Mauritius: an export-led economic success

By

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Declaration

Except where otherwise indicated this thesis is my own work.

Berhanu Woldekidan

To my wife

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Glossary

ACP	African, Caribbean and Pacific States
ANU	Australian National University
ASEAN	Association of South East Asian Nations
c.i.f	cost, insurance, freight
CPI	consumer price index
CGE	computable general equilibrium
ECU	European currency units
EC	European Community
ERA	effective rate of assistance
ERP	effective rate of protection
EPE	Export Processing Enterprise
EPZ	Export Processing Zone
NEPZ	Non Export Processing Zone
f.o.b.	free on board
GATT	General Agreement on Tariffs and Trade
GDP	gross domestic product
GNP	gross national product
GSP	general system of preferences
IMF	International Monetary Fund
ICOR	incremental capital-output ratio
ISIC	International Standard Industrial Classification
ISA	International Sugar Agreement
KWH	kilo watt hour
LTA	long term agreement
MFA	Multifibre Arrangement
NCDS	National Centre for Development Studies
ODA	Overseas Development Assistance

NRA	nominal rate of assistance
NRP	nominal rate of protection
OECD	Organization for Economic Cooperation and Development
SDR	special drawing rights
SITC	Standard International Trade Classification
STA	short term agreement
STABEX	Stabilization of export earnings of ACP member countries by EC under Lomé Accords
SYSMIN	Stabilization of mining earnings of ACP member countries by EC under Lomé Accords
UNCTAD	United Nations Conference on Trade and Development
UNIDO	United Nations Industrial and Development Organization

Symbols

-	zero
..	not available
.	insignificant
n.a	not applicable

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Abstract

In the 1960s and early 1970s, Mauritius had problems of low economic growth, high unemployment and balance of payments deficits. By the late 1980s it had overcome these problems, attained a high level of economic growth and graduated to the World Bank list of middle income countries. The growth of the economy was closely related to the growth of exports.

This thesis discusses the development strategies and policies adopted by the government over the last two decades. In the middle of the 1960s, the government adopted an import-substitution strategy to diversify the mono-culture sugar economy by entering manufacturing. This strategy failed to stimulate employment, reduce balance of payments deficits or to improve overall economic growth. In the early 1970s the government began to encourage exports of manufactures to overcome its difficulties. Mauritius then successfully developed labour-intensive, export-oriented manufacturing and tourism.

This study identifies the major macro and microeconomic policies associated with the rapid growth of manufactures which led to accelerated growth for the economy as a whole.

The study also examines the external factors that facilitated the growth of exports. These were mainly the Sugar Protocol of the Lomé Convention and the Multifibre Arrangement (MFA). The Sugar Protocol of the Lomé Convention ensured high and stable export earnings from sugar. By restricting imports from competitors to its major export markets, the Multifibre Arrangement allowed Mauritius to sell its clothing exports at higher prices than would otherwise have been the case while rapidly increasing its clothing export volume.

The economy-wide effects of changes in external factors are analysed in this study. Conditions within the European Community (EC) and recent international developments point in the direction of sugar trade liberalization. The economy-wide

effects of cuts in the export price and quantity of sugar exports to the EC from Mauritius are analyzed using a general equilibrium model. The analysis indicates that the sugar industry would suffer a considerable loss in earnings with sugar trade liberalization. The other losers from the change would be import-substitution and non-traded goods industries. Exporting industries other than sugar would gain.

Mauritius could face cuts in clothing export earnings if trade in clothing were liberalized and the Multifibre Arrangement dismantled. Mauritius would require great policy flexibility to meet such challenges. The general equilibrium outcome of a fall in the export price of clothing if the Multifibre Arrangement were liberalized would also be unfavourable if no compensatory action were taken.

The magnitude of tariff protection and other forms of industry assistance are estimated. Import-substitution manufacturing industries receive the highest level of protection followed by agriculture (excluding sugar). The service sector is the most disadvantaged by the tariff structure. The scope for raising the competitiveness of the economy by further liberalizing the tariff regime is examined. The impact of tariff reduction on different sectors and on the overall economy is estimated using the general equilibrium model. The analysis indicates that tariff reduction would encourage tourism and discourage import-substituting manufactures. Its effect is small on export-oriented industries as these industries enjoy duty free imports of inputs. The net effect is an overall gain to the economy with reduced inflation and expanded overall output.

1
Introduction

This study outlines the recent strong economic growth of Mauritius and examines the factors responsible. Global trends toward trade liberalization are paradoxically leading to concerns that Mauritius' successful performance may be fragile and unsustainable. Some policy options to sustain economic growth are suggested.

Background

Mauritius is a small and densely populated island situated in the south-west of the Indian Ocean and 800 km east of Madagascar. It is inhabited by people of diverse ethnic backgrounds, originating from three continents.

In the early Mauritian economic development sugar dominated its overall economic performance. The Mauritian economy has depended very heavily on the export of sugar since the middle of the 19th century. In 1970, cane sugar and its by-products accounted for over 90 per cent of exports. It also provided 33 per cent of GDP and 43 per cent of employment. The Mauritian economy derived its momentum from the sugar industry, but when this industry reached its geographic limits in the 1950s, growth became constrained. Low economic growth led to high unemployment and chronic balance of payments deficits in the 1950s. To overcome these problems the government sought to diversify the economy from sugar to manufactures. In 1964 it adopted an import-substitution development strategy. Import-substituting industries were encouraged through protection and industry incentives. The failure of this strategy to achieve the intended goals quickly became evident. Mauritius turned from protected import-substituting manufacturing to export-oriented manufacturing.

In the early 1970s more emphasis was given to an export-led strategy. An export processing zone was established, concentrating on the production of manufactures for export. The "export processing zone" was used as a concept rather than being

established as a geographical area. This proved an extremely innovative and successful approach. Tourism was encouraged and foreign investment welcomed. By the late 1980s Mauritius had added labour-intensive manufactures and tourism exports to sugar exports. Clothing became the leading export earner, although the sugar industry still plays an important role in the economy.

Mauritius attained a real average annual growth rate of 7.2 per cent between 1984 and 1988, one of the highest in the world. The current account balance has been in surplus since 1986. Inflation was reduced to almost zero and near full employment was attained in 1987.

The transformation of Mauritius from a poorly performing economy to a rapidly growing one followed changing domestic policies. It liberalized its trade policies by abolishing quantitative restrictions, however it did not eliminate tariff protection. But inputs to the export processing enterprises were allowed to enter duty free. It also liberalized its exchange rate regimes. But as Mauritius followed an export-led strategy, its economic performance is also influenced by its external environment which is favourable for its two most important industries, sugar and clothing. These industries jointly accounted for 80 per cent of total exports and 45 per cent of total employment in 1988.

The bilateral trade agreement between the EC and the African, Caribbean and Pacific (ACP) countries which created the Sugar Protocol under the Lomé Convention, was helpful. Mauritian sugar producers are paid a price equal to the subsidised price paid to EC sugar producers. Mauritius is able to sell about 80 per cent of its sugar exports to the EC market above the world market prices. The Protocol price has also been relatively stable. The Sugar Protocol thus has had considerable welfare implications for Mauritius.

Recent developments in the EC, including moves toward the formation of a single European market by the end of 1992, potential agricultural trade liberalization under the General Agreement of Tariffs and Trade (GATT), a favourable attitude to

changes in the political climate in Eastern Europe that could lead to increased trade, and the large volume of sugar production by the EC for export (at the moment the EC is the largest producer and exporter of sugar in the world) suggest that the Sugar Protocol may not be sustainable in its present form. These changes could lead to the liberalization of the sugar trade within the EC and of the EC with the rest of the world.

Under the Lomé Convention Mauritius has free access for its exports of clothing to the EC market. In practice it also has open market access to the United States for most of its clothing export under the General System of Preferences (GSP). By restricting the clothing exports of large exporters such as Hong Kong, the Republic of Korea, Taiwan and China, the Multifibre Arrangement created opportunities for Mauritius, which is not a member of it. Mauritius receives higher prices for its clothing exports to the EC (which absorbs 60 per cent of Mauritius clothing exports) and the United States (which absorbs 35 per cent of Mauritius clothing exports) than it would obtain in the absence of the Multifibre Arrangement. Losses could occur to Mauritius exports and the Mauritian economy if the Multifibre Arrangement was ended. The loss to clothing exports would be in terms of a drop in clothing export prices by the amount prices have been raised due to the presence of the Arrangement. This would have an unfavourable impact on various aspects of the economy.

The export arrangements for sugar and clothing are beyond the control of Mauritius, but Mauritius could probably become more competitive by reducing its level of protection (cutting tariffs) and improving other policies.

The government has adopted policies to enhance both import-substitution and export-promotion. The measurement of tariff protection highlights the extent of assistance given to import-substitution and its impact on resource allocation. The major beneficiaries of the tariff structure are non-export processing manufacturing industries. The services sector is the main loser. The services sector receives no tariff protection but it pays higher costs in using protected inputs. Hence, there is a potential

for resources to flow out from the services sector to the non-export processing manufacturing sector.

Objectives and hypotheses

This study examines the underlying causes of the recent high economic growth of Mauritius. The central theme of the study is the investigation of the contribution of domestic policies and the external environment to this growth. The following hypotheses are tested.

- Domestic macroeconomic and trade policies are the main causes of recent rapid economic growth of Mauritius.
- The external environment has contributed to the economic success of Mauritius.
- Changes in the current external environment would have unfavourable effect on the economy.

