes imports. The degree of taxation will depend on the size of the taxes and how they are divided between importable and exportable goods.

Figure 1B shows what happens to an individual product when an across-the-board tariff on imports is established. For simplicity, it is assumed that all the adjustments in price occur via the exchange rate, that the price of domestic goods is kept constant, and that the international price of that particular product (P*) is given exogeneously in world markets. Thus, an increase or a decrease in the exchange rate raises or decreases the price of the product relative to that of domestic products in the economy.

Let p represent the domestic price, q^s the quantity supplied, and q^d the quantity demanded for that product. Under free trade, 'of' is the price of the commodity and ad is the amount exported (Figure 1B). After the tariff is imposed, the exchange rate falls from AG to CG and the domestic price of the commodity falls from 'of' to oe; the good becomes an import good. If the authorities prohibit imports of that commodity (or impose a tariff of ec per unit of imports) its domestic price rises to oc, production increases from eg to cb, and consumption falls from eh to el. Thus, when imports of q are prohibited, its output is higher than when there is an across-the-board import tariff but no prohibition, and lower than when there is the free trade situation. In other words, the net effect of a fall in the exchange rate and a prohibition of imports of q is a tax of cf per unit of exports. Thus, import controls have served to offset, in part, the negative effects of a generalized system of import tariffs. However, the way it is usually measured in the analysis of what is commonly known as agricultural policy, the commodity

under consideration would appear to be protected, since its domestic price is higher than the international price when evaluated at a distorted exchange rate.

Failure to consider the impact of tariffs, subsidies, and other trade restrictions on the global structure of relative prices in the economy can lead to serious mistakes in formulating economic policy for agriculture in developing countries. In fact, it is impossible to understand the development of the agricultural sector in most developing countries unless it is looked at in a general equilibrium context that incorporates foreign trade.

It is worth noting that exports of a country will be less diversified the higher the incidence of a given structure of trade taxes and subsidies, bacause commodities with a high supply elasticity can easily be kept away from export markets.

On additional point has to do with the effects of a differential treatment of agricultural commodities. Turning again to figure 1B, assume that there is another commodity, q_o, whose supply curve is q_o^s, and whose international price is the same as that for commodity q. When an across-the-board tariff of BC is imposed, the exchange rate and the price of q and q_o fall to oe, the exports of q_o fall to hj and commodity q becomes an importable. If imports of commodity q are prohibited, the domestic price of q rises to oc, while that of q stays at oe. This means that the price of q has risen relative to that of q_o, and resources will shift within agriculture to move production from commodity q_o to

commodity q as a result of the prohibition of imports of q. In sum, the overall policies on tariffs and import restrictions discriminate against exportable commodities, and the import policy specific to a particular product distorts incentives within agriculture.

This paper examines the impact on relative prices of Colombia's foreign trade by estimating the incidence of trade taxes, measuring the true gross tariff on imports (the tariff equivalent of import restrictions plus the observed tariff), the gross subsidy on exports, the net tax on different export categories, and the net effect on selected agricultural commodities of the overall trade regime and policies restricting Colombia's imports or exports.

Estimation of the Incidence of Commercial Policy

The framework for estimating how much commercial policy affects the structure of relative prices can thus be summarized[5/] as follows: let the demand for home goods (H^d) be given by

$$H^d = H^d (P_m / P_h, P_x / P_h, I) \qquad (15)$$

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

$$H^s = H^s (P_m / P_h, P_x / P_h, K, L, t), \qquad (16)$$

where K and L stand for factors of production and t for technology.

General equilibrium is obtained when $H^d = H^s$. Displacement from equilibrium, holding I, K, L, and t constant, gives

$$\hat{H}^d = n_m (\hat{P}_m - \hat{P}_h) + n_x (\hat{P}_x - \hat{P}_h) \text{ and} \qquad (17)$$

$$\hat{H}^s = e_m (\hat{P}_m - \hat{P}_h) + e_x (\hat{P}_x - \hat{P}_h), \qquad (18)$$

where a hat (^) indicates a percentage change. Equating (17) and (18), it follows that

$$\gamma m\ (\hat{P}_m - \hat{P}_h) + \gamma x(\hat{P}_x - \hat{P}_h) = 0, \qquad (19)$$

where $\gamma m = n_m - e_m$ and $\gamma x = n_x - e_x$ are the elasticities of the excess demand function for home goods with respect to the relative prices of importables and exportables.

