FINANCIAL ASPECTS OF THE BARBADOS SUGAR INDUSTRY*

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Introduction

The financial requirements of the Barbados Sugar Industry must be viewed against its recent operating performance as well as recent developments on the international sugar market. Raw sugar prices, in keeping with a tradition of wide fluctuations, fell to below £100 per tonne in October 1977 after reaching as high as £650 per ton on the London Daily Market in November 1974. However, the recent International Sugar Agreement which establishes price ranges, export quotas and buffer stocks for the trading of sugar on the free market, should be a significant stabilizing influence on the expectations of sugar producers and consumers. Along with the phenomenon of falling prices, the cane sugar industry is experiencing increased competition from European beet sugar and substitutes such as "high fructose syrup" and articicial sweeteners. The Barbados Sugar Industry, in particular, has been suffering from declining production and rising costs in a market dominated by large producers with lower production costs.

The purpose of this paper is to examine the financial requirements of the industry and to assess the adequacy of its sources of finance. The paper first overviews the performance of the industry and examines its structure. It goes on the analyse its financial requirements and describes the institutional arrangement for financing. Finally, an attempt is made to determine the adequacy of the available financing.

Overview of the Industry

Sugar production in Barbados fluctuated around 170,000 tons annually between 1950 and 1969. By 1976, it had fallen to 102,000 tons. Although the acreage cultivated has been declining, reflecting the diversion of sugar land into other uses, the most important reason for the decline in production has been the steady drop in yields. If yields had remained at their average 1965/69 level (3.4 tons of sugar per acre), production would have exceeded 130,000 tons in 1976.

The two main reasons for the steady fall in yields have been the dry weather pattern which the island has been experiencing since 1970 and the high incidence of canefires (see Appendix). In addition, a number of factors reflecting the change to less labour intensive production, for example, less effective weed control, compaction of the soil due to the use of machines and the increase in extraneous matter collected with the cane have also contributed to the reduction in yields.

Studies on rainfall patterns in Barbados show that the country is at present undergoing a marked dry spell, and it is thought that this low average

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*The author has updated the paper presented to the Conference.

Table 1. Barbados: Sugar Production Statistics; 1964-1976

Year	Acreage Reaped	Cane Milled	Sugar Produced	Tons of Cane per Acre	TC/TS	Tons of Sugar per Acre	Effective* Rainfall
	(.....'000 tons .....)			(tons)		(tons)	(inches)
1964	50.8	1,476	161.5	29.0	9.4	3.2	53.0
1965	49.5	1,731	196.0	35.0	8.8	4.0	53.5
1966	51.5	1,559	171.9	30.3	9.1	3.3	60.0
1967	52.2	1,826	200.6	35.0	9.1	3.8	47.0
1968	50.6	1,369	159.1	27.0	8.6	3.1	50.0
1969	50.5	1,264	138.5	25.0	9.1	2.7	52.0
1970	49.8	1,433	153.9	28.8	9.3	3.1	51.0
1971	48.7	1,214	134.6	25.0	9.0	2.8	46.0
1972	43.9	1,043	110.5	23.8	9.4	2.5	49.5
1973	46.3	1,072	116.3	23.1	9.2	2.5	45.0
1974	41.4	941	108.6	22.7	8.7	2.6	46.5
1975	39.8	832	96.9	20.9	8.6	2.0	45.5
1976	39.3	829	102.0	21.1	8.9	2.6	45.0

*"Effective rainfall" attempts to measure rainfall by distribution rather than total rainfall. For an explanation of effective rainfall, see: J.C. Hudson, (Agronomist, Barbados Sugar Producers' Association),"Fire, Water and Sugar Production in Barbados".

Source: Ministry of Finance and Planning and Barbados Sugar Producers' Association.

Table 2. Cost of Sugar Production in Barbados and Sugar Prices Received; 1970-76

Production Costs	1970	1971	1972	1973	1974	1975	1976[1]
	(..... BDS$ per ton .....)						
Wages	142.8	154.8	184.8	182.0	207.0	372.0	371.0
Supplies	44.8	52.0	58.8	67.6	100.0	139.8	137.4
Sub-Total	187.6	206.8	243.6	249.6	307.0	511.8	508.4
Depreciation	31.6	32.4	36.0	42.2	47.6	56.8	51.0
Miscellaneous	33.6	41.6	48.0	42.4	52.6	69.5	61.5
	252.8	280.8	327.6	334.2	407.2	638.1	620.9
Prices received by producers	218.5	216.5	284.5	282.6	539.4	822.3	617.8

[1]Estimates

Source: Barbados Sugar Producers' Association

annual rainfall could last for another six to eight years. This will militate against any attempt to improve yields. However, the withdrawal of permission to burn cane, and improvements in cultivation practices, especially at the small farm level, could go a long way to improving yields.