Outline

The remaining chapters are organized as follows. The second Chapter presents an overview of the Mauritian economy. It briefly outlines the discovery and early settlement of the island. The pre-independence economic history of the island is discussed, but the major emphasis is on post-independence economic performance.

The third Chapter presents an historical review of the Mauritian sugar industry, the Sugar Protocol of the EC, and its importance to Mauritian exports. The international aspects of sugar production and exports are also discussed. The gain from the Sugar Protocol is estimated in terms of the welfare gain as measured by the income transfer from the EC to Mauritius. It is also measured in terms of the stability effect on sugar export earnings.

The fourth Chapter evaluates the achievements of export processing enterprises in Mauritius. It reviews the generation of employment, private direct foreign investment, manufactured exports and economic growth. The Chapter reviews the performance of the Mauritian clothing industry since the early 1970s. Chapter 4 also examines the domestic conditions that have contributed to the success of the clothing industry, the largest employer and export earner, in Mauritius. The impact of domestic economic policies on export growth are analyzed. An econometric analysis is applied to establish the relationship between export growth and major macroeconomic variables. The welfare effects of export processing enterprises are analyzed using a cost/benefit approach.

The fifth Chapter presents the analytical framework which is used to measure protection (assistance) to Mauritian industries. It discusses the theory of protection and formulates the estimation method of protection (assistance) used in Chapter 9.

Chapter 6 presents the analytical framework of the Mauritian multi-sector CGE model. The model is Johansen in style and belongs to the family of Australian ORANI models. The model has been modified to reflect the Mauritian economic environment and policy issues. Chapter 6 discusses the theoretical structure and special features of the model. It presents the simulation procedure, the economic environment and model closure. The Chapter also discusses sources and manipulation of data required by the model. The CGE model is used in estimating the economy-wide impacts of changes in the external environment in Chapter 7 and 8. It is also applied in Chapter 9 in simulating domestic policy changes.

Chapter 7 analyzes the impact of sugar trade liberalization in the EC on the Mauritian economy. The liberalization of sugar trade is anticipated to result in a decline in the price of sugar in the EC market and in a fall in the export quota granted to Mauritius.

The effect of the sugar price and quantity decline on the Mauritian sugar industry is first analyzed graphically in a partial equilibrium context. Then the price

and quantity decline are simulated separately and later jointly using the CGE model. The price and quantity reduction scenarios are simulated in the short and long run.

Chapter 8 gives an account of global aspects of the clothing market, as clothing production in Mauritius is mainly for export. A discussion of trade agreements that affect clothing exports (that is, the Lomé Convention and MFA) follows. The effects of the Multifibre Arrangement on the Mauritian economy are analyzed by anticipating the dismantling of the Multifibre Arrangement. This results in a decline in the price of clothing. Accordingly, the economy-wide impact of a fall in the export price of Mauritian clothing is simulated.

In Chapter 9 the nominal and effective rates of tariff protection and other forms of assistance are estimated. The estimation is for manufacturing industries at the three digit ISIC level and for eight sub-sectors of the economy. For manufacturing industries protection (assistance) rates are estimated for export-oriented (export processing enterprises) and import-substituting (non-export processing enterprises) enterprises. Because similar enterprises receive widely different levels of protection in Mauritius, measurement of protection by industry could be misleading. While import-substitution enterprises are protected through the tariff system, export-oriented industries producing similar goods are not. An economy-wide effect of reducing tariff protection to import-substituting enterprises is simulated.

Chapter 10 provides a summary, conclusions and discusses some policy implications. If the export markets for sugar and clothing were to change unfavourably adverse effects would be felt on the Mauritian economy. As Mauritius has very little control over external events it may be able to offset these external adverse effects by raising its competitiveness. One way of improving its competitiveness is through tariff reduction.

2

An overview of the Mauritian economy

In contrast to its neighbouring African nations, which have had meagre economic growth in the last two decades, the Mauritian economy has performed very well. Micro and macroeconomic reforms relieved the economic problems faced by Mauritius in the 1960s and 1970s and contributed to the strong performance of the economy. Political stability and a skilled labour force have also been important factors.

Background

Discovery and early settlement

It is believed that Mauritius was known to the Arabs as far back as the seventh century. Arab traders used Mauritius as a source of food and fuel as they sailed across the Indian Ocean. Contact with Europe dates back to the sixteenth century when Portuguese navigators paid Mauritius a visit. Like the Arab traders, the Portuguese did not settle on the island. They merely used it as a stop over between Cape Town and Goa. There were no local inhabitants.

The Dutch were the first foreign settlers on the island. The Dutch landed in 1698 and named the island after their ruler, prince Maurice Van Nassau, hence its present name (Benedict 1961). They brought slaves from Madagascar to cut down the rich forests of ebony. They also introduced sugar cane, cattle, and deer (Benedict 1961). However, the Dutch settlement was not efficiently administered and food shortages led to its abandonment in 1710 (Simmons 1982). The only remaining evidence of Dutch occupation today are a few Dutch place-names and small numbers of descendants of the runaway slaves who became the first permanent inhabitants of Mauritius.

In 1715 when the French took possession and renamed the island, Isle de France, it was claimed to be uninhabited (Benoit 1985). Its effective demographic and economic development started in 1722. The French established sugar cane and coffee. They introduced manioc tropica from Brazil as a staple diet for their slaves. Spices were grown and traded (Ly-Tio-Fane 1958). The island was also used as a naval base by the French in the struggle for the Indian Ocean. In 1810, after a century of settlement, the French surrendered the island to the British. Though French occupation ceased almost two centuries ago, the language and culture of contemporary Mauritius is highly influenced by France, and there is still a close relationship between the two countries.

The British ruled Mauritius until independence in 1968. Under British rule and with abundant, cheap slave labour from Madagascar, Mozambique and Western Africa sugar production for export became profitable (Jhumka 1989). Exports were stimulated by a reduction in duties on sugar by Britain in 1826. Exports of sugar rose from less than 10,000 tonnes in 1810 to above 30,000 tonnes in 1830. By 1900 exports reached about 180,000 tonnes (Pineo 1984). After the abolition of slavery in 1835, indentured workers from India became the major source of labour for sugar cane cultivation. Cane growing became the mainstay of the island's economy.

Early population growth, ethnicity, religion and language

Since early settlement the population has grown rapidly, mainly through immigration. In 1735 the population numbered about 1000, including 200 Europeans. By 1797 there were 60,500 inhabitants of whom 50,000 were slaves (Benedict 1961). Until the abolition of slavery the major source of population growth was forced recruitment of slaves. After the abolition of slavery, the inflow of indentured labour was the main source of population growth. The population tripled from 100,000 in 1833 to 310,000 in 1861, mainly as a result of the inflow of indentured labour.

Table 2.1 **Early population growth, 1833-1952**

	Population ('000)
1833	100
1861	310
1901	371
1931	393
1944	419
1952	515

Source: E. Titmuss, *Social Policies and Population Growth in Mauritius: report to the Governor of Mauritius*, 1961, London.

The population growth rate slowed between 1861 and the end of World War I. There was little immigration; population growth mainly depended on natural increase and natural increase was slowed by high death rates.

Table 2.2 **Birth and death rates, 1871-1988**

	Births per thousand of population	Deaths per thousand of population
1871-1875[a]	36.5	28.4
1896-1900[a]	36.4	35.6
1921-1925[a]	39.0	31.0
1950	49.7	13.9
1962	38.5	9.3
1972	24.8	7.9
1987	19.1	6.6
1988	19.7	6.6

[a] Five year averages.

Sources: E. Titmuss, *Social Policies and Population Growth in Mauritius: report to the Governor of Mauritius*, 1961, London; R. Bheenick and E. Hanoomanjee, *Mauritius: towards an industrial training strategy*, Editions de l'Ocean Indien Ltee, Port Louis, 1988; and Mauritius Central Statistical Office, *Annual Digest of Statistics*, 1988, Port Louis.

Between the first census of 1871 and the end of the nineteenth century the mortality rate rose from 28.4 to 35.6 per 1000, while the birth rate remained

unchanged. After World War II birth rates first rose slowly and then declined. Death rates declined mainly as the result of the eradication of malaria and the introduction of vaccines. Economic recovery after the war contributed to the increase in the birth rate. But eventually the birth rate started to decline faster than the death rate with the combined effects resulting in falling population growth. The decline in the population growth rate since 1962 has mainly resulted from the fall in fertility rates attributable to an effective family planning program (Bheenick and Hanoomanjee 1988). Thus total population almost doubled between 1952 and 1987, but population growth declined from a peak of 3.1 per cent per annum during 1952-62 to 0.94 per annum between 1983 and 1987.

Today's Mauritians originate from three continents: Europe, Asia and Africa. They are composed of four ethnic and religious groups: Franco-Mauritians (Catholic), Creoles[1] (Catholic), Indians (Muslim and Hindu) and Chinese (Buddhist and Catholic). These ethnic groups are generally grouped into three categories: Indo-Mauritians, Sino-Mauritians and the general population (Europeans, descendants of Europeans, Africans and persons of mixed ethnic origin).

The Indo-Mauritians, (76 per cent are Hindu), comprised 68 per cent of the total population in 1967 (Table 2.3). They are still the largest ethnic group and are generally blue collar workers. In a society where hierarchy is related to the ownership of sugar, the Franco-Mauritians are the élite. Creoles are either in the professional or labouring classes (Simmons 1982).

