

PRICE POLICY AND AGRICULTURAL
EXPORT PERFORMANCE IN JAMAICA

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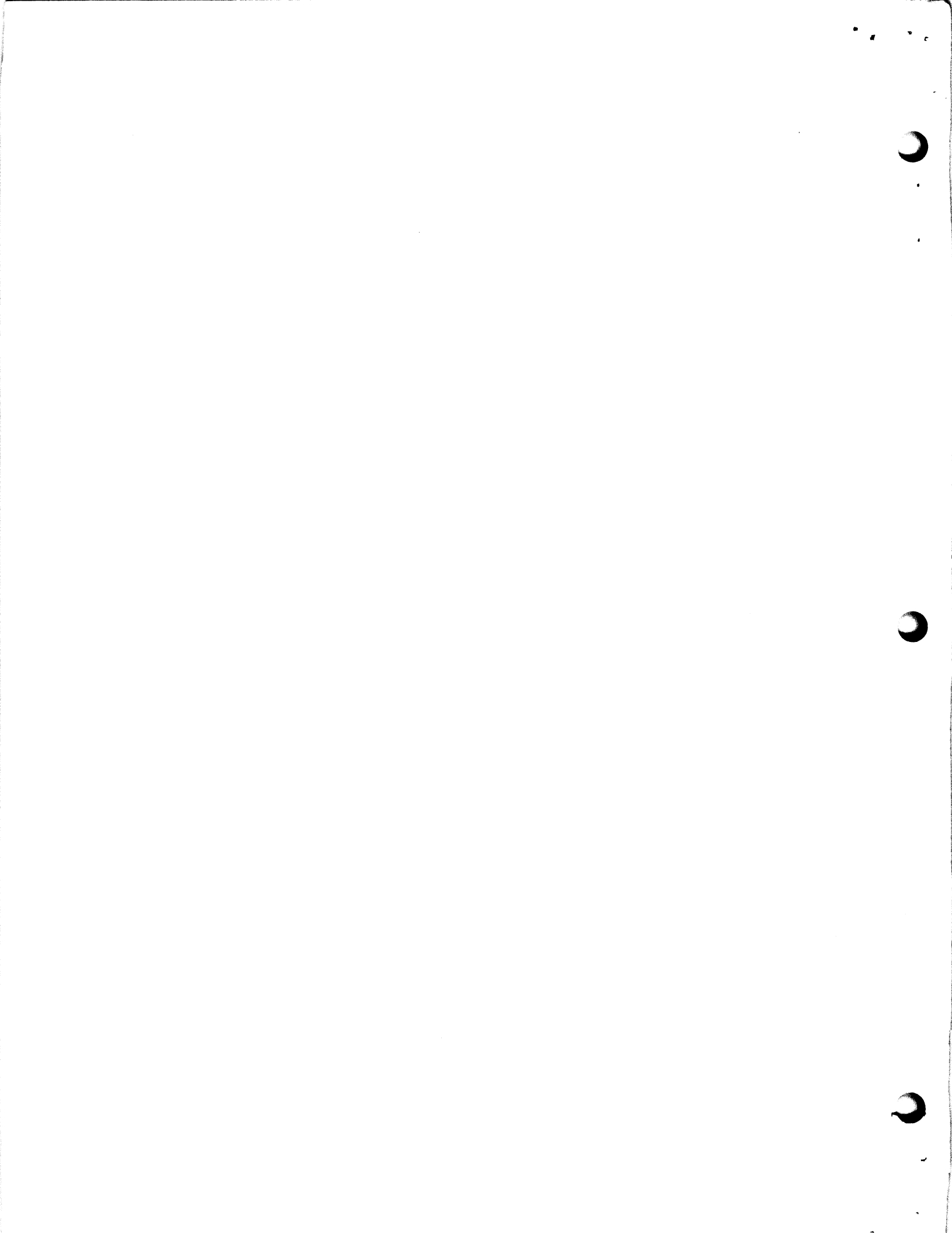
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Jamaica represents one of the most extreme development experiences among the lesser developed countries (LDCs) during the past twenty years. Following fairly respectable growth in gross domestic product (GDP) in the 1960's, the country registered growing balance of payments crises, increased inflation, and almost uninterrupted negative rates of growth from 1973 to 1980. Within this scenario the performance of the agricultural sector played an important role. This article is concerned with documenting and evaluating that experience with respect to the treatment and performance of agricultural export activities.^{1/} In particular, we investigate the influence of the major commodity boards' policies on agricultural export production. It is our contention that prices make a difference and failure to recognize this proviso has led to counterproductive policies by the commodity boards with negative consequences for the country's export performance. We also attempt to explain the rationale behind the observed price policies of the boards and determine the beneficiaries of these policies.^{2/}