According to the Barbados Sugar Producers' Association, average costs of production exceeded prices received by producers over the period 1970-73. Even allowing for some overstatement of the cost estimates, particularly in the items "Depreciation" and "Miscellaneous", it appears that the profitability of the industry was only marginal at best. Furthermore, in spite of the high prices of sugar in 1974 and 1975, the incidence of the sugar export levy which withdrew approximately $30 million from the industry still prevented some estates from improving their profit position. This profit squeeze stimulated a consolidation in the number of factories leading to an improvement in capacity utilization, but it probably also contributed to lower yields through reduction in some inputs and overall investment levels.

Between 1960 and 1976, the sugar industry accounted for an average of 12.0 per cent of Gross Domestic Product (GDP) of the island, and in 1977 employed approximately 10,600 workers, 12.0 per cent of the total labour force.

Although the contribution of sugar to GDP has been falling since 1969, on two occasions, namely 1974 and 1975, there were significant departures from this trend. The failture of the European beet crop in 1974, combined with a secular decline in world supply relative to consumption, resulted in an acute shortage of sugar on the world market, pushing the world market price to as high as US$.52 per pound in November 1974. Barbados benefited from such high prices and in 1974, sugar's contribution to GDP and domestic exports increased considerably and practically doubled in 1975.

The gross foreign exchange receipts from sugar and its by-products are second only to tourism and manufacturing although its net contribution to GNP is considerably higher than manufacturing and probably as large as tourism. In 1973, the year prior to the price boom, the industry's export earnings were $32.3 million, 39 per cent of total visible export receipts. In 1975, the value of sugar exports virtually tripled from 1973, totalling 195.1 million, 53.7 per cent of visible domestic exports.

Barbados currently exports 50,000 tons of sugar to Europe under the provisions of the Lomé Convention. It also sold 50,000 tons on the world market in 1977, plus about 1,000 tons to Caricom countries. The marketing prospects for the industry will, however, be considerably influenced by the recently concluded International Sugar Agreement. The new agreement is calculated to stabilize trading arrangements on the world sugar market and has come at a time when the price of sugar on the world market has fallen to below £100 per tonne of raw sugar((US) 8 cents per pound), well below the cost of production in Barbados.

The main provision of this agreement between major producer and consumer nations is a combination of export quotas to producers and reserve surplus stocks aimed at holding sugar prices within a range of (US) 11 and 21 cents per pound. The basic export tonnage entitlements to countries party to the agreement total 15.9 million tonnes. The agreement which is expected to run for five years starting January, 1978, provides Barbados with a guaranteed market for 70,000 tons of sugar at a more or less stable economic price, which

Table 3. Barbados: Gross Domestic Product at Factor Cost; 1960-1976

Year	Sugar	Manufacturing	Distribution	Government & Services	Other	Total
	(..... BDS$ Million .....)					
1960	25.5	10.0	27.6	25.4	37.0	125.5
1961	25.9	12.2	28.0	26.8	35.8	128.7
1962	25.3	13.3	29.2	28.2	37.1	133.1
1963	37.0	14.0	33.6	30.0	38.3	152.9
1964	29.7	15.1	34.1	31.9	39.2	150.0
1965	31.5	16.2	35.6	34.6	40.3	158.2
1966	32.0	17.8	37.3	40.4	43.8	171.3
1967	35.1	19.6	39.2	48.1	51.0	193.0
1968	28.6	22.7	50.0	63.9	59.3	224.5
1969	24.0	26.5	59.2	74.2	63.0	246.9
1970	27.1	31.4	71.2	87.5	72.7	289.9
1971	24.0	37.0	78.2	103.9	78.4	321.5
1972	25.8	43.6	84.0	114.9	86.9	355.2
1973	28.0	50.9	102.1	135.9	101.7	418.6
1974	52.2	62.1	122.7	159.3	181.1	577.4
1975	95.0	69.4	132.2	170.9	188.6	656.1
1976	44.9	78.2	151.6	188.6	211.3	674.6

Source: 1960-72: Estimates of Ministry of Finance and Planning;
1973 : Estimates by CEPCIES Secretariat of the OAS;
1974-76: "Provisional Estimates of Gross Domestic Product 1974-76" by Ione Marshall;
Central Bank of Barbados Quarterly Report, Vol. IV, No. 2, June 1977.

is hoped to rise gently, settling around (US) 13 cents per pound. The total guaranteed export market of over 120,000 tons is a reasonable goal for the industry and its stability allows a chance for planning and projection analyses.