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[1] Orginally the word "creole" meant a person of French descent born in Mauritius, but today it means a Mauritian of mixed African or Indian and European descent.

Table 2.3 **Ethnic composition and religion, 1967**

	Urban		Rural		Total	
	Number ('000)	Per cent	Number ('000)	Per cent	Number ('000)	Per cent
Indo-Mauritian	187	54	345	80	532	68
Hindu	123	35	280	65	403	52
Muslim	64	18	65	15	129	17
Sino-Mauritian[a]	19	6	6	1	25	3
General population[b]	142	40	83	19	225	29
Total	348	100	434	100	782	100

[a] Catholic and Buddhist

[b] Mostly Catholic

Source: Mauritius Central Statistical Office, *Mauritius Annual Report*, Ross Hill, 1968.

Though more than eight languages are spoken on the island, two, Creole (52 per cent) and Hindi (32 per cent) are spoken by about 84 per cent of the population (Paul 1987). The official language is English, but French is most commonly spoken by the educated élite. Other languages include Tamil, Urdu, Telugu, Marathi and Chinese.

Population and labour force

Mauritius is today one of the most densely populated areas in the world, with about 518 people per square kilometre. The current labour force reflects the population growth of the past decades. The labour force has increased since the late 1960s, mainly as a result of a 1950s baby boom. In 1967, the work force accounted for 57 per cent of the population (aged between 15 and 64 years). The largest increase occurred between 1983 and 1987: 19,300 new job-seekers entered the labour market each year compared to 8,600 entrants per year for the period 1972-83. Rising female participation in the labour force and favourable economic conditions that reduced

emigration were the main reasons for the increase in the labour force in the 1980s (Bheenick and Hanoomanjee 1988).

Table 2.4 **Population and labour force, 1962-87**

	1962	1972	1983	1986	1987
Population('000)	682	826	967	994	1003
Labour force('000)	184	254	330	417	427
Growth rate (per cent)					
Population	1.9	1.4	0.8	0.9	0.9
Labour force	3.3	2.9	4.5	2.4	2.4

Source: R. Bheenick and E. Hanoomanjee *Mauritius: towards an industrial training strategy*, Editions de l'Ocean Indien Ltee, Port Louis, 1988.

The quality of the labour force is generally high in Mauritius. As employment data is not available by skill, information on the level of education has to be used as a proxy for skill. According to the British Central Office of Information (1964), by the early 1960s 85 per cent of all primary school age Mauritians received primary education. By the 1980s all primary school age children were enroled in school. The enrolment rate for secondary education for 1965 and 1986 was 26 and 51 per cent, respectively (World Bank 1989).

Female participation in the labour force rose from 20 per cent in 1972 to 35 per cent in 1987. In 1991 about 42 per cent of all women were either working or seeking employment, compared to 28 per cent in 1983. Increasing demand for female labour, particularly in export processing enterprises, has been the main factor in increased female work force participation. Women's education has also risen. In 1983, about 3.5 per cent of women had obtained tertiary education compared to 3.8 per cent of men, and 42 per cent of women had secondary education compared to 40 per cent of men.

Employment, wages and prices

Employment

Immediately after independence, Mauritius was faced with severe employment problems. Sugar accounted for 50 per cent employment, but the sugar industry was not able to employ the rapidly growing labour force, particularly as cultivable land approached its limit. As a result 20 per cent of the labour force remained unemployed (Scott 1976). In addition underemployment was believed to be substantial. In the 1970s, nearly 8,000 jobs were created in the formal sector every year and by 1979 unemployment had declined to 6 per cent (Jeetun 1989) despite the decline of employment in agriculture. The expansion of export-oriented, labour-intensive industrial manufacturing, reduced unemployment from 16 per cent in 1972 to 7 per cent in 1979. Job creation was largely in export processing enterprises and in tourism (Table 2.5). Public service employment was the only sector other than agriculture which has shown a decline.

Table 2.5 **Employment by large establishments[a] in key sectors, 1970 -88**

	Export processing		Agriculture		Public service		Hotels and restaurants		Other		Total[b]	
	'000	per cent	'000	per cent	'000	per cent	'000	per cent	'000	per cent	'000	per cent
1970	-	-	61	46	43	33	0.7	1	26	20	130	100
1975	10	6	65	37	45	26	2.4	1	51	29	148	100
1980	22	11	58	29	55	28	3.1	2	60	30	198	100
1981	24	12	57	29	55	28	3.3	2	58	29	196	100
1982	24	12	57	29	55	28	3.2	2	57	29	195	100
1983	26	13	56	29	55	28	3.2	2	54	28	194	100
1984	36	18	54	27	55	27	3.2	2	53	26	201	100
1988	91	34	50	19	54	20	5.0	2	69	26	269	100

[a] Large establishments are those which employ more than ten people.
[b] Totals may not add up due to rounding.

Source: A. Jeetun, 'Employment trends and training needs', *Prosi*, Mai No. 294, Port Louis, 1989.

The growth in employment was interrupted by a downturn in the economy between 1979 and 1983. Employment declined from 199,000 in 1979 to 194,000 in 1983, at an average rate of 0.7 per cent per year. Unemployment reached an unprecedented 22 per cent in 1982.

The recovery of the economy in 1984 and its dramatic growth since then has resulted in an average employment growth of 7.4 per cent per annum. More than 95 per cent of the new jobs were created in labour-intensive export processing. Employment in the export processing enterprises almost tripled in four years: from 36,000 in 1984 to 91,000 in 1988. As a result the Mauritian economy absorbed almost all the unemployed labour as well as the new entrants to the labour force. Near full employment was attained in 1987 (Table 2.6).

The increase in total employment since 1967 was due partly to the employment of those previously unemployed (38 per cent), partly to growth in the working age population and an increase in the male participation rate (22 per cent) and partly to an increase in participation of women in the labour force (40 per cent) (World Bank 1989a).

Although employment has increased substantially in absolute numbers in all sectors there have been large differences among the sectors (Table 2.6). While the share of industrial employment more than tripled (to 36 per cent) between 1967 and 1987, the share of the agricultural sector employment halved to 21 per cent in the same period. The share of services in employment remained 43 per cent.

Table 2.6 **Total employment by sector and gender, 1967-87**

	Total employment ('000)				Share of female employment (per cent)			
	1967	1972	1983	1987	1967	1972	1983	1987
Employment								
Agriculture	57	70	62	84	30	23	25	33
Industry	15	53	77	148	14	9	27	44
Manufactures	(8)	(29)	(54)	(120)	(19)	(15)	(38)	(54)
Services	59	90	115	174	16	25	27	28
Total	139	213	254	406	17	20	26	35
Unemployed	..	42	68	21	..	..	..	..
Labour force	..	254	330	427	..	..	..	..
Unemployment rate per cent	20	16	19	5	..	..	..	..

Source: R. Bheenick and E. Hanoomanjee, *Mauritius: towards an industrial training strategy*, Editions de l'Ocean Indien Ltee, Port Louis, 1988.

Wages

Increases in wages and salaries are based on negotiations within a firm and gains vary from firm to firm and sector to sector depending on relative bargaining strengths. The government also influences the labour market through its labour and wage policies and as a large employer.

Wages are highest in the public sector and lowest in sugar production. Average nominal monthly earnings for all sectors have been growing at an average rate of 10 per cent per annum. The annual growth in earnings peaked in 1987 at a rate of 21 per cent, mainly due to the high increase in wages in the public sector. Wages in the other sectors have also increased (Table 2.7).

Table 2.7 **Monthly nominal earnings and growth rates by sector, September 1980-September 1989**[a]

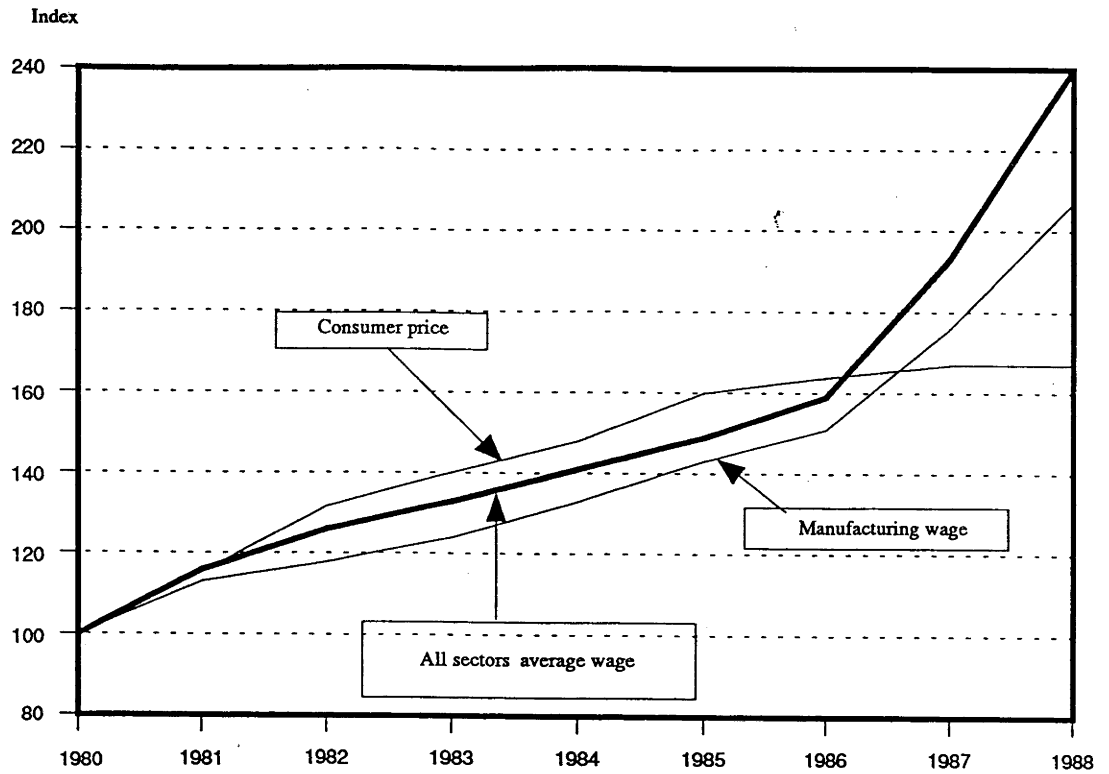
	Agriculture		Sugar[b]		Manuf-acture		Public[c] sector		All sectors	
	Rupee	per[d] cent	Rupee	per[d] cent	Rupee	per[d] cent	Rupee	per[d] cent	Rupee	per[d] cent
1980	1073	na	1060	na	1327	na	1571	na	1442	na
1981	1308	22	1294	22	1506	13	1758	12	1672	16
1982	1469	12	1475	14	1568	4	1936	10	1822	9
1983	1548	5	1552	5	1642	5	2051	6	1921	5
1984	1704	10	1708	10	1766	8	2153	5	2034	6
1985	1770	4	1768	4	1896	7	2243	4	2151	6
1986	1939	10	1942	10	2010	6	2343	5	2298	7
1987	2261	17	2249	16	2332	16	2982	27	2778	21
1988	2519	11	2512	12	2522	8	3125	5	2996	8
1989	2720	8	2700	8	2934	16	3923	26	3548	18