In the first section of the paper we discuss both the stated and the implicit goals of the commodity boards in Jamaica. Next, trends in economic growth, export output and pricing patterns for

selected export crops are presented. We then analyze these trends and the use of price policy to meet stated and/or implicit goals. In so doing we undertake the measurement of nominal protection coefficients for export crops to establish the relative degree of implicit taxation or subsidization; analyze variations in F.O.B. and farmgate prices; estimate the supply response of selected export crops; and, draw out the implications of these findings in our conclusions.

Export Crop Pricing Policy

Government controlled marketing boards are set up for a variety of reasons: price stability, revenue collection (through explicit taxes) and the maximization of foreign exchange earnings (Hertford; Bovet and Unnevehr; Olayide, et al.; Brown). In Jamaica, export crop marketing boards are statutory bodies under the control and supervision of the Ministry of Agriculture. The board membership is a mix of growers and appointed officials. The main responsibilities of these boards are to promote the development of their respective export crops and engage in orderly marketing of the crop.

The boards also are expected to promote price stability and maximize foreign exchange earnings. However, given the mix of private growers and government officials, it may be that board members have their own interests at heart. That is, the board undertakes as its function the maximization of profits from its selling and buying operations. These profits are then used to increase board member salaries, to grant concessionary loans for privileged growers (i.e., board members), finance board owned plantations at the expense of individual farmers, etc.

Pricing policy then becomes an important modus operandi in achieving various board functions. For example, if the board wishes to maximize foreign exchange and promote the industry, then the price received by the farm should be the world price received by the board minus the costs of processing. But, if the board wishes to maximize its profits, then the price set is determined by the following formulation:

The profit equation for the board is:

$$(1) \quad \pi = (P_W \cdot S_E) - (P_F \cdot S_E) - (C \cdot S_E)$$

where P_W is the world price; P_F is the farmgate price; π is board profits; C is the cost of processing; and S_E is the quantity of the export crop supplied.

The first order condition is:

$$(2) \quad \frac{\partial \pi}{\partial S_E} = P_W - C - P_F(1 + 1/n) = 0$$

where n is the price elasticity of supply of the export crops.

The price to the farmer is then:

$$(3) \quad P_F = \frac{P_W - C}{(1 + 1/n)}$$

Farmers are then subject to some price discrimination if supply is not perfectly elastic ($n \neq \infty$). That is, farmers receive a price less than the F.O.B. price minus the cost of processing. Hence, the more elastic supply is, the lower will be the output produced and the lower the foreign exchange earned. Monopsony power of the board then

determines both the equilibrium price and the quantity of the export crop. This policy also reduces the benefits to society, as less foreign exchange is available for imports. Furthermore, income distribution is worsened as only a select few benefit from the revenue collected by the board, and not society as a whole as in the case of a general government taxing policy. This is because board members use the revenue for their own purposes and not general fiscal programs.

Jamaican Economic Growth

In Table 1 the sharp shift in growth performance from the 1960's to the 1970's is underscored. Associated with this overall decline in GDP was a steady decline in agricultural growth from the early 1960's onwards and, more to our interest here, a rapid decline in export agriculture from the late sixties onwards.^{3/} Since this data is based on five year moving averages it hides the fact that the period from 1978 through 1980 was also made up of consecutive years of negative growth in agricultural exports.

In Table 2 we present the historical growth rates for output, F.O.B. prices and farmgate prices for the principal export crops in Jamaica.^{4/} Except for coffee (where modest growth occurred), all crops recorded significant declines in the 1970's (Table 2, Panel A). However, it should be pointed out that these output and farmgate price figures are only recording actions by the commodity boards purchasing these crops for export. Therefore the decline in export sales recorded for bananas, coconuts and citrus are not reflecting a true

Table 1. Real Rates of Growth of the Economy, the Nonagricultural Sector, the Manufacturing Sector, the Mining Sector and the Agricultural Sector in Jamaica, 1961-1979^{a/}

Period ^{b/}	National GDP	Non-Agr. GDP	Manufacturing GDP	Mining GDP	Agr. GDP	Export Agr. GDP	Domestic Food Crop GDP	Livestock GDP
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1962-1967	5.44	5.62	6.10	5.77	2.13	1.19	1.56	6.71
1967-1972	6.28	6.87	4.67	13.30	1.92	-3.14	6.78	0.39
1972-1979	-1.51	-1.67	-2.67	- 1.05	1.12	-4.20	3.21	1.96
1961-1979	2.81	3.08	2.28	5.26	1.70	-2.11	3.54	3.03

^{a/} Average annual compounded real rate of growth.