Structure of the Industry

Barbados has about 60,000 acres of arable land, of which about 48,000 acres are at present used for sugar production. Ownership of the land is divided between estates of 25 acres or more, which occupy roughly 80 per cent of the land, and small-holders, owning about 20 per cent.

The 206 estates are almost all locally-owned[1] and they control operations at every level of sugar activity, from the growing of the sugar cane to the export of sugar. It is estimated that almost the entire arable acreage of the estates is devoted to sugar cane production accounting for about 85 per cent of the cane produced. The estates have an advantage over the small-holders in their practice of more scientific methods of cultivation, and also

[1] About 95 per cent of the estates are locally owned.

Table 4. World Sugar Prices, 1960-1976 (Annual Average) and Barbados' Export Price

Year	World Price (ISA Daily)[1]	Barbados' Export Price[2]
	(..... BDS$ per ton .....)	
1960	140.68	191.99
1961	120.96	198.56
1962	124.54	202.84
1963	372.28	237.84
1964	256.70	215.36
1965	90.50	195.04
1966	81.08	205.81
1967	86.02	195.62
1968	85.12	222.46
1969	143.36	221.49
1970	165.32	218.52
1971	201.60	216.46
1972	325.70	284.48
1973	423.36	282.64
1974	1,343.56	539.39
1975	917.96	822.30
1976	354.00	617.67

[1] International Sugar Agreement (ISA), f.a.s. or f.o.b. Caribbean or Brazilian ports;

[2] This is the price to the factory but excludes harbour levies, terminal charges and marketing expenses. The 1975 export receipts include an export levy which amounted to roughly $370 per ton of sugar exported.

Sources: International Sugar Organization, Sugar Year Book, various issues; Barbados Sugar Producers' Association, Sugar Industry Review, No. 28, June 1976.

Table 5. Composition of Domestic Exports; 1966-1975

Year	Sugar[1]	By-Products (Rum)	Manufactured Goods	Other	Total Visible Exports	Sugar and By-Products as % of Total Visible Exports
1966	33.8	6.6	4.7	4.9	50.1	80.6
1967	36.6	7.7	4.8	5.3	53.5	82.8
1968	36.2	6.4	8.7	8.3	59.6	71.5
1969	27.0	6.4	15.7	8.2	57.4	58.2
1970	29.4	8.4	18.2	6.2	62.1	60.9
1971	26.4	7.7	18.7	0.4	53.2	64.1
1972	27.1	7.9	27.5	0.6	63.1	55.5
1973	32.3	8.8	39.8	2.8	83.7	49.1
1974	52.2	12.8	53.2	4.8	122.9	52.9
1975	95.1	16.0	61.1	4.7	176.8	62.8
1976	46.5	13.4	70.7	2.7	133.4	44.9

[1] Includes fancy molasses

Source: Barbados Statistical Service, Overseas Trade Reports.

because of more efficient management techniques. As a result, the average yield on estates is approximately 24 tons of cane per acre, as compared with an average of 16 tons per acre for small-holders.

The 5,651 small-holders cultivate about 10,000 acres, 7,000 of which are at present devoted to sugar cane. Data taken from the 1971 Agricultural Census suggest four types of small farmers who all, to varying extents, engage in sugar cane production. These distinctions are useful in determining their financial requirements.

Table 6. Number of Samllholders in Agriculture and Area Operated

Size Group (acres)	No. of Self-employed	Acreage	Total Holders	Acres
0 - 1	1,602	634	4,004	1,569
1 - 5	842	1,465	1,517	2,563
5 - 10	77	478	95	882
10 - 25	30	438	35	860

Source: Census of Agriculture, 1971.

The first group comprises the "true" peasant who makes a living entirely from his agricultural production. These peasant-farmers actually require little or no credit because of their low cash outlays for labour, as the units in this category are small enough to be owner-operated. Moreover, this type of farmer is reluctant to enter into debt or go through the tedious mechanics of borrowing.

The second group comprises mainly part-time farmers and includes a number of persons who purchased plots when some estates were sub-divided in the late 1960's. This group still derives most of its income from non-agricultural sources and so its need for credit is not so pressing.

Groups three and four have practically similar needs with regard to credit; the difference is more one of degree. The third group carries on the most diversified operations and receives significant revenue from market gardening at various times during the year. Nevertheless, this is usually not enough to eliminate completely the need for short-term credit for sugar cane production. The fourth group is almost entirely engaged in sugar production and its credit requirements are even more pronounced.