[a] In establishments of more than ten workers. [b] Including factories. [c] Central government. [d] Per cent refers to percentage changes from previous year.

Source: Mauritius Central Statistical Office, *Annual Digest of Statistics*, Port Louis, 1988; and Mauritius Central Statistical Office, *Biannual Survey of Employment and Earnings*, Port Louis, 1989.

The recent increase in wages has exacerbated the disparity in wages between the public and other sectors. These wage distortions have prevented the movement of labour from the public to the private sector and aggravate labour shortages, particularly in manufacturing since 1986.

Figure 2.1 **Consumer price and wage index, 1980-88**



Source: World Bank, *Mauritius: managing success*, Washington, D.C., 1989a.

Manufacturing wages are below the wage rates prevailing in other sectors because wage rates in the export processing enterprises reflect low skilled work. Until 1986 money wage movements were successfully restrained by partial indexation of wages to price rises. This worked while unemployment existed but as the economy approached full employment in 1987 increases in wages outstripped those of prices.

Prices

After a period of relative stability in the 1960s, prices began to rise in the early 1970s, mainly because of increases in petroleum prices. Inflationary pressure was exacerbated by the sugar boom in the mid-1970s and the devaluation of the Mauritian rupee in 1979. The average inflation rate was 14.3 per cent in the 1970s and peaked at 42 per cent in 1980. Tough macroeconomic policies of tight monetary and fiscal policies reduced inflation to 0.5 per cent by 1987. Prices started to rise again in 1988, as a result of high wage increments in 1987.

Economic growth

Before independence

Between 1950 and 1960 the annual average real growth rate was only 1.8 per cent per year. With a population growth rate of 3.0 per cent per year, standards of living fell and real GNP per capita declined at 1.2 per cent annually. In the 1960s per capita income grew modestly at 1.2 per cent a year, restoring the decline of the 1950s.

Table 2.8 **Pre-independence real gross national product and its composition, 1950-67** (at 1953 prices)

	1950	1955	1960	1965	1966	1967
GNP (rupee million)	489	565	714	741	715	1000
(US$ million)	103	118	150	155	150	205
GNP per capita						
(rupee)	1029	1009	1116	1008	949	1302
(US$)	216	211	235	211	199	268
Percentage share (per cent)						
Agriculture	31	31	23	25	24	23
Industry	27	27	22	23	22	23
Manufactures	(23)	(22)	(16)	(16)	(15)	(15)
Services	42	42	55	52	54	54

Sources: J. Meade, *et al.*, *The economic and social structure of Mauritius*: a report to the Governor of Mauritius, London, 1961; Mauritius Central Statistical Office, (Various issues), Government Printer, Port Louis; and the Mauritius Central Statistical Office, *Mauritius Annual Report*, *The National Income and National Accounts of Mauritius*, (various issues), Port Louis.

Because of the way it was settled, Mauritius was never a peasant economy. Its agriculture depended mainly on a single cash crop, sugar.

Of the total area of 460,800 acres roughly 70 per cent is arable land. In 1967 about three-quarters of the total arable land was cultivated and sugar cane plantations covered 197,000 acres, or about 90 per cent of the total cultivated area. In 1967 sugar production amounted to 638,322 tonnes, with exports of 515,880 tonnes valued at

US$58 million. In 1967 sugar and sugar by-products represented 96 per cent of the total value of exports.

Prior to independence, services were the largest sector, particularly in terms of employment. Services accounted for 54 per cent of GDP and 42 per cent of employment in 1967 (Table 2.6).

Manufacturing accounted for 16 per cent of GDP. The main activity was processing the by-products of sugar and a few other agricultural products: that is, it was confined to cane milling, alcohol distiling, timber, tea and fibre processing (British Central Office of Information 1968). Industrial output (manufacturing and construction (Table 2.8)) was relatively high (23 per cent of GDP) compared with other developing countries at a similar level of development.

Post-independence

Like most newly independent governments, the government of Mauritius sought to raise living standards. This required overcoming two major problems: a negative balance of payments (discussed below) and high unemployment and underemployment. The government sought to encourage investment in, and production of, labour-intensive manufactures for export by passing an Export Processing Zone Act in 1970. The enterprises took time to develop, but accelerated exports and growth by the middle of the 1970s.

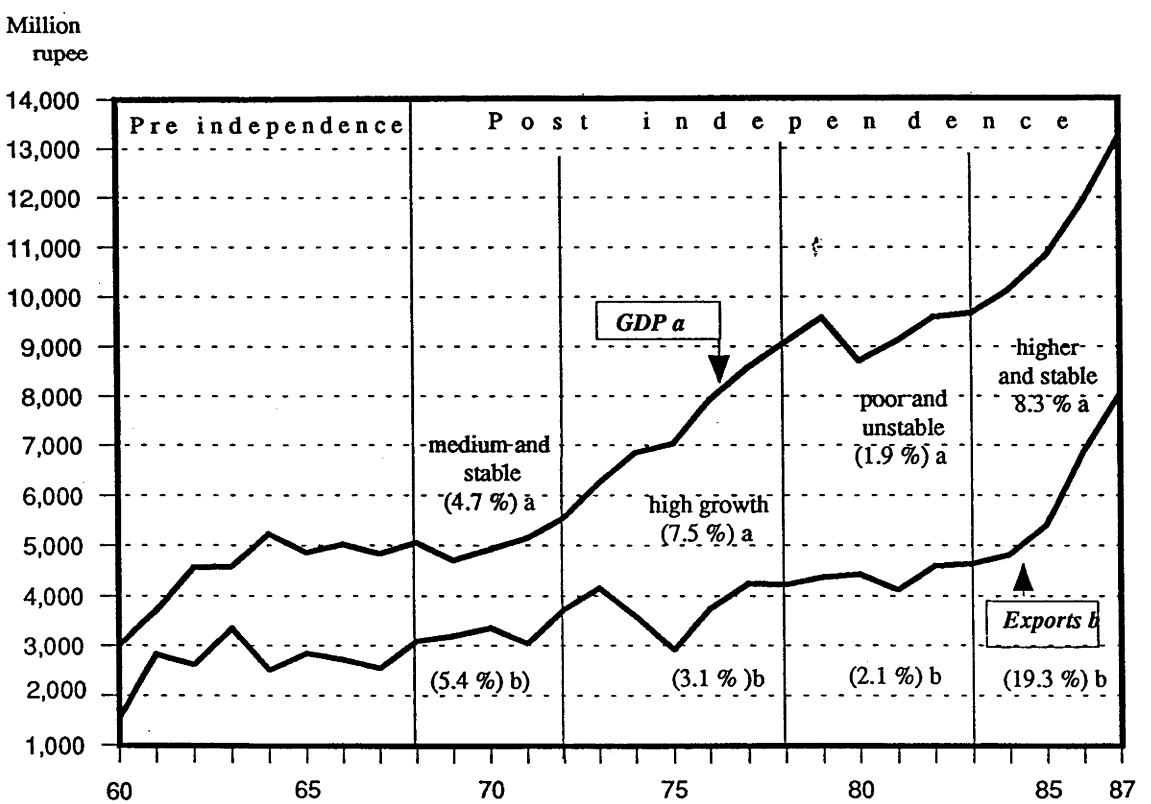
Table 2.9 **Indicators of post independence economic performance, 1968-87** (real average annual growth rates, per cent) (1980=100)

	1968-73	1973-79	1979-84	1984-87	1970-80	1980-87
GDP	4.7	7.5	1.9	9.3	7.1	5.7
GDP per capita	3.3	5.8	0.6	8.3	5.5	4.7
Agriculture	..	-3.7	0.1	6.8	-3.3	5.2
Industry	..	9.9	2.1	14.6	10.0	8.7
Manufactures	(..)	(6.2)	(4.6)	(16.9)	(7.1)	(10.9)
Services	..	11.9	2.9	5.1	11.5	4.1
Export	5.4	3.1	2.1	19.3	3.1	9.0
Consumer price	4.8	5.3	4.8	2.8	14.3	6.7

Source: International Economic Data Bank, the Australian National University, 1989.