In equation (11), $P_m / P_h = P_x / P_h \cdot P^* \cdot T$.

Assuming P^* to be constant,

$$(\hat{P}_m - \hat{P}_h) = (\hat{P}_x - \hat{P}_h) + \hat{T}. \qquad (20)$$

Placing equation (20) in (18), the incidence of the tariff on the exportable sector is given by

$$\hat{P}_x - \hat{P}_h = -\omega\hat{T} \qquad (21)$$

where $\omega = \gamma m / (\gamma m + \gamma x)$.

This result is not suprising, since it is a basic principle of public finance that the influence 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, when the excess supply of exportable goods is perfectly inelastic, their price falls by the amount of the tariff.

Since $\hat{T} = (\hat{P}_m - \hat{P}_x)$, we can replace it in (21) and obtain

$$d\ln (P_h / P_x) = \omega\ d\ln (P_m / P_x), \qquad (22)$$

where dln stands for the derivative of the natural logarithm of the variable in brackets. Assuming constant ω, after the integration of (22),

$$\ln (P_h/P_x) = a + \omega \ln (P_m/P_x), \qquad (23)$$

which is the basic equation used for estimation of ω. This parameter ( ) can be estimated using ordinary least squares (OLS).

To estimate monthly information published by Colombia's central bank, Banco de la Republica, on price indexes of home goods, exports, and imports for 1970-79 was used. This information is not available before 1970. Aggregate price indexes are available for home goods (P_n), importable goods (P_m), all exports (P_x), exports excluding coffee (P_{xnc}), coffee exports (P_{xc}), and for different categories of home goods, imports, and exports.

The are, then, two basic equations tobe estimated:

$$\ln (P_h/P_x)_t = a + \omega \ln (P_m/P_x)_t + U_t, \text{ and} \qquad (24)$$

$$\ln (P_h/P_{xnc})_t = a + \omega \ln (P_{m/}P_{xnc}) + b\ln (P_{xc}/P_{xnc}) + U \qquad (25)$$

Contemporaneous values were used in estimating the equations. The problem of autocorrelations was solved using the Cochrane-Orautt correction and a second-order autoregressive process. The period covered is March 1970 to October 1979, (116 observations). The statistical results are shown in equations (26) and (27)

$$\ln (P_h/P_x) = \underset{(0.24)}{0.6121^*} + \underset{(0.29)}{0.9486^{**}} \ln (P_m/P_x);$$

$R^2 = 0.90$; $P_1 = \underset{(0.09)}{1.211}$; $P_2 = \underset{(0.09)}{-0.22}$; and D.W. = 2.078. (26)

$$\ln (P_h / P_{xnc}) = 0.2981 + 0.9695^{**} \ln (P_m / P_{xnc}) + \underset{(0.027)}{0.0467} \ln (P_{xc} / P_{xnc}); \quad R^2 = 0.80; \; 1 = \underset{(0.09)}{1.21}; \; 2 = \underset{(0.09)}{-0.22}; \; D.W. = 2.069. \tag{27}$$

The standard error of the estimated coefficient is shown below each one in parenthesis. One asterisk indicates that the coefficient is significant at the 90 percent level, and two asterisks that it is significant at the 99 percent level. The statistical results are good. There is no autocorrelation problem, and the R^2 shows a good fit. The estimated coefficient for the incidence parameter is significant at a 99 percent level.

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

The implications of these results for economic policy are strong. However, one must be aware of the many limitations that exist when a simplified model like the one presented here is used to estimate the incidence of a given tariff structure on relative prices. These limitations arise from the assumptions used to derive the estimating equations. The model assumes that resources, income, foreign prices, technology, and elasticities are constant and that there is no surplus in the current account. These assumptions contrast sharply with findings that the economy quickly reallocates resources in response to changes in relative prices.