^{b/} Based on 5 year moving averages, for beginning and end points for the years indicated in the table.

Source: Pollard, 1982, p. 5., Table 1.

Table 2. Growth Rates of Output, F.O.B. Prices and Farmgate Prices for Selected Export Crops in Jamaica, 1962-1978.

Panel A. Growth Rates of Output ^{a/}						
Period	Sugar Cane (1)	Banana (2)	Coconut (3)	Cocoa (4)	Coffee (5)	Citrus (6)
1962-1970	-0.65	-10.3 ^{b/}	0.74	- 4.20	0.59	-1.49
1970-1978	-2.90	- 7.43	-21.0	- 0.54	2.02	-5.92

Panel B. Growth Rates of F.O.B. Prices ^{a/}						
Period	Sugar Cane (1)	Banana (2)	Coconut (3)	Cocoa (4)	Coffee (5)	Citrus (6)
1962-1970	-2.75	- 0.06 ^{b/}	--	- 2.80	3.09	n.a.
1970-1978	4.13	7.77	4.67	14.06	8.34	n.a.

Panel C. Growth Rates of Farmgate Prices ^{a/}						
Period	Sugar Cane (1)	Banana (2)	Coconut (3)	Cocoa (4)	Coffee (5)	Citrus (6)
1962-1970	-5.09	- 0.70 ^{b/}	- 3.02	- 2.51	-0.12	-3.80
1970-1978	-1.25	5.06	7.06	1.64	9.80	-4.07

^{a/}The growth rates are expressed as average annual compounded growth rates, based on three year moving averages.

^{b/}For bananas, the period is 1965-1970.

Source: Pollard, 1982; Various tables.

decline in domestic production, but rather the diversion of local output to local processing and domestic product markets rather than exports through the boards. For cocoa, coffee and sugar, however, the figures in Panel A of Table 2 do represent changes in production as the boards are the only marketing channel for both domestic and export sales.

These developments are generally acknowledged in Jamaica. For example, bananas are increasingly used as a form of starch in low income diets in the face of food shortages. This was especially true for the late 1970s. However, Jamaica's foreign exchange constraint was somewhat relaxed in 1981 which led to increased food imports and the apparent demise of the local banana market. The collapse of the local banana market has led to an increase in bananas delivered to the board, but a high rejection rate of this fruit has also occurred since much local output is not fit for the English market.

Another example of this diversion of sales to local markets is coconuts. The board price paid to farmers, though recording a positive rate of growth in the 1970's (7.06 percent per year), was clearly inferior to the informal local market non-board price. Otherwise there would not have been such a precipitous decline in board purchases (21.0 percent per year) in the 1970's. It has been estimated that the Coconut Board only buys ten percent of the total production of coconuts today whereas in the late 1960's they purchased close to ninety percent. Curiously the board has resorted to importing copra (which has varied from 100 to 149 percent of local production in the mid to late 1970's) and purchasing locally produced soybean oil (made

from soybean imports) to replace declining local coconut deliveries since they refuse to raise their prices to match the non-board local price.^{5/} True, the board faces price controls on the final products it sells (e.g. cooking oil, soaps, detergents) which compromises its ability to increase prices to farmers, but only a few consumers are able to buy coconut products at the controlled prices.

As is illustrated in Table 2, Panels B and C, for most of the traditional export crops farmgate price increases have been substantially less than the F.O.B. prices. This indicates that the commodity boards have not been passing on world price increases to their local producers in both the 1960's and 1970's. This price discrimination has caused a continuing decline in output into the 1970's. Further, for all export crops the boards willingly pass on world price decreases, but not world price increases.