The post-independence economic performance of Mauritius can be broadly divided into four periods. Exports and GDP moved together (Figure 2.2).

Figure 2.2 **Gross domestic product and exports, 1960-87** (1980 prices)



[a] Average real annual GDP growth. [b] Average annual export growth.
Source: International Economic Data Bank, the Australian National University, 1989.

Medium and stable growth (1968-73)

The early independence period between 1968 and 1973 was characterized by medium but stable economic growth (Figure 2.2 and Table 2.9). In this period sugar dominated exports and overall economic performance: whenever the sugar industry was prosperous, so was the economy. Between 1968 and 1972 sugar production, and the value of exports was not impressive, particularly so in 1968 and 1970. A cyclone in 1970 reduced growth. During this period, monetary and fiscal policies were tight and domestic savings and investment remained virtually constant. The government budget was in surplus for much of the period. External borrowing was low, with total debt amounting to only US$32 million (14 per cent of GNP) in 1970. While this helped to stabilize prices, economic growth was low and unemployment was rising.

High growth (1973-79)

With the exception of 1975 when the island was struck by two cyclones, 1973-79 saw high economic growth. High production and favourable export prices for sugar in 1973 and 1974 boosted effective demand at the beginning of the period. Reinvesting the windfall of the sugar boom in joint ventures in the export processing enterprises increased production and the export of manufactures. The production of manufactures, mainly clothing, for export, contributed substantially to overall economic growth.

Poor and unstable growth (1979-84)

The period of prosperity was followed by a period of stagnation from 1979 to 1983. The boom in the previous period resulted in increases in wages at an average rate of 10 per cent per annum. This raised the cost of production and reduced the competitiveness of manufactured exports, despite a devaluation of the rupee by 20 per cent in 1979. The sugar industry was hit by droughts in 1980 and 1981. The 1980 drought was the worst ever recorded, causing a 30 per cent decline in production. Exports, employment and government revenue fell.

Unemployment rose again and the balance of payments went into deficit. The expansion of government expenditure on social welfare stimulated inflation. The economy was also affected by the world-wide recession of 1982-83. However, the impact was limited because Mauritius was protected by sugar export agreements.

High and stable growth (1984-87)

Economic performance during 1979-83 was weak enough to force the government to take initiatives to liberalize the economy. Successful macroeconomic stabilization programs restrained public expenditure by reducing social welfare and abandoning inefficient parastatal government bodies. Exchange rate regimes were liberalized. The exchange rate was devalued again by 30 per cent in 1981, delinked from the SDR in 1983 and pegged to a trade weighted basket of major trading partner currencies. The adoption of a flexible exchange rate in 1984 resulted in a continuous depreciation of the rupee against the strong currencies of the United Kingdom and Japan.

Investment was redirected to the productive sectors, the adjustment of wages and salaries to the consumer price index was partial, credit expansion was restricted, and the trade regime was liberalized. The elimination of quantitative restrictions and some gradual reduction in tariffs on imports lowered protection.

These programs created an economic environment that encouraged domestic and foreign investment and rapid economic growth during 1984-87. Real GDP grew at an average of 8.3 per cent a year. Per capita income nearly doubled, to rupee 17,300 (US$1490), between 1983 and 1987. The export processing enterprises were the main contributors to growth, but tourism emerged as the third largest export earner. In 1987 a total number of 201,000 tourists (about one-fifth of the total population of Mauritius) arrived in Mauritius. Foreign earnings from tourism totalled US$139 million accounting for 11 per cent of total merchandise and non-factor services export. By the end of this prosperous period inflation was reduced to almost zero and near full employment was attained. Because of its openness and ability to compete on the world market, Mauritius achieved high economic growth.

Savings and investment

Mauritius, unlike most other developing countries, has a highly monetized economy with 70 per cent of households having a bank account (Ghosh 1988). Domestic savings rates in Mauritius have been among the highest in the world, peaking at 29 per cent of GDP in 1987. This figure was comparable to Hong Kong and was higher than most ASEAN countries including Indonesia, Philippines and Thailand (Table 2.10).

Table 2.10 **Gross domestic saving as a percentage of GDP 1966-87**

	1966-70[a]	1971-75[a]	1976-80[a]	1981-85[a]	1986	1987
Singapore	17.1	26.3	34.8	43.2	38.7	39.9
Korea, Republic of	14.3	18.3	26.3	27.4	34.6	37.6
Hong Kong	21.2	26.3	30.2	28.0	27.9	30.7
Indonesia	13.0	23.1	28.7	29.7	24.9	29.1
Philippines	18.7	21.1	24.8	20.1	13.7	16.6
Thailand	21.3	22.8	21.5	20.4	24.5	23.9
Mauritius	**12.0**	**21.8**	**18.5**	**17.5**	**28.7**	**28.8**

[a] Five year averages.

Source: World Bank, *World Tables 1988-89,* Johns Hopkins University press Baltimore, Washington, D.C., 1989b.

Domestic savings as a proportion of GDP have been growing since the 1960s, with the largest increase in the first half of the 1970s coinciding with the sugar boom and the overall good performance of the economy. Savings were lower than investment in the early 1980s when Mauritius was acquiring private direct foreign investment in manufacturing and tourism (Table 2.11). Savings in the private sector were greater than private investment throughout the 1980s, and total savings were greater than investment in the late 1980s, leading to capital outflow.

Table 2.11 **Sectoral savings and investment as a percentage of GDP, 1982-88**

	1982	1983	1984	1985	1986	1987	1988
Private sector							
Savings	17.1	17.7	18.3	20.4	25.3	25.4	21.5
Investment	11.8	11.0	16.3	17.4	15.0	18.5	15.5
Public sector							
Savings	-4.7	-2.9	-2.2	-1.0	1.6	3.1	4.2
Investment	6.4	6.4	5.7	6.0	7.0	7.5	10.0
Total domestic							
Savings	12.4	14.8	16.2	19.4	26.9	28.6	25.7
Investment	18.2	17.5	22.0	23.5	22.0	26.0	25.5

Source: World Bank, *Mauritius: managing success*, Washington, D.C., 1989a.

The highest gross domestic investment occurred in the second half of the 1970s, averaging 30 per cent of GDP per year. It fell to 17.5 per cent in 1983 before picking-up to 26 per cent in 1987. The incremental capital-output ratio (ICOR) for 1983-88 averaged at about 3.7 with a peak of 7.0 in 1986. In 1988, 60 per cent of domestic investment was in the private sector. The private sector's fixed investment has increased by 14 per cent annually in real terms for the last 5 years. Much of it has taken place in the export processing enterprises where investment has grown at an average rate of 30 per cent a year since 1983 (World Bank 1989a).

Foreign trade policies

The import policies of Mauritius since independence fall broadly into three periods: a period of low government intervention, 1968-75; a period of restrictions, 1976-82; and a period of liberalization, 1983-88.

Between 1968 and 1975 imports, with few exceptions, were almost free of tariffs. Tariffs were levied on alcoholic drinks and cigarettes mainly for revenue purposes. Tariffs and quotas on a few items were also levied to protect domestic

industries from imports. This was also thought to minimise trade deficits. Imports, however, generally followed export earnings so that trade deficits were not a problem, at least until 1973.

Trade deficits appeared in the mid-1970s with import substitution policies that were biased against exports: in 1976 exports were only 76 per cent of imports. The government responded by cutting imports by the imposition of import quotas, prohibitive import duties, credit ceilings for banks, credit restriction for importers, cash payments for imports, importation in the currency of the country of origin, delays in obtaining import permits and an import levy payable at the time of ordering goods. These import restrictions were applied for seven years between 1976 and 1982. Import restrictions created shortages of inputs for exporting industries. The government finally recognized the cause of the deficit and sought to overcome it by raising exports rather than controlling imports.

With the assistance of the World Bank and the International Monetary Fund liberalization began with the devaluations of 1979 and 1981. Import restrictions and quotas remained intact until 1982, but were eased after 1983 and gradually removed altogether. Liberalization of imports has increased competition and created greater dynamism in trade and production. But there is no evidence on liberalization of trade in terms of tariff reduction. Detailed work of tariffs is found in Chapter 9.

Agricultural export policy was closely associated with the sugar agreements; it changed little over the years. Exports of manufactures were also influenced by trade agreements. Membership of the African, Caribbean and Pacific (ACP) countries allows Mauritius free access to EC markets for its exports, including clothing. Mauritian goods also have duty free entry into the United States under the United States General System of Preference (see Chapter 8).

Foreign trade

The island of Mauritius has traditionally relied heavily on imported food and manufactured products. In the early 1960s the island spent about a quarter of its total import expenditure on food. The remaining three-quarters was spent on manufactures. This has not changed very much through the years. In 1988, food imports made up 10 per cent of total imports, manufactures 70 per cent and chemicals and fuels the remaining 20 per cent.

Table 2.12 **Pre-independence visible trade balance, 1941-67** (US$ million)

	1941-50[a]	1951-60[a]	1961-65[a]	1966	1967
Imports	19.0	54.0	71.0	70.0	76.0
Exports	19.0	57.0	71.0	69.0	61.0
Balance	0.2	3.0	0.3	-1.0	-15.0
Sugar as per cent of total exports	93.0	93.0	92.0	93.0	94.0

[a] Yearly average.