Before 1950, almost every sugar estate owned its own factory and carried out its own milling operations. However, the number of sugar factories on the island has declined steadily from 35 in 1950 to 9 in 1976, as more estates were consolidated and others went out of sugar production entirely. With the reduction in the tonnage of cane milled from 1.7 million in 1963 to 1.3 million by 1969, it became increasingly unprofitable to operate all the factories, most of which were operating below full capacity.

In 1970, the owners of sugar and fancy molasses factories formed a new company, the Barbados Sugar Factories Limited (BSF), which acquired all the assets and liabilities of the companies and individuals owning these

factories. This company, established with a capital stock of $50 million is, therefore, jointly owned by the cane producers. Shares are allotted to cane producers in proportion to the acreage owned and an allotment of shares was offered for small farmers *en bloc*. Dividends of the company are distributed on the basis of production.

At the marketing stage, the sugar is handled by a committee comprising representatives of the Sugar Producers' Association, Barbados Sugar Factories Limited and local merchants who act as commission agents for Barbados Sugar Factories Limited, for exporting the sugar. All sugar produced is bought from the factories by Barbados Sugar Factories Limited, and the local merchants arrange contracts and shipments, subject to the approval of the export committee, for a fee of one-half per cent.

Financing Requirements

The main financial concern of the sugar industry has generally been the provision of short-term finance. This is because the process of sugar production requires a steady flow of expenditure over a long growing period during which no revenues are earned. (It takes 16 months for the first crop to mature and one year for the subsequent ratoons.) Furthermore, in recent years this financial need has not been eased from year to year as the poor profit position of the industry has precluded any financial reserves after outstanding credit and production costs are settled.

Starting in December 1973, the Central Bank of Barbados, in cooperation with the Sugar Industry Agricultural Bank, developed a programme of refinancing to the sugar industry which satisfies the entire short-term financial needs of the estates and factories. The small farmer who owns up to 25 acres is served separately by the Agricultural Credit Bank. In the meantime, however, the medium and long-term credit requirements which were trimmed by a programme of consolidating factory capacity, are beginning to emerge. These will be key factors in the improvement of the industry.

Short-Term Requirements

The sugar industry makes use of short-term financing at each of the three stages of sugar production - field operations, factory operations and marketing. In estimating the costs of producing cane on small farms and estates, we assume for the sake of simplicity that:

(i) a small farm size does not exceed 25 acres;

(ii) the majority of small farms average three crops before replanting. The estates benefit from superior cultivation practices and, in most cases, better rainfall, and average four crops before replanting;

(iii) the yield on the small farms averages 16 tons of cane per acre; the estates average 24 tons of cane per acre. (This average is based on current yields.)

(iv) the haphazard planning of many small farmers very often precludes any systamatic "throwing-out" and replanting of a fixed part of cane acreage each year.

Therefore, for this costing exercise, full cultivation and planting on small farms is regarded as taking place in the first year; this places a high cost on first year operations as compared with later years. However, because of the estates' replanting schedule and the planned nature of their production in general, costs tend to be roughly equal each year.

Table 7. Average Production Costs per Acre on Small Farms
(Year 1 represents 1977)

	1st Year[1]	2nd Year	3rd Year
	(..... $ .....)		
Cultivation	190.00	50.00	50.00
Weeding and spraying	320.00	100.00	100.00
Planting material	108.00	-	-
- Wages for planting	36.00	-	-
Fertilizers	90.00	90.00	90.00
- Application	10.00	10.00	10.00
Taxes	11.00	8.00	8.00
Interest	15.00	8.00	8.00
Production costs	780.00	266.00	266.00
Reaping and cartage (16 tons per acre)	320.00	280.00	240.00
Total Costs	1,100.00	546.00	506.00

[1] Figures for the 1st year comprise expenses up to the first crop which is harvested in 16 months.

Source: Based on estimates made by officials in the sugar industry.

As seen from Table 7, the total average cost of production per acre on small farms over the three crops is $717. This includes the cost of reaping and cartage which can be excluded for the purpose of considering credit requirements. Credit for reaping and cartage is normally provided by the sugar factories which provide the service where requested and debit the cane producers' account receivable. When these costs are excluded, the average credit requirement is $437. However, because of the need to expend a minimum of $780 per acre in the first year, the realistic financing requirement over the three crops would be roughly $800 per acre in the first year and $250-$275 per acre in the following two years. In Table 9, production costs for the estate are estimated at $1,164 per acre; this figure includes the reaping and cartage costs which are tied into the overall costs. The higher production cost per acre for the estates can be explained by their higher yield per acre and also because, in the case of small farms, no allowance is made for the wages of the farmer who owns the land.