To establish whether the exclusion of variables by assuming them constant could effect the estimated value for ω, several tests were performed that incorporated these variables or proxies into the original estimating equation. The results, which are not included here, showed that the value of ω was highly stable at about 0.9, so that the basic conclusion about the high incidence of commercial policy on Colombian exports stands firm.[6/]

Import Tariffs, Export Subsidies, and Net Incentives on Traded Commodities

To calculate the incentive to exports arising from the system of import tariffs, import restrictions, and export subsidies, it is necessary to estimate the tariff equivalent of import restrictions and to add to it the observed ad valorem duties paid; the the gross subsidies are calculated for coffee exports, other agricultural exports, and exports of manufactured commodities.

In order to calculate the tariff equivalent of import restrictions, one must know the price elasticity of the demand for imports, as well as how much restrictions reduced imports below what they would have been.

If $\hat{N}$ = estimated demand elasticity of imports,

$\frac{\hat{}}{(dQ/Q)}$ = estimated reduction of imports due to administrative restrictions, and,

$\hat{t}$ = tariff equivalent of import restrictions,

then $\hat{t} = \frac{\hat{}}{(dQ/Q)} / \hat{N}$. (28)

The author estimates that between 1956 and 1967 quantity rationing reduced imports 24 to 27 percent below what they would have been, and the import demand elasticities ranged between -0.45 and -0.71.[7/] Using equation (28), it is estimated that $\hat{t}$ ranged between 37 and 54 percent during that period.

Imported commodities were subject to the payment of specific and ad valorem duties, as well as to the deposit in the Central Bank of prior import deposits. Exports of goods other than coffee were granted various kinds of subsidies, including differential exchange rates, direct subsidies, exemption from the payment of import duties on raw materials and intermediate products, and subsidized interest rates on export credits. Coffee exports were taxed via differential exchange rates or, since 1967, by an explicit ad valorem export duty.

If E_m = nominal exchange rate for imports,

E_c = nominal exchange rate for coffee exports,

E_{xm} = nominal exchange rate for exports other than coffee,

Z = nominal cost of importing, including tariffs,

Z^1 = nominal cost of importing, including tariffs, and the opportunity cost of prior import deposits,

$\bar{t}$ = average ad valorem import tariff,

$\bar{T}$ = average ad valorem tariff equivalent of the opportunity cost of prior import deposits,

S_t = export subsidy equivalent via a tax credit certificate,

S_c = export subsidy equivalent via a special credit facility,

S_i = export subsidy equivalent via a drawback system or exemption of import duties on raw materials and intermediate products, and

ac = share of coffee exports in total exports.

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

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

$E^1 = E_{xm} (1 + S_t)$,

$E^2 = E_{xm} (1 + S_t + S_i + S_c)$, and

$E = acE_c + (1 - ac) E^1$.

The variable Z measures the direct, observable costs of importing, while Z^1 incorporates the opportunity cost of prior import deposits. The variable E^1 is the exchange rate for all those 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 regarding export tax credit. 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 bound for the minor exports exchange rate. E^2 is the exchange rate for industrial exports that 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. It incorporates direct taxes on coffee and the income tax credit certificate for minor exports. This exchange rate overestimates the true average exchange rate by a small margin because, according to

the weighting system, a higher value is imputed to the exchange rate of some products, such as crude oil, bananas, and raw hides, which were classified as major exports and received, in fact, a lower exchange rate.

To measure the extent of implicit import tariff or export subsidies in the system, any exchange rate can be used as the numeraire. For the purposes of this research, the average export exchange rate (E) was used to measure subsidies and taxes. The measured ratios of exchange rates are presented in Table 1.

To measure the bias of the system, any export exchange rate can also be used as numeraire. The export exchange rate (E) is also used to establish the apparent bias of Colombia's foreign trade regime.

The figures for the nominal cost of importing indicate that Colombia has an import substitution bias which has raised the price of importable goods relative to that of exportable goods by 15-35 percent. The figures for the export exchange rates of agriculture and industry in Table 1 show an export promotion bias as well; the ratio of these two columns is greater than one. 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 rate for agriculture with that for industry shows that industrial and non-coffee agricultural exports were treated equally until 1959: after 1960 industrial exports were favored.