Source: Mauritius Central Statistical Office, *Mauritius Annual Report* (various issues), Port Louis.

The external sector grew in the 1970s and 1980s. Recent increases in the productivity of export-oriented manufactures and tourism have substantially contributed to the growth of exports. Exports grew, in real terms, by an average of 3 per cent per annum in the 1970s, and 11 per cent per annum in the 1980s, while the corresponding growth rate for imports was 7.6 and 6.7 per cent. As a result the ratio of exports to GDP increased from 43 per cent in 1970 to 61 per cent in 1988.

Table 2.13 **Domestic exports by main sector, 1968-87**

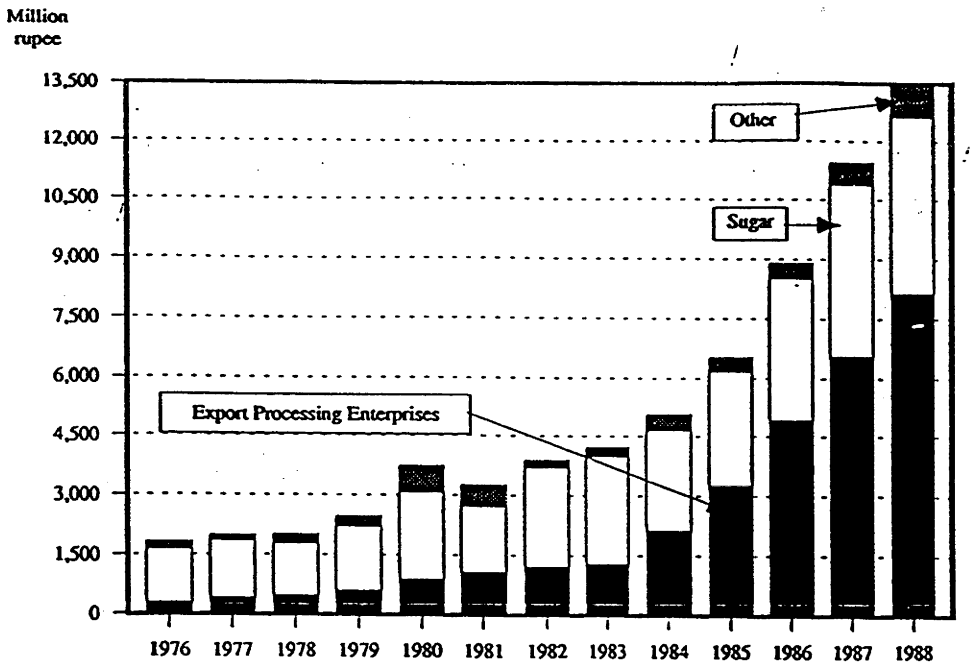
	1968		1973		1980		1985		1987	
	US$ '000	per cent	US$ '000	per cent	US$ '000	per cent	US$ '000	per cent	US$ '000	per cent
Agriculture	61	99	123	91	300	71	203	48	344	39
Of which										
Sugar	58	93	112	83	280	66	186	44	332	38
Tea	2	.	4	3	6	1	1	1	7	1
Molasses	2	.	7	5	14	3	6	3	6	1
Manufactures	.	.	10	7	113	27	207	49	514	58
Of which										
Clothing	.	.	4	3	74	17	165	39	430	49
Textiles	.	.	.	.	7	2	6	1	11	1
Other	.	.	6	4	32	8	36	9	73	8
Other	.	.	3	2	10	2	13	3	22	3
Total export	62	100	136	100	423	100	423	100	880	100

Source: Mauritius Central Statistical Office, *Statistical Yearbook*, Government Printer, Port Louis, 1989.

Composition of exports

Exports have been diversified since the mid-1970s, (Figure 2.3). Sugar export volumes and earnings have grown in absolute terms, except in a few drought years, but the export share of sugar declined from 86 per cent in 1970 to 36 per cent in 1987. The growth of manufactured exports from 1973 to 1987 has been impressive. The clothing industry was the driving force of labour-intensive export growth.

Figure 2.3 **Composition of exports, 1976-88**

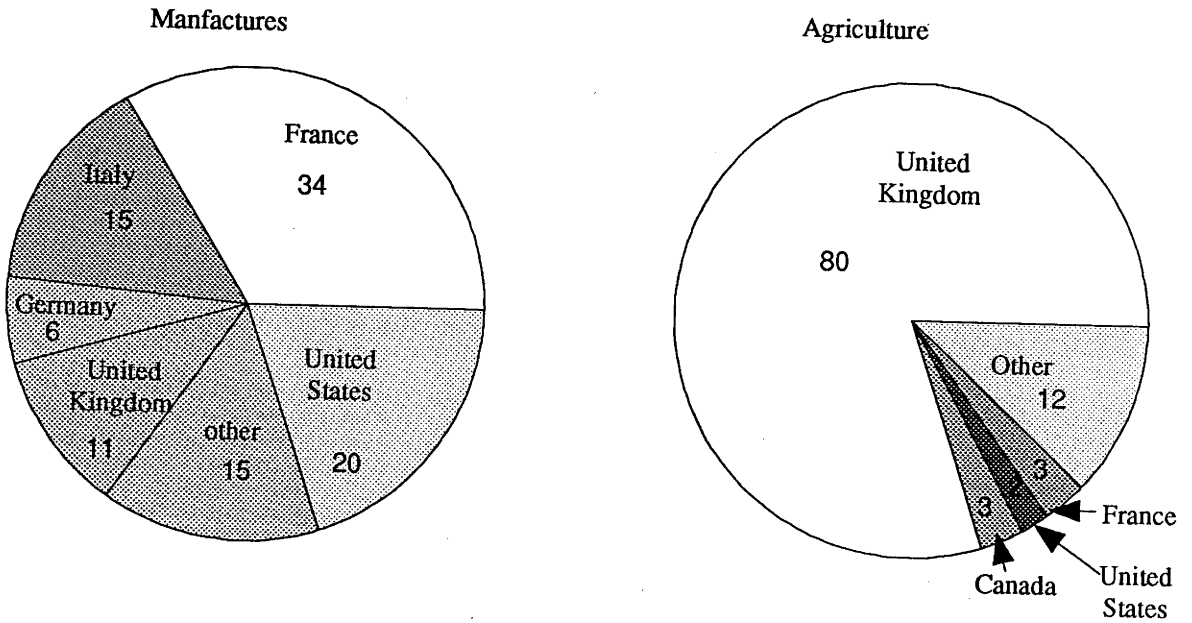


Source: Mauritius Central Statistical Office, *Quarterly Trade Statistics*, various issues, Port Louis.

Destination of exports

Although Mauritius exports to 38 countries, 82 per cent of its total exports go to only four countries. The most important destination, the United Kingdom, imports more than one-third of total Mauritius' exports and 80 per cent of total agricultural exports. The second major market, France, imports more than 20 per cent of total exports, about the same magnitude as the United States and Germany combined. In 1988 France was the major importer of Mauritian manufactures (34 per cent) followed by the United States (20 per cent), Germany (15 per cent) and the United Kingdom (11 per cent) (Figure 2.4).

Figure 2.4 **Exports by major destination, 1988**



Source: Mauritius Central Statistical Office, *Quarterly Trade Statistics*, various issues, Port Louis.

Terms of trade

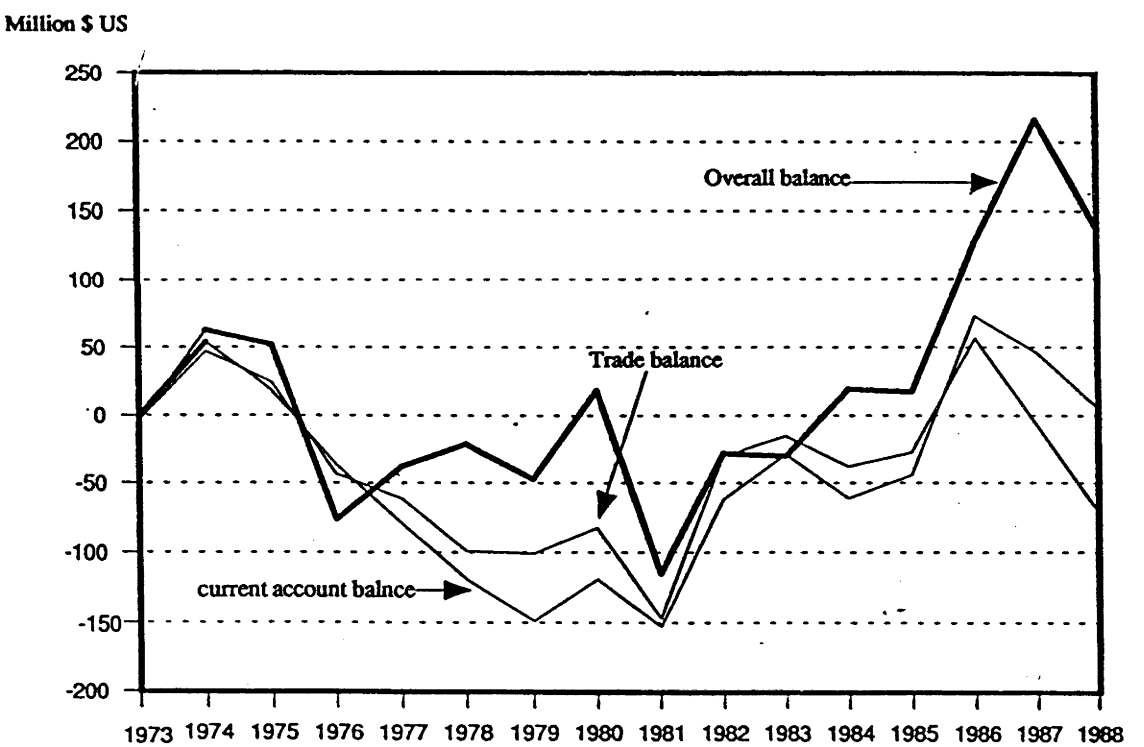
Mauritius had a favourable terms of trade throughout 1968-88 with the exception of 1981 when the export and import price indices were almost equal, the export prices were greater than import prices. The terms of trade peaked in 1975 at 202 induced by the unprecedented high price for sugar in the world market. Thereafter it continued to fall until 1981 when it bottomed at 100. The terms of trade has been rising since 1982 and reached 177 in 1988 (International Monetary Fund). During 1968-88 the terms of trade has been increasing at an average of 23 per cent per year measured by a linear time trend.