With regard to factory operations, the first need for short-term financing arises during the out-of-crop season when repairing and replacing factory equipment take place. This expenditure starts immediately at the beginning of the crop year and covers essentially the dismantling of equipment, replacement costs for new equipment, repair costs and supply accounts.

Table 8. Average Production Costs Per Acre on Estates*
(1977 Costs)

	$
Wages	607
Fertilizers and Field Operations (spraying)	138
Motor and Mechanical Expenses	124
Freighting	16
Depreciation	39
Maintenance	29
Fees, Salaries and Allowances	122
Insurance - Buildings, Canes	34
Land Taxes	9
Incidentals	25
Interest Charges	21
Total Production Costs	1,164

*Based on a weighted average of estimated costs in high, medium and low rainfall areas.

Source: Estimates by Sugar officials.

These outlays stretch over 38 weeks whereas revenue is earned over the 14-week duration of the crop. Once the crop starts, the sugar factories' main on-going expenses are the 74 per cent of net sugar receipts which they pay to cane producers for cane supplies. The latter expense, however, does not normally affect their credit requirement since payment is settled by proceeds received from Barbados Sugar Factories Limited when they purchase the sugar from the factories. The factories' short-term credit requirement was $12.4 million for the 1976/77 crop.

The third significant short-term financing requirement is at the marketing level. The size of this requirement is directly determined by the price and timing of sugar exports. The sugar is purchased from the factories by Barbados Sugar Factories Limited who are required to pay the factories even before export revenues are received. For the 1976/77 crop, Barbados Sugar Factories Limited borrowed $38.6 million to finance the marketing of sugar.

Long-Term Requirements

Long term credit to the industry has for a long time been a problem area, as is the case of most agricultural enterprises. The industry has managed to provide new equipment in the past and make any capital outlays through its profits and from lines of credit with the commercial banks. It has been doing this with reasonable success by withholding dividend payments and by limiting its programmes to available funds. In addition, the programme of retiring the less viable factories and consolidating and up-grading the existing ones has to a large extent reduced financing needs in the short-run. However, this process of amalgamation has just about come to an end and any further up-grading of the existing factories will require new machinery and equipment, the cost of which has been rising rapidly since 1973. Moreover, the profit margin over the last six to eight years has been too small to allow any substantial capital reinvestment. These considerations indicate a growing need for finance in this area.

Long term finance is also needed in the industry's programme of increased mechanization. The amount required for this purpose is unclear since it involves a decision on the desirable level of mechanization. Factors to be considered are the capacity of harvesters to operate on small and often uneven fields, and the availability and cost of manual labour. Initially, mechanization was indicated by a declining supply of labour and increasing labour costs. However, at current levels of unemployment, the impetus toward mechanization has slackened considerably.

Nevertheless, full mechanization of at least 15 per cent of sugar production is indicated especially in the event of unfavourable developments in the market for manual labour. Wages account for the major part of production costs and any rapid increase in costs or decline in supply would encourage more extensive use of harvesters. At present, roughly six per cent of the sugar cane is reaped mechanically and about 50 per cent mechanically loaded. Over the next six to eight years, capacity for mechanical loading is expected to increase to between 80 and 90 per cent and harvesting to between 12 and 15 per cent.

This programme of mechanization would require long-term financing at reasonably favourable rates of interest for periods of six to eight years. In the case of mechanized loading, about 60 additional loaders with tractors would be needed at a total cost of about $3 million. For harvesting, 12 McConnel

Stage II machines with tractors, costing $1.2 million, and seven "Chopper" harvesters, at a cost of $2 million, would have to be imported. This would bring the total cost of mechanization over the next six to eight years to roughly $6.2 million.

Sources of Finance

The main sources of credit of the sugar industry are:

(i) The Sugar Industry Agricultural Bank (SIAB);
(ii) Commercial banks;
(iii) The Agricultural Credit Bank; and
(iv) Commercial houses.

Sugar Industry Agricultural Bank

The Sugar Industry Agricultural Bank was established in 1902 with a grant of £80,000 from the British Treasury. Its main purpose was to provide short-term credit to the sugar plantations of 25 acres or more at concessionary rates of interest to meet current operating costs. (SIAB was later given authority to lend to sugar factories as well.) Up until 1973, SIAB has used its equity capital and retained earnings on a revolving basis for making loans. To supplement its own limited funds, SIAB at times borrowed from commercial banks frequently at rates above those at which it was on-lending.

Since 1974, SIAB has assumed the role of the major supplier of short-term credit to the industry through the rediscounts provided by Central Bank for on-lending to the sugar industry. For the crop year 1974/75, Central Bank provided $9.5 million to SIAB at 5.5 per cent for on-lending to sugar plantations; in 1975/76 this limit was increased to $14 million to cover the full extent of the plantations' requirements. An additional line of $10 million was allocated for the 1975/76 season to cover the short-term financing requirements of sugar factories.