This poor agricultural export performance in Jamaica from the late 1960's onwards contrasts to the generally positive growth record recorded by most other Latin American countries' export sectors. Domestic food crops (and peasant producers) invariably experienced declines in output and acreage in most Latin American countries through the encroachment of expanding export crops, promoted to maximize foreign exchange earnings (de Janvry). Jamaica is an exception to this pattern. Domestic foodstuffs expanded in the 1970's while agricultural exports declined. This performance was not due to deteriorating world price trends for the export crops. Rather it was in large part due to foreign exchange shortages which led to food import restrictions,

increased local prices of food and increased supply of domestic food (Pollard). Reinforcing this trend was the inefficiency associated with the pricing and marketing policies of the commodity boards themselves. We now turn to an analysis of these pricing policies.

Analysis of Price Policy

1. Price Variation

One objective frequently mentioned by these boards was their presumed role in stabilizing prices for local producers. As shown in Table 3, except for sugar cane, farmgate prices fluctuated more than F.O.B. prices as measured by the coefficient of variation. Hence, the boards have not stabilized prices paid to farmers. When this result is combined with the fact that for many products such as sugar cane and cocoa F.O.B. prices were rising faster than farmgate prices, one can conclude that in all likelihood these boards generally did not pass on price increases, but did pass on price decreases to the farmers. Further, the banana, cocoa and coffee boards have set up price stabilization funds, but have never used the money from these funds to stabilize prices. The banana board used these funds to help cover costs and the coffee and cocoa boards have just kept the funds in the form of time deposits in a local bank, rather than using them to stabilize prices.

2. Implicit Taxation and Maximization of Foreign Exchange Earnings

The trends in farmgate (i.e. producer) and F.O.B. prices are highlighted more closely through the use of nominal protection coefficients (NPC's) in Table 4. The NPC is defined as the ratio of prices received

Table 3. Comparison of Price Variation Between Farmgate and F.O.B. Prices for Selected Export Crops in Jamaica, 1960-1979^{a/}

	Sugar Cane	Banana	Coconut (Percent)	Cocoa	Coffee
F.O.B. Price	31.95	22.34	20.0	(12.0) ^{b/}	33.9
Farmgate Price	21.0	24.6	22.9	(23.8)	36.4

^{a/} Price variation is the coefficient of variation defined as the standard deviation of the selected price divided by the mean price.

^{b/} Number in parentheses is for the years 1960-1977.

Table 4. Average Nominal Protection Coefficients for Selected Export Crops and the Effective Exchange Rate in Jamaica for Selected Time Periods.

Period	Sugar Cane	Bananas	Cocoa	Coffee	Average Effective Exchange Rate (\$J/\$US) ^{d/}
1960-1964	1.12	0.68 ^{b/}	n.a.	0.75	1.76
1965-1969	1.08	0.80	0.84	0.78	1.56
1970-1974	0.89	0.84	0.79	0.54	1.20
1975-1979	0.77	0.50 ^{c/}	0.55	0.68	0.74

^{a/}The NPC is defined as the ratio of the farmgate price to the F.O.B. price received in Jamaica minus marketing and processing costs: $NPC = \frac{P_F}{P_W} - C$.

^{b/}Only the year 1964.

^{c/}Only the year 1975.

^{d/}The nominal exchange rate deflated by the implicit GDP deflator, base year 1974.

Source: Pollard, Table 3.5.

by local producers to the F.O.B. prices received by the boards minus any processing and marketing costs:
$$NPC = \frac{P_F}{P_{W-C}}$$
 (Balassa). An NPC ratio greater than one indicates subsidization while a ratio less than one indicates that boards are taxing producers for the crop in question. The data indicate that sugar, bananas, cocoa and coffee farmers have been heavily taxed by board action in the 1970's (and the latter three in the 1960's as well). It was not possible due to data limitations to derive NPCs for coconuts and citrus, but a measure of the tax can be derived by comparing local and board prices. For both crops, local prices were approximately twice the board price. On average the rate of taxation (1-NPC) for all export crops has ranged from 11 to 50 percent in the 1970's.

At the same time that individual commodity boards were taxing producers through their pricing policies, an increasingly overvalued exchange rate (Column 5 of Table 4) was introducing an additional implicit tax on exporters by the late 1970's. When one combines the implicit taxation from both sources producers were experiencing a heavy burden from the mid-1970's onwards. This combined taxation (assuming an average overvaluation of 10 percent) has averaged from 21 to 60 percent for the crops in question in the 1970's. Hence, the boards have not followed a policy of maximizing foreign exchange earnings (which would imply an NPC equal to one). We now explore the factors accounting for this heavy taxation of export crops in Jamaica.