Balance of payments and reserves

Current account and overall balances were in deficit between the mid-1970s and mid-1980s.

The visible trade balance continued to fall until it bottomed at US$150 million in 1981 when it accounted for 14 per cent of GNP. The increase in sugar receipts in 1973 resulted in a substantial increase in consumption and hence a massive increase in imports. When sugar earnings dropped in 1976 demand remained high. Insufficient growth of production and exports relative to demand resulted in a deficit in visible trade. The large visible trade deficit in 1981 was largely due to reduced export volumes of sugar, a result of low production in 1980. The appreciation of the US dollar against other currencies and the devaluation of the rupee in the same year also contributed to the deficit. The trade balance has improved since but has continued in deficit, except for 1986.

Figure 2.5 Balance of payments, 1973-88



Source: World Bank, *World Tables*, Washington, D.C., 1989b.

The current account balance closely followed the trade balance. As Mauritius was a net importer of services until the mid-1980s, the current account deficit was even deeper than the visible trade deficit for about a decade to 1986. The current account balance has improved more than the trade balance since 1986, owing to the

growth of services and increases in net private transfers. Between 1981 and 1986 net private transfers more than doubled, due to the increase in remittances from Mauritians working overseas. The current account balance was in surplus, 5 per cent of GDP (US$73 million), in 1986. It has remained in surplus since then.

The overall balance is higher than the current account balance, except in a few years, due to capital inflow. Part of the current account deficit was offset by loans and foreign direct investment. Since 1975 private foreign direct investment has become important, particularly with the emergence of export processing enterprises. A large proportion of the external debt, however, consists of public borrowing to support liberalization and recovery.

Debt and official development assistance

Although total debt has increased from US$457 million in 1980 to US$708 million in 1987, the ratio of total debt to GNP (Table 2.14) has marginally decreased, from its peak of 58 per cent in 1985 to 40 per cent in 1987. This has occurred despite rising total debt. This suggests that borrowed funds were spent on investment which resulted in high growth.

Table 2.14 **Total debt and debt-service ratios, 1980-87**

	Total debt		Debt-service ratio	
	US$ million	Per cent of GNP	US$ million	Per cent of exports
1980	457	41	40	7
1981	540	49	57	11
1982	578	55	67	13
1983	563	53	89	17
1984	560	55	79	16
1985	612	58	72	13
1986	629	44	69	8
1987	708	40	77	6

Sources: World Bank, *Mauritius Economic Memorandum: recent development and prospects*, Washington, D.C., 1983; and World Bank, *Mauritius: managing success*, Washington, D.C., 1989.

Until 1983 Mauritius indebtedness increased. Its debt-service more than doubled, from US$40 million in 1980 to US$89 million in 1983. With the growth in exports between 1984 and 1987, however, the debt-service ratio has declined (Table 2.14). Compared to other middle-income countries, the debt-service ratio (6 per cent in 1987) is relatively low.

In per capita terms, Mauritius is a relatively large recipient of foreign assistance in comparison to other countries at its level of income. In 1987 it received US$62.5 per capita in Official Development Assistance (ODA). This was three times that of the average of the lower middle income countries US$20.9 per capita (Table 2.15).

Table 2.15 **Official Development Assistance[a], 1987**

	Population	Official Development Assistance	
	(million)	Total (US$ million)	Per capita (US$)
Cameroon	10.9	213	19.6
Costa Rica	2.6	228	87.5
Cote d' Ivoire	11.1	254	22.8
Fiji	0.7	36	50.0
Malaysia	16.5	363	22.0
Mauritius	**1.0**	**65**	**62.5**
Mexico	81.9	156	1.9
Peru	20.2	292	14.4
Philippines	58.4	775	13.3
Senegal	7.0	642	92.4
Thailand	53.6	500	9.4

[a] Net disbursement.
Sources: World Bank, *World Development Report*, Washington, D.C., 1989c and *Pacific Economic Bulletin*, 4:1, 1989.

The economic growth of the Mauritian economy in the last two decades was impressive. However, it had its ups and downs accompanied by good and poor economic policies. Overall the economy performed well in response to micro and macroeconomic reforms adopted since the late 1970s. These reforms largely liberalized the economy and enhanced export competitiveness.

3

The Mauritian sugar industry with particular emphasis on the EC Sugar Protocol

The sugar industry has played a major role in the economic growth of Mauritius. In 1988, sugar and its by-products represented about 90 per cent of agricultural output and 32 per cent of total exports. It employed 15 per cent of the labour force.

Special bilateral sugar agreements, notably the Commonwealth Sugar Agreement (1951) and later the Sugar Protocol, which was annexed to the Lomé Convention (1975), have been critical to this growth.

The Protocol quota allows Mauritius to export 80 per cent of its sugar exports to the EC market at higher than world market prices. It also shelters the sugar industry from fluctuating world sugar prices.

World sugar production and consumption

Almost two-thirds of world sugar production originates in sugar cane grown in tropical climates. The remaining sugar is produced from beets in industrial countries located in the temperate regions. A large proportion (85 per cent) of world beet sugar is produced in Europe (Table 3.1). Once refined, sugar from cane and beet can not be distinguished.

Table 3.1 **World production of sugar by source, 1989** (million tonnes of raw value)

	Cane sugar	Beet sugar	Total
Europe	0.3	34.2	34.4
North America	3.1	3.2	6.3
Central America	14.0	-	14.0
South America	11.9	0.5	12.4
Asia	26.8	2.1	28.9
Africa	7.0	0.6	7.6
Oceania	4.3	-	4.3
World	67.4	40.5	107.9
Percentage of total production	62.5	37.5	100.0

Source: International Sugar Organization, *Sugar Yearbook*, London, 1989.

Half the world's sugar is produced in developing countries. The rest is divided between industrial (nearly a third of world production) and the former centrally planned countries. While sugar production is spread over a wide range of countries, it is dominated by a few large producers, with a large number of countries producing small amounts. In 1989, of the 103 sugar producing countries four (India, the former USSR, Cuba and Brazil) and the EC block produced nearly 50 per cent of world sugar. Another 25 per cent was produced by another seven countries (Table 3.2). This leaves only a quarter of world sugar to be produced by 90 other countries.

Table 3.2 **World sugar production and consumption by major countries, 1989**

	Production		Consumption		Stock[a]
	Amount (million tonnes)	share of world (per cent)	Amount (million tonnes)	share of world per cent	Amount (million tonnes)
EC	16.6	15	12.8	12	12.6
India	9.9	9	10.7	10	1.8
USSR	9.6	9	13.7	13	6.2
Cuba	7.6	7	0.9	1	0.3
Brazil	7.3	7	7.4	7	2.3
United States	6.2	6	7.5	7	2.4
China	5.4	5	7.2	7	1.6
Thailand	4.3	4	1.0	1	0.4
Australia	3.8	4	0.9	1	1.6
Mexico	3.6	3	4.0	4	0.1
South Africa	2.3	2	1.4	1	0.8
Indonesia	2.2	2	2.6	2	0.7
Pakistan	2.0	2	2.1	2	0.9
Poland	1.9	2	1.8	2	1.0
Japan	1.0	1	2.8	3	0.8
Mauritius	0.6	0	0.0	0	0.2
Total	84.0	78	78.0	73	33.7
World	108.0	100	107.0	100	45.0

[a] End of year.

Source: International Sugar Organization, *Sugar Yearbook*, London, 1989.

In 1989 nearly three-quarters of world sugar was consumed where it was produced. Six of the seven largest producers, (the exception being Cuba) are also the largest consumers (Table 3.2). These six countries consumed more than half of the world supply. The consumption of Cuba was small because of its relatively small population size. Its per capita consumption of 68 kilograms per annum is, however, the highest in the world.

Annual per capita sugar consumption varies a great deal among countries, from

6 kilograms in China to 68 kilograms in Cuba, with a world average of 21 kilograms (Table 3.3). Some countries not included in the table have even lower per capita consumption than China. For instance, Cambodia's per capita consumption is as low as 0.6 kilograms per year.