The Central Bank extended its financing to SIAB in March 1977 to include the marketing of sugar for the 1976/77 crop year. Marketing finance had previously been provided by the commercial banks, partly from their own funds and since 1974, partly from funds borrowed from Central Bank at special rates for that purpose. For the 1976/77 crop year, SIAB allocations from Central Bank were: $16 million for sugar plantations; $14 million for sugar factories; $40 million for marketing. The length of maturity on these loans is 270 days in the case of loans to sugar plantations and 180 days for sugar factories and marketing.

SIAB also makes medium-term loans to plantations to cover costs of farming equipment and the like. These medium term loans which accounted for six per cent of SIAB's advances in 1975/76, are funded by its retained earnings and allocations from special funds. The Price Stabilization Reserve Fund provided $2 million to SIAB in 1972 at 5½ per cent to supplement its own resources. SIAB has since borrowed $0.7 million more from the Price Stabilisation Reserve Fund and $0.4 million from $1 million allocated by the Sugar Export Fund at 5 per cent. These funds were used to make medium term loans for the purchase of cane harvesting equipment.

The rate of interest charged on SIAB loans and advances varies according to the source of the fund loans and the maturity of the loan. The maximum rate at which it can lend its own funds or borrowed funds where no rate is stipulated is 8 per cent. In fact, SIAB has been lending since October 1975 at 7 per cent on loans for cultivation. The rate increases by one per cent when the outstanding loans go over one year. For the 1976/77 crop year, the rates charged on SIAB's own funds were reduced to 4½ per cent for current advances and 6½ per cent on loans over one year. Interest charged on medium-term loans for mechanical equipment fell from 8 per cent in 1974/75 to 5½ per cent in 1976/77.

Commercial Banks

Before 1974, the bulk of the credit provided to the sugar industry came from the commercial banking system. In 1973, for example, out of a total of $22.3 million in credit to the industry, $17.3 million (77.6 per cent) was provided by commercial banks. With the establishment of the Central Bank, however, lending to the sugar industry has ceased to be a prime activity of the commercial banks. Since 1974 the Sugar Industry Agricultural Bank, through rediscounts with the Central Bank, was able to provide considerably more working capital at lower interest rates to the industry. Hence in 1976, out of total credit of $32.4 million to the industry, commercial banks contributed only $7.7 million (23.8 per cent).

Table 9. Credit to the Sugar Industry; 1970/76

Year	SIAB[1]	Commercial Banks[2]	Total
	(..... BDS$ million .....)		
1970	3.3	11.4	14.7
1971	3.9	13.1	17.0
1972	4.5	12.6	17.1
1973	5.0	15.9	20.9
1974	5.8	11.8	17.6
1975	13.8	7.5	25.3
1976	23.3	7.2	30.5

[1]Advanced during the year.

[2]Outstanding at year-end.

Sources: Sugar Industry Agricultural Bank;
Report and Accounts of Central Bank of Barbados.

Commercial bank credit to sugar plantations is covered by the Agricultural Aids Act (AAA), 1905-2. This Act stipulates that lending to agriculture for cultivation purposes should not exceed a rate of interest of 8 per cent per annum. In 1973 and 1974, commercial banks were encountering liquidity problems and were reluctant to lend to the industry from their own funds at the concessionary rate stipulated under the AAA, especially at a time when the differential between the market lending rates and rates charged under the AAA was as large as 4 per cent.

Table 10. Maximum Interest Rates Under AAA and Average Commercial Bank Rates; 1973-76

Year	AAA	Average Weighted Rate on Commercial Bank Loans
	(..... per cent .....)	
1973	8	11.8
1974	8	12.4
1975	8	11.3
1976	8	9.4

Source: Central Bank of Barbados.

Factory operations were seen as a manufacturing activity and were not covered by the Agricultural Aids Act. Commercial bank credit to factories was, therefore, at rates of 10 to 11 per cent, making it extremely costly for the industry to acquire credit for milling.

Commercial banks in Barbados are traditionally reluctant to provide long-term finance to agriculture, and almost all of them lack the technical capacity necessary for evaluating and servicing agricultural loans. Also, because of the uncertain nature of the activity, long-term financing to agriculture is relatively high-risk and, therefore, unattractive, except at extremely high and often prohibitive rates of interest. Between 1970 and 1976, medium and long-term loans outstanding by commercial banks averaged barely $1.4 million per year.