3. Price Responsiveness and Monopsony Pricing

A common justification for this implicit taxation is the frequently stated belief by board officials that farmers are unresponsive to prices. Hence boards are allegedly in a position to exploit this taxing power without any effect on output. To test this hypothesis, supply functions for the main export crops were estimated. The form of the supply function in arithmetic form is as follows:

$$(4) \quad Q_t = a_0 + a_1 P_{t-1} + E_t$$

where Q_t is the quantity supplied to the board; P_{t-1} is the real farm level price (nominal price deflated by GDP deflator, 1974 = 100) offered by the board lagged one year (except for sugar where price is lagged two time periods) and E is the error term. The use of the GDP deflator is to capture price changes of all other sectors in the economy. All supply elasticities, which are calculated at the point of means, shown in Table 5 are significant at the 5 percent level and, moreover, real prices explain over 60 percent of the variation in output for cocoa, coffee, sugar and citrus. These findings highlight the fact that, contrary to board assumptions, farmers are indeed responsive to price changes.

For example a 10 percent increase in sugar prices would have increased sugar output by 3.5 percent over the period 1961-79. In the case of coffee, cocoa and citrus these output responses are even higher (5 to 6 percent increases in output for a 10 percent price rise). The lack of a significant price response for bananas and an apparently illogical response for coconuts are easily explained. Both products

Table 5. Estimates of Supply Elasticities for Selected Export Crops in Jamaica

Period	Sugar Cane	Bananas ^{a/}	Coconut	Coffee	Cocoa	Citrus
1961 - 1970	0.43	n.s.	n.s.	1.12	0.54	0.49
1970 - 1979	n.e.	n.s.	-1.95	n.s.	0.56	0.71
1961 - 1979	0.35	n.s.	-1.34	0.65	0.57	0.52

^{a/} For bananas, the period is 1965 - 1979.

n.e. -- Not estimated.

n.s. -- Not significant.

Source: Pollard, various tables.

have local markets separate from the commodity board market. Despite real price increases by these two boards, sales to these particular boards have been unresponsive or declining since producers have been selling to non-board local markets that offer prices higher than board prices.

The supply elasticities can also be used to examine if the boards are engaging in monopsony pricing. This is done by manipulating equation (3). It can be seen that $1/1+n$ is equal to the NPC ($P_F/P_W - C$) and this result is used to derive the NPC that would have been observed if monopsony pricing has been employed by the boards. These results are presented in Table 6. The pricing behavior of the coffee board during the 1960's comes the closest to following a monopsony pricing pattern. For all other crops (for all periods) we reject the hypothesis that boards set prices to maximize profits, as the actual NPC is at least twice the derived monopsony NPC.

This rejection of monopsony pricing behavior by the boards implies that board price policy does not fulfill stated or implicit objectives. What criteria, then, determines prices set by the Boards? First, it may be that the Boards have not been forecasting the world market price accurately and the prices paid to farmers reflect these miscalculations. This answer implies long term Board incompetence which does not seem plausible given the accumulated knowledge of world markets by the Boards over time. A more logical explanation could be that the Boards attempt to maximize profits, but the "monopsony" price paid to farmers would be at a level that farmers would not tolerate. Thus, the price

Table 6. Comparison of Actual and Monopsony Rates of Nominal Protection

Crop	Period	Average Actual NPC	Monopsony NPC ^{a/}
Sugar	1960-1969	1.10	0.30
	1970-1979	0.83	0.30
Banana	1960-1969	0.78	n.e.
	1970-1979	0.78	n.e.
Coffee	1960-1969	0.77	0.53
	1970-1979	0.61	0.00
Cocoa	1960-1969	0.84	0.35
	1970-1979	0.62	0.32

^{a/}The monopsony NPC was calculated using the equation $NPC = 1/1+n$. The estimates of n are from the estimates of the supply elasticities from Table 5; n.e. is not estimated.

that is paid to farmers, neither maximizes the Boards' profits nor the amount of foreign exchange that could be earned.