Table 3.3 **World per capita sugar consumption by region, 1989**

Region	Kilograms per person	Region	Kilograms per person
Europe	42.4	Central America	46.7
EC	39.0	Cuba	68.0
USSR	47.9	Mexico	47.6
North America	31.2	Africa	13.2
Canada	40.0	Mauritius	37.0
United States	30.3	South Africa	30.9
Asia	11.7	South America	41.5
China	6.4	Brazil	50.2
India	13.2		
Japan	39.2	Oceania	43.3
		Australia	50.9
World	20.9		

Source: International Sugar Organization, *Sugar Yearbook*, London, 1989.

The level of consumption increases as income rises. Hence there is a big scope for world per capita consumption to increase as low income countries attain a higher level of income. With most industrial countries reaching their saturation level of per capita consumption, coupled with low population growth, the future of sugar consumption depends largely on the economic growth of low income countries.

World sugar trade

World sugar exports have not kept up with production. At a global level, sugar production for exports has declined since the turn of the century when more than half of the sugar produced was exported (Abbott 1990). In 1960 the share of sugar exports declined to 35 per cent of world sugar production. This share had fallen to 30 per cent during the period 1976 to 1980 and further declined to 26 per cent in 1989 (Table 3.4). Sugar exports have fallen mainly because of increasing self-sufficiency in the industrial countries and increased consumption in sugar exporting developing countries.

In the developed countries of the EC, and in the United States, self-sufficiency in sugar production is promoted by protection and subsidies. The producers of these countries are guaranteed a price above their marginal cost and above the world price. Because of high producer prices, production quotas have to be imposed to limit production.

The subsidies for sugar production in industrial countries have reduced the volume of sugar traded internationally, reducing the market available to cane sugar-producing developing countries, such as Mauritius. The industrial countries have not only used subsidies to attain self-sufficiency, they have exported sugar in competition with cane sugar exports from developing countries. From 1974 to 1989 the industrial countries' net exports of sugar to the world market increased from 2.8 million tonnes to 9.2 million tonnes. This increase came largely from the EC which turned from a net importer in 1975 to a net exporter of 5.5 million tonnes in 1982. In 1989, the EC become the second largest exporter of sugar after Cuba, accounting for 18 per cent of world exports. The EC expanded its sugar production despite its cost disadvantages. The EC is one of the least efficient sugar producers in the world (see Table 3.7).

Table 3.4 **World sugar trade by major exporters and importers, 1972-89**
(million tonnes)

	1972-75[a]	1976-80[a]	1981-85[a]	1987	1988	1989
Major exporters						
Cuba	5.0	6.5	7.2	6.5	7.0	7.1
EC	1.4	3.2	4.9	5.5	4.9	5.0
Australia	2.0	2.4	2.6	2.8	3.0	3.2
Thailand	1.3	1.1	1.6	2.1	2.0	3.1
Brazil	2.4	2.1	2.8	2.4	1.6	1.0
South Africa	0.9	0.9	0.8	1.1	0.9	0.9
Mauritius	**0.6**	**0.6**	**0.6**	**0.7**	**0.7**	**0.7**
World	21.7	25.8	28.9	28.3	27.4	27.9
Major importers						
USSR	2.4	4.3	5.8	5.1	4.4	5.6
Japan	2.7	2.5	1.9	1.8	1.9	1.9
EC	2.2	1.7	1.4	1.7	1.7	1.8
United States	4.6	4.4	3.0	1.2	1.3	1.6
China	0.5	1.1	1.8	2.2	4.0	1.6
Korea, Republic of	0.3	0.5	0.8	1.0	1.1	1.2
World	21.4	25.1	27.8	27.6	27.0	27.5
World exports as a percentage of world production	28.6	29.8	29.5	27.1	26.1	25.8

[a] Annual average.
Source: International Sugar Organization, *Sugar Yearbook*, London, 1989.

The desire for self-sufficiency not only reduced world sugar trade, but also increased world market distortions since subsidized sugar is dumped on the world market. Attempts to regulate the market and stabilize export prices through international commodity agreements have failed to achieve their objectives, but have added regulatory constraints to the sugar industry.

The world sugar market is highly regulated. Of the 26 per cent of world sugar production traded internationally, 83 per cent was traded through bilateral or

multilateral arrangements. As a result, less than 5 per cent of world production was traded in the free market.

There are almost as many sugar exporting countries as there are producing countries. However, world sugar trade is even more concentrated geographically (in fewer countries) than production. Three-quarters of total exports is supplied by seven countries. Of these countries Cuba (25 per cent), EC (18 per cent), Australia (11 per cent) and Thailand (11 per cent) supplied nearly two-thirds of total exports (Table 3.4).

Half of the sugar entering the world market is imported by six countries. These major importers, with the exception of Japan and the Republic of Korea, are also major producers. Among the major importer market economies, Japan, EC and the United States have more than halved their shares from 44 per cent in 1972-75 to 20 per cent in 1989. In the same period the other countries, (the USSR, China and the Republic of Korea) doubled their share from 15 to 30 per cent.

Although sugar is losing its importance as an export commodity, it still plays a major role in the national economies of many developing countries such as Mauritius.

The importance of sugar

Because of the importance of the sugar industry in the Mauritian economy Mauritius is often referred to as 'the sugar bowl island'. The island's economic and social environment has been greatly influenced and shaped by the dominant position of the sugar industry. With its strong forward and backward linkages to the rest of the economy, the sugar industry was the driving force of the Mauritian economy until the mid-1970s.

Table 3.5 **Mauritian sugar industry contribution to GDP, export earnings and employment, 1970-88**

	Sugar contribution to:			Sugar as percentage of:		
	GDP (million rupee)	Exports (million rupee)	Employment ('000)	GDP	Export earnings	Employment
1970	306	332	56	30	88	43
1975	830	1549	58	24	85	34
1980	1238	2407	51	16	67	26
1985	1971	2868	45	14	44	21
1988	2749	4322	41	13	32	15

Source: Mauritius Central Statistical Office, *Biannual Statistics,* (various issues), Government Printer, Port Louis.

Since the mid-1970s, with economic diversification, the relative contribution of sugar to GDP and employment has declined. In the 1980s sugar's relative contribution to exports also declined. But despite the growth of manufactures in the export processing enterprises, sugar remains a high foreign exchange earner, accounting for about one-third (32 per cent) of export earnings in 1988.

The sugar industry has also been the major source of investment for the newly expanding manufacturing sector (World Bank 1989a). Profits from the sugar industry were invested in export-oriented joint ventures. In spite of the rapid advances made in industrialization and tourism, the sugar industry still leads in terms of value added. The value added to output ratio of sugar (45 per cent), moreover is higher than that of manufactures (35 per cent).

Sugar production and efficiency

In 1989, with a total production of 652,000 tonnes, Mauritius was the ninth largest sugar producer among sugar exporting countries. It had the second highest level of production per population (590 kgs) after Cuba (700 kgs).

Sugar cane production still occupies 87 per cent of total cultivated land, equal to about 45 per cent of the total area of the island. The total cultivated area of sugar has declined marginally, by 10,000 acres (3 per cent), as the production of other crops has grown in recent years.

Table 3.6 **Mauritian sugar production and yield, 1968-87**

	Cultivated area ('000 hectare)	Production ('000 tonnes)		Sugar yield per hectare (tonnes)			
		Cane	Sugar	Miller	Owners	Tenant	Average
1968	79	5152	596	12.1	9.0	6.9	10.5
1970-75[a]	78	5536	628	13.2	9.0	7.6	11.3
1976-80[a]	79	5912	637	13.6.	10.4	8.3	12.5
1981-85[a]	77	5546	618	13.1.	9.4	8.5	11.6
1986	77	6025	707	14.1.	11.3	8.7	12.7
1987	76	6231	691	14.6.	11.9	9.1	13.2

[a] Five years average.
Source: Mauritius Central Statistical Office, *Annual Digest of Statistics*, Government Printer, Port Louis, 1989.

Land formerly used for sugar cane production has been diverted to other uses, but improvements in technology, mainly by the 19 mills who cultivated about 55 per cent of the total sugar area, and economics of scale have raised output per hectare. Increasing the yields of the 33,000 small planters (owners and tenants) offers further scope for increasing sugar cane production. Cane production per hectare is one of the highest in the world. With 71.5 tonnes per hectare, it is well above the world average of 60 tonnes per hectare (Table 3.7).

Table 3.7 **Sugar production: cost and yields for selected countries, 1981**

	Cost of production US cents/lb	Yield per hectare (tonnes) Sugar	Cane
EC	> 20	8.0	na
Italy	> 20	6.4	na
Netherlands	> 20	9.9	na
Belgium	16 - 20	9.3	na
United Kingdom	16 - 20	7.1	na
West Germany	16 - 20	6.6	na
France	12 - 14	10.1	na
United States	> 20	10.1	na
Africa			
Mauritius	**12 - 16**	**8.5**	**71.5**
South Africa	12 - 16	9.5	82.9
Zimbabwe	< 12	13.3	_
Asia			
India	12 - 16	2.3	_
Philippines	< 12	—	_
Oceania			
Australia	12 - 16	11.4	79.4
Fiji	< 12	—	54.5
Latin America and Caribbean			
Argentina	16 - 20	4.8	55.0
Brazil	< 12	5.0	63.8
Cuba	—	5.5	52.1

Source: G. Abbott, *Sugar*, Billing and Sons Ltd., London, 1990: Tables 2.3, 2.6 and 2.9.

A study by the International Sugar Organization (Table 3.7) has classified Mauritius as a medium to low cost producer. Its production cost of 12-16 US cents per pound is comparable with leading sugar producers such as Australia and South Africa. Abbott