Evidence that only coffee exports were discriminated against and the rest of the exports were favored seems to be supported by a comparison of

Table 1: 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	Ec/E (Coffee)	E_1/E (Agriculture)	E_2/E (Industry)
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	1.32
1961	1.12	1.21	0.84	1.37	1.51
1962	1.00	1.06	0.85	1.37	1.50
1963	1.19	1.40	0.83	1.35	1.46
1964	1.18	1.29	0.84	1.38	1.50
1965	1.01	1.18	0.70	1.52	1.69
1966	1.40	1.53	0.80	1.36	1.52
1967	1.24	1.35	0.83	1.28	1.45
1968	1.23	1.34	0.85	1.24	1.39
1969	1.20	1.31	0.84	1.20	1.32
1970	1.21	1.33	0.86	1.23	1.38
1971	1.18	1.29	0.83	1.20	1.37
1972	1.16	1.22	0.81	1.17	1.31
1973	1.17	1.23	0.81	1.17	1.27
1974	1.14	1.24	0.79	1.15	1.23
1975	1.19	1.26	0.85	1.12	1.25
1976	1.23	1.24	0.88	1.14	1.27
1977	1.29	1.29	0.90	1.15	1.29
1978	1.27	1.27	0.91	1.15	1.28

Source: Jorge García García, The Effects of Exchange Rates and Commercial Policy on Agricultural Incentives in Colombia: 1953-1978, (Washington, D.C.: International Food Policy Research Institute, 1981), Table 7.

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 substitution bias and give misleading ideas of the structure of protection in Colombia.

Once the size of the import premium has been established and observed tariffs and subsidies have been measured, the net effect on prices of actual tariffs, import restrictions, and export subsidies can be determined. For the period 1956-67, the import premium is added to the observed tariff, which is derived from the figures for Z/E in Table 1 and the average (arithmetic) export subsidies and taxes from the figures for E_c/E, E_1/E, and E_2/E in the same table. This information is summarized in Table 2.

Table 2 shows that there was substantially less discrimination against exports in the 1970s than in the 1950s and 1960s, despite high gross subsidies granted during the early years. The net tax on agricultural non-coffee exports ranged between 20 and 37 percent during the 1950s and 1960s, compared to 4 percent in the 1970s. Coffee has always been taxed (in net terms) but the rate fell from 68-85 percent in the 1950s and 1960s to about 36 percent in the 1970s. In contrast, the net tax on industrial exports, which was 10-27 percent in the 1950s and 1960s, became

Table 2

Summary of Import Tariffs and Export Subsidies

Premium, Tariff, or Subsidy	1956-1967 (percent)	1967-1978
Import Premium	37.0-54.0	-
Nominal Tariff[a/]	16.0	20.0
"True" Import Tariffs	53.0-70.0	20.0
Export Subsidies, Agriculture:		
Coffee	-15.0	-16.0
Other	33.0	16.0
Industry:	43.0	30.0
Net Subsidy, Agriculture:		
Coffee	-68, -85	-36.0
Other	-20, -37	-4.0
Industry:	-10, -27	10.0

a These figures are derived from Table 1.

a 10 percent subsidy in the 1970s. This explains why industrial exports increased so rapidly after 1967 despite a reduction in the observed rate of the subsidy (Table 1).

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 import substitution became less important. However, the system of export promotion favored some industrial import-competing activities that were discriminated against in the 1950s and 1960s, because the upward adjustment of the real exchange rate meant a rise in protection for them.[8/]

These findings indicate that policy decisions provided an incentive to move resources out of agricultural exports and into importable goods and non-traded goods, both agricultural and non-agricultural.

Nominal Protection and Net Incentives for Selected Agricultural Commodities

In comparing the domestic and international prices for meat, milk, rice, wheat, sugar, corn, barley, palm oil, and cotton to determine whether these products have been protected or taxed by restrictions on their imports and exports, the international c.i.f. prices are evaluated at the average export exchange rate (E). The domestic prices are those received by producers or paid by consumers. Whenever the ratio of the domestic to the international price for a particular product is higher than one, that product is being

protected. The nominal rate of protection is the excess of the ratio over one.[9/] These price ratios are shown in Table 3.[10/] When interpreting them, it should be noted that some domestic prices are for producers, others for wholesalers, and still others for consumers.