Beneficiaries of Price Policy

The beneficiaries of these price policies vary among the Boards (see Pollard for a fuller treatment of this). In the case of sugar, the revenue collected goes to the government and is used to subsidize the government owned sugar mills and local consumers through low, controlled prices. For bananas, coconuts and citrus, the chief beneficiaries of price policy appear to be the larger farmers who control the industry through their board directorships. The benefits that accrue to these farmers appear to be in the form of profits from the processing plants (and not their farm operations) in the case of coconuts and citrus, and cheap credit and input subsidies in the case of bananas. Further, urban consumers who can get coconut products at the controlled prices also benefit. In the case of coffee, local coffee processors have been satisfied at the expense of earning additional foreign exchange, since the price paid by processors is less than the export F.O.B. price. This had led to a subsidization of local processors by coffee farmers. Cocoa has imposed the lowest level of taxation of all the export industries, but has still reduced possible foreign exchange earnings. The benefits of this taxation have accrued to the Board which has used this money to establish its own cocoa plantations competing directly with cocoa farmers.

Conclusions

The primary conclusions drawn from this analysis of the Jamaican export crop sector are two. First, export crop farmers have been implicitly taxed by the pricing system of the commodity boards. Second, contrary to the assumptions of board officials, export crop farmers do respond positively to prices. Calculation of nominal protection coefficients reveals that export crop farmers have been taxed an average of twenty to thirty percent in the 1970's. With the exception of sugar which was subsidized in the 1960's, other export crops were taxed at 1970 levels in the 1960's. The estimated supply response functions show that farmers do respond positively to prices. This is in sharp contrast to the statements of commodity board officials stating that farmers do not respond to prices and that offering farmers higher prices would be a wasted effort.

Furthermore, these Boards state that price stability is an important objective. However, the coefficient of variation for farmgate prices is higher than that for F.O.B. prices with the exception of sugar. Another important objective of the Boards is the earning of foreign exchange. However, the implicit taxation of farmers by the Boards' pricing policies has seriously reduced the level of potential foreign exchange earnings and has contributed to the growing balance of payments problem in the mid to late 1970's.

Although the Boards have not set prices to maximize their own revenue, they still have sacrificed foreign exchange earnings for Board profits. Thus, the pricing policy of the Boards is inefficient

both in terms of the maximization of their own profits and in the maximization of foreign exchange earnings.

Implications

The implicit taxation of export enterprises and the distribution of benefits from price policy has thus imposed high social costs on Jamaica in terms of efficiency and equity. All farmers in export industries have been "forced" to subsidize select interest groups (i.e. large farmers; board members) which has led to a worsening of the income distribution within Jamaica. The loss of foreign exchange earnings compromises Jamaica's capacity to import and impacts on all groups in society. Finally, the Boards have not exercised the desired flexibility necessary to take advantage of favorable world market conditions. This has been a direct result of the Boards desire to satisfy select interest groups at the expense of farmers and society as a whole.

Footnotes

1/ The exact share of agricultural exports in total merchandise exports cannot be easily derived. The "true" total foreign earnings of Jamaica cannot be estimated due to the implicit pricing system of bauxite and alumina exports that arises from the vertically integrated nature of this industry. However, after subtracting out the somewhat artificially reported export value of bauxite and alumina, agricultural exports averaged 80 percent of the remaining merchandise exports over the 1960s and declined to an average of 66 percent over the late 1970s.

2/ Most studies of price policies document the implicit economic costs and benefits of such policies, but do not engage in exploration of the rationale behind these policies. Lewis in an extensive search of the literature on price policy states that economists are very good at documenting price distortions, but not the reasons behind them.

3/ Over the decade of the 1970's agriculture accounted for approximately one-third of total employment. Also, the share of export agriculture of total agricultural GDP averaged 31 percent over the period 1962-1972, but declined to an average of 20 percent over the late 1970s.

4/ The traditional outlets for the two main export crops, sugar and bananas, are protected markets in the United Kingdom. Jamaica has a quota of 150,000 tons for bananas in the U.K. and receives a tariff preference over Latin American banana exports. For sugar, Jamaica has a quota of 135,000 tons in the EEC and a preference under the ACP agreement with the EEC. During the 1960's Jamaica's sugar

quota was 235,000 tons with the United Kingdom, and 80,000 tons with the United States from 1960 until 1974 when the United States Sugar Agreement expired.

^{5/} In 1981 the board increased its price paid to farms by 158 percent and the result was an increase in the non-board price to a level of 148 percent above the board price. Moreover, the board has been forced to buy soybean oil locally produced from soybean imports and has not been given foreign exchange to import coconut oil.

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