Agricultural Credit Bank

The Agricultural Credit Bank was set up in 1961 as successor to the Peasants' Loan Bank to provide short-term loans to small farmers with less than 25 acres. Its policy is geared towards providing credit to small farmers, many of them tenants, frequently on uneconomic terms, as these farmers often cannot meet the credit eligibility criteria of commercial banks.

Under the Agricultural Credit Bank Act, loans are made to owners or tenants for cultivation of holdings and for such purposes as may be considered reasonable and necessary for increasing the productivity of holdings. Loans are made up to $600 per acre at a rate of interest of 3 per cent. The Bank approved 264 loans for cultivation in 1975/76 and made advances totalling $96,843 for that period.

The Agricultural Credit Bank is, nevertheless, plagued by certain structural and operational weaknesses which undermine its ability to service the financial needs of small farmers adequately. Government allocations to the Bank's capital have totalled $3.1 million since its establishment; but at May 31, 1976, the figure stood at $2 million as a result of a constant excess of operating expenses over income and the incidence of bad debts. Table 12 which covers the period 1969/70 to 1975/76 shows a surplus of expenditure over interest income in every year. In addition, the bank suffers from a severe shortage of technical officers for supervising credit and providing technical advice to farmers. There are at present four technical officers serving small farmers.

Table 11. Cultivation Loans by the Agricultural Credit Bank; 1966-1976

Year	Value of Loans Advanced
	(.....BDS$'000 .....)
1966	100.7
1967	97.1
1968	80.0
1969	62.5
1970	42.9
1971	42.0
1972	56.1
1973	41.5
1974	58.2
1975	110.9
1976	96.8

Note: Loans advanced from June 1 - May 31 in each year.

Source: Annual Report and Statement of Accounts, Agricultural Credit Bank.

Table 12. Income and Expenditure Total; 1969/70 - 1975/76

Year	Expenditure	Interest Income	Loss Debited to Capital
	(..... BDS$'000 .....)		
1970	92.6	23.1	69.4
1971	102.2	18.2	83.9
1972	91.9	10.8	73.1
1973	111.9	23.4	88.5
1974	123.1	24.6	98.6
1975	133.8	40.6	93.8
1976	140.9	61.8	79.1

Source: Income and Expenditure Statement of Agriculture, Agricultural Credit Bank, 1970-76.

Commercial Houses

Commercial houses provide suppliers' book credit to the industry or make direct loans for general purposes. These loans are usually provided by firms connected with the estates or factories. Factories made greater use of this course of funds because of their low profitability and their less favoured position in securing commercial bank accommodation.

Most of the medium-term loans to estates and factories for machinery and equipment were supplied by this source until recently when SIAB increased

its medium-term lending facilities. Owing to the inter-relationship with other commercial enterprises, it is difficult to isolate and estimate the extent of commercial house financing, but it is known to be significant.

Adequacy of Credit Facilities

As outlined earlier, the sugar industry has a strong demand for short-term credit three-quarters of the production cycle. In addition to this, declining profits and an outflow of capital from sugar over the years have created an increasing need for long term financing. In the following section, we attempt to measure the adequacy of available financing in the light of credit requirements of the industry.

The small farmers need financing up to $780 in their first year of cultivation. The Agricultural Credit Bank increased the maximum limit on loans for cultivation from the grossly inadequate figure of $300 per acre to $600 per acre in August 1977. With the new limit, some small farmers, whose only income is from sugar cane cultivation, may still need additional credit to cover total production costs. However, the increased limit considerably reduced this additional credit requirement and thus reduces the small farmers' financing cost. The new limit seems adequate for the second and third crops, the cost of production of which, including reaping and cartage costs, is both about $500. However, the Bank's small capital base permits financial assistance to a relatively small number of farmers only. In 1975/76, 264 loans were approved, representing only 16 per cent of small farmers in categories 2, 3 and 4 (see Table 6); the value of loans advanced was $96,843.

The short-term credit requirements of the estates and factories are adequately served. The Central Bank's allocation to SIAB is determined by consultation with the industry, and the $60 million allocated by Central Bank for the 1976/77 sugar season fully represents their estimated short-term financial requirements for that year.

Despite the Central Bank's financing scheme, the pattern of sugar receipts still poses some problems. Payments to farmers are made in two parts; the first is made during the harvest period (February to June), the second usually comes in August and may be as late as December. Since rediscounts from the Central Bank have a 270 day maturity beginning from July of the previous year, estates and SIAB are very often forced to borrow short-term from commercial banks to cover the 90 days intervening between the maturity of the rediscounted bills and the extension of new credit. SIAB has also had to carry large outstanding balances on its loans to the industry because of the inability of some estates to redeem their loans fully. At June 30, 1977, the loans plus accrued interest outstanding totalled $1.4 million for 1974/75 and $2.8 million for 1975/76.