Table 3 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 observed during the late 1950s and the 1960s, when the peso was greatly overvalued. When the overvaluation was reduced, the rate of protection on all these activities fell and sometimes became negative, thus becoming a subsidy to domestic consumption. Sorghum, soybeans, rice, barley, and sugar were all taxed instead of protected after the reduction. To establish whether a particular commodity was taxed or protected as a result of the combination of microeconomic policies applied to it and the overvaluation of the peso, the individual nominal rates of protection are compared with the measure of overvaluation.

The rate of overvaluation is measured in the following way. The analysis in this paper has already established that the "true" import tariff was between 53 and 70 percent in the 1950s and 1960s (Table 2). In addition, coffee exports were taxed at 15 percent; other exports received a gross subsidy in the 33-43 percent range in the 1950s and 1960s, and in the 16-30 percent range in the 1970s. The high share of coffee exports in total exports indicates 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.[11/] For simplicity, it is assumed that exports were taxed

Table 3: Ratios of Import to Export Exchange Rates and of Domestic to International Prices, Selected Agricultural Products, 1953-78

Year	Producer/International Prices							Wholesale/ Internat. Prices		Consumer/ Internat. Prices	
	Sorghum	Soybeans	Milk	Wheat	Corn	Sugar	Barley	Veg.Oil	Rice	Meat	Cot.Fiber
1953	n.a.	n.a.	n.a.	2.24	1.48	1.79	n.a.	n.a.	1.77	n.a.	1.14
1954	n.a.	n.a.	n.a.	2.85	2.08	1.97	n.a.	n.a.	1.97	n.a.	1.25
1955	n.a.	n.a.	n.a.	2.53	2.00	1.78	n.a.	n.a.	1.39	3.03	0.73
1956	n.a.	n.a.	n.a.	2.12	1.77	1.39	n.a.	n.a.	1.50	2.87	0.57
1957	n.a.	n.a.	n.a.	2.49	1.95	1.24	n.a.	n.a.	1.58	2.59	0.77
1958	n.a.	1.45	2.37	2.37	1.31	1.82	n.a.	n.a.	1.13	1.98	0.52
1959	n.a.	1.78	1.85	2.59	1.56	2.33	n.a.	n.a.	1.20	2.22	0.68
1960	n.a.	1.35	2.17	2.34	1.69	2.13	1.51	n.a.	1.52	2.28	1.26
1961	n.a.	0.99	2.35	2.15	1.77	2.12	1.62	n.a.	1.99	2.18	0.93
1962	n.a.	1.05	1.95	1.74	1.20	2.10	n.a.	n.a.	1.05	2.23	0.90
1963	n.a.	1.17	1.65	1.74	1.55	0.82	1.54	2.73	1.04	2.12	1.00
1964	n.a.	1.52	2.08	2.15	1.95	1.24	1.71	2.99	1.41	1.83	1.11
1965	1.27	1.17	1.93	2.05	1.32	2.50	0.97	2.00	1.55	1.42	0.83
1966	1.25	1.14	2.60	2.17	1.45	3.12	1.32	2.98	1.66	1.97	1.17
1967	1.05	1.13	2.37	1.76	1.58	2.43	1.28	2.08	1.37	1.92	1.02
1968	1.54	1.21	2.95	1.85	1.56	2.55	1.22	2.56	1.26	1.55	0.93
1969	1.23	1.25	2.86	1.88	1.31	1.35	1.18	2.63	1.09	1.54	0.89
1970	1.12	1.29	2.69	1.80	1.32	1.54	1.12	2.56	1.06	1.20	0.93
1971	1.07	1.11	1.76	1.30	1.33	0.96	1.12	2.64	1.05	1.01	0.84
1972	1.34	0.94	1.44	1.47	1.58	0.59	0.57	2.56	0.83	0.89	0.74
1973	0.94	0.54	1.88	0.74	1.25	0.47	0.65	1.53	0.52	0.80	0.76
1974	0.77	0.74	1.57	0.85	0.87	0.17	0.68	1.52	0.54	0.73	0.71
1975	0.90	0.97	1.25	1.34	1.06	0.30	1.06	1.49	0.65	1.63	0.95
1976	1.02	1.07	1.41	1.40	1.21	0.63	0.98	1.88	0.83	1.79	1.00
1977	1.65	1.22	1.93	2.03	2.30	1.37	n.a.	1.61	1.13	1.95	1.02
1978	n.a.	n.a.	1.67	n.a.	1.82	n.a.	n.a.	n.a.	0.95	-	0.95

Source: Jorge García García, The Effects of Exchange Rates and Commercial Policy on Agricultural Incentives in Colombia, 1953-1978, (Washington, D.C.: International Food Policy Research Institute, 1981) Table 9.

at a rate of 10 percent for the whole period. Therefore, the distortion in prices, or the rate of overvaluation of the peso, was about 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 3 provides a basis for determining which food products were overprotected in comparison to a free trade situation.

The trade policies followed during 1953-78 imposed a tax on sorghum, soybeans, barley, and cotton. The production of these crops 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 relationship 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 sharp decline in its domestic price. In fact, the trade policy for 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 variability during the decade, did not offset the overvaluation, and there was too little incentive for output 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 ratios of their domestic prices to international prices have always been above the measured rates of overvaluation of the peso. The figures in

Table 3 do not support the notion that domestic producers can compete effectively with foreign suppliers. If imports of milk and vegetable oil were freely allowed, the country would probably become a large importer of these two products. Wheat is the only major food product imported during the entire period covered in this study.

The nominal protection for sugar was higher than the rate of overvaluation for most of the 1950s and the first half of the 1960s, which stimulated its production. However, in the 1960s the country began to export sugar. One possible explanation for this apparently strange result is that sugar producers restricted domestic sales in order to have supplies for export because they wanted to maximize profits in domestic and foreign markets. Exports continued during the 1970s, but the domestic price was below the international price. Although Colombia seems to have a clear comparative advantage in sugar production, the policy of restricting sugar exports contributed to the decline of domestic prices below international prices.

The domestic price used for meat in Table 3 is the consumer price, whereas the international price is on a c.i.f. basis. The two prices are not strictly comparable because the international price includes all the marketing costs from the port of entry to the final consumer. If an arbitrary 50 percent marketing margin is added to the international price, then meat production before 1965 was protected, sometimes by a substantial margin, as in the second half of the 1950s.[12/] Meat exports began after 1962 and domestic and international prices corresponded closely during the second halves of both the 1960s and the 1970s. In the first half of the

1970s, the domestic price was below the international price. Colombia exported cattle until 1953, then was out of the export market for almost 10 years. During this period, cattle would have been imported if domestic production had not been protected. The country has a competitive edge as an exporter of meat, but apparently a great deal of technological development is necessary if this advantage is to be maintained.[13/]

Conclusions

In Colombia, 90 percent of a tariff on imports falls on exports, both on traditional exports such as agricultural and minig products and on industrial exports. This means that a uniform tariff of 50 percent on all imports leads to a reduction of 45 percent in the price of exportable goods relative to home goods.

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 overvaluations 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, some 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. 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, the sugar, barley, and rice group 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 non-traded 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 food imports are not allowed to enter, the rise in relative price of potentially importable food products is an incentive for consumers to increase consumption of non-traded foodstuffs, and hence, an incentive to produce them.

The importance of an export promotion strategy and the depressing effect a tariff has on exports points to the need for a low tariff. For example, a uniform tariff of 30 percent on all imports constitutes a tax equivalent to 27 percent on all exports. This means that exports with high supply elasticities will be unable to compete in international markets. In this context, the simultaneous promotion of non-traditional (industrial) exports and the manufacture of import substitutes are not compatible because resources will move mainly between these two activities within the industrial sector.

A comparison of domestic and international prices shows the clear advantage non-food agricultural products have over food in international markets. Thus, the high rates of taxation of exports in the 1950s and

1960s did not keep many non-food agricultural products from being exported, while most food products sold at prices higher than the international ones. This substantial comparative advantage is not a good reason to tax agricultural exports. In fact, freer trade will lead (as it did in the 1970s) to the birth of many export activities in agriculture and industry that high tax rates would hold down.

Agricultural policies have to be designed keeping in mind the general equilibrium implications of economic policies directed to promote other economic sectors, and not by looking at the effects of microeconomic or specific policies for agriculture alone. A partial equilibrium framework can lead to misleading conclusions and wrong or inedequate policy recommendations.

FOOTNOTES

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

2/ An exception is I.M.D. Little, Tibor Scitovsky, and Maurice Scott, Industry and Trade in Some Developing Countries (New York: Oxford University Press, 1970), pp. 177-178. In the studies conducted by the National Bureau of Economic Research on the foreign trade regimes and economic development of nine countries, little attention is paid to the effects overall protection and exchange controls have on agriculture, except in the study on Egypt by Ben Hansen. Schultz stresses the importance of policies that undervalue agriculture in Theodore W. Schultz, "On the Economics and Politics of Agriculture," in Distortion of Agricultural Incentives, ed. Theodore W. Schultz, (Bloomington, IN: Indiana University Press, 1978) pp. 3-23. D.G. Johnson stresses how international trade boosts agricultural incentives in developing countries in D.G. Johnson, "International Prices and Trade in Reducing the Distortion of Incentives," in Distortion of Agricultural Incentives, pp. 207-209. Explicit references are made as to how trade and exchange rate policies have helped extract the surplus from Brazil's agricultural sector in G. Edward Schuh, "Approaches to 'Basic Needs' and to 'Equity' that Distort Incentives in Agriculture," in Distortion of Agricultural Incentives, pp. 311-313. In the Colombian context, see Jaime A. P. de Melo, "Distortions in the Factor Market: Some General Equilibrium Estimates," The Review

of Economics and Statistics (November, 1977): 398-403, where he incorporates intersectoral relations but holds constant the distortions in the product market. A study by Christopher Cook deals with similar problems; see Christopher Cook, The Impact of Commodity Price Distortions on the Development of the Agricultural Sector in Third World Countries: A Case Study of Colombia, (Ph.D. Thesis, Concordia University, 1980).

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4/ For a graphic presentation of these interactions, see Larry A. Sjaastad, "Commercial Policy, 'True' Tariffs and Relative Prices," University of Chicago, Chicago, 1979, (mimeograph).

5/ The method used to estimate the incidence of commercial policy is presented in detail in Larry A. Sjaastad, "The Incidence of Uniform Tariff in Uruguay," University of Chicago, Chicago, 1980, (mimeograph).

6/ For a report of these results, see Jorge García García, The Effects of Exchange Rate and Commercial Policy on Agricultural Incentives in Colombia, Research Report #24, (Washington, D.C.: International

Food Policy Research Institute, 1981), chapter 4.

7/ García, Effects of Exchange Rates and Commercial Policy, chapter 5.

8/ A study by Hutcheson of effective protection on 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 Martínez, and Ricardo Villaveces, Análisis de la Estructura de Control a las Importaciones en Colombia, vol. 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, DNP1433-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 en Colombia," Revista de Planeación y Desarrollo, (May - August, 1979), 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 Economía Colombiana en Relación con el Proceso de Integración Andina (Bogotá: Fundación para la Educación Superior y el Desarrollo, 1974), Table 3.

9/ It can be argued that since only the nominal rate of protection is measured and since only the effective rate matters for production, this statement is correct only if the nominal rate of protection for purchased inputs that are traded is lower than the nominal rate of protection for the final product. However, the nominal rate of protection for fertilizers, particularly urea, was about the same as for final agricultural food products. Exportable goods were, no doubt, taxed because they were paid at low exchange rates and had to buy their inputs at prices above the international ones. In addition, some, such as coffee, had their exports explicitly taxed. Others, such as cotton, had to be sold in the domestic market at prices lower than international ones.

10/ In interpreting 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.

11/ These rates are found by weighting the taxes and subsidies in Table 1 by the share of each group of exports in total exports.

12/ There is usually a 35 percent margin between wholesalers and consumers in the meat marketing channals 50 percent margin means that the margin left between producers and wholesalers is only 11 percent.

13/ 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," Washington, D.C., 1980, (mimeograph).