The major financial constraint for the industry seems to be at the level of medium and long-term finance. The industry's programme of factory consolidation in recent years has helped to minimize maintenance costs as usable machinery and equipment from retired factories was employed in other factories. This programme has practically reached its limit because further factory consolidation would reduce the industry's grinding capacity below 560 tons of cane per hour, which is considered at present to be the minimum level for efficient production. The factories must, therefore, be in continuously good working condition with the prompt replacement of old or worn-out machinery by new machinery.

The financing problem is exacerbated by the low profit position of the industry in recent years, which has not enabled any substantial capital reinvestment. Indeed, even investors with sugar interests are reluctant to invest heavily in the industry because of the uncertainty surrounding its economic viability and the higher returns on investment in other commercial and industrial ventures.

Commercial banks have so far engaged only minimally in medium and long-term lending to the industry. They lent a total of $0.5 million in 1975/76 and their rates were as high as 10 to 12.5 per cent. SIAB also provides some medium-term financing, but its funds for this purpose are limited mainly to retained earnings, which are severely restricted by its excessively lenient lending policy towards the industry, and modest fund allocations. In all, medium-term financing by SIAB totalled $1.4 million in the 1976/77 crop.

Table 13. Medium and Long-Term Lending to Sugar; 1970-76

Year	SIAB[1]	Commercial Banks[2]	Total Loans Outstanding
	(..... BDS$'000 .....)		
1970	-	2,100	2,100
1971	-	1,188	1,188
1972	189	1,693	1,882
1973	35	1,420	1,455
1974	321	1,632	1,953
1975	1,238	543	1,781
1976	1,377	1,012	2,389

[1]Medium-term loans disbursed.

[2]Medium and long-term loans outstanding.

Sources: Sugar Industry Agricultural Bank, Reports and Accounts; Central Bank of Barbados.

The industry may soon require medium and long-term finance of approximately $3.5 million annually to cover plantation and factory equipment and machinery and projected mechanization. The present supply of such financing falls far short of this sum.

Conclusion

The availability of finance to the sugar industry will be one of the major determinants of its level of efficiency and output in the future. At present, the short-term credit requirements of the sugar estates and factories are adequately met by SIAB, and to a lesser extent by commercial banks, through the Central Bank discounting scheme which started in 1974. In addition, recent modifications in the credit provisions of the Agricultural Credit Bank increasing to $600 per acre the maximum limit on cultivation loans, have considerably eased the small farmers' financing situation.

However, two major problems remain. First, there is an urgent need for the increased availability of medium and long-term finance. The industry has been able to postpone the problem in recent years, but the future maintenance of estates and factories in addition to plans for increased mechanization will entail a substantial increase in these facilities.

Secondly, short-term credit to small farmers still falls short of their financial needs for the first year's cultivation. Furthermore, the scope of the Bank's lending capacity does not encompass the majority of small farmers in need of credit because of its low capital base.

Credit, however, is not the only constraint to the improvement of the industry. Since Barbados is a relatively high cost producer of sugar, it must seek to improve cane yields and adopt measures which will raise efficiencies and reduce costs. In addition, it is necessary to consider carefully the economic feasibility of increased mechanisation and reach a consensus on the most efficient form and level that mechanization would take.

Appendix

An estimate was made of the acres of cane burnt between 1967 and 1976 and multiple regression tests were done to show the functional relationship between sugar yield and effective rainfall/cane-fires.

The hypothesis $Y = f(R_{t-1}\ C_{t-1})$ was tested such that

$Y = a + b_1 R_{t-1}, b_2 C_{t-1}$ where Y = sugar yield per acre
R = rainfall per annum
C = acreage burnt per annum.

This gave $Y = 0.2017 + \underset{(3.0)}{0625}\ R_{t-1} - \underset{(13.11)}{.00003}\ C_{t-1}$

$R^2 = 0.75$; D.W. = 2.15; F = 15.34

The variables in parenthesis are "t" statistics; R^2 is the coefficient of multiple determination showing the percentage of variation in the dependant variable that is explained by the independent variables. D.W. is the Durbin Watson Statistic which tests for auto correlation. R^2 shows a significantly strong relationship between the yield of sugar and rainfall/cane-fires. Both the coefficients of rainfall and cane-fires were significant at the 5 per cent level and all the variables had the right signs. Tests done on the correlation of sugar yield/rainfall and sugar yield/cane-fires separately do not show a strong enough relationship for either one by itself to explain adequately the variation in yield. However, there would seem to be other factors, as pointed out in the text, that contribute to the variation in the yield of sugar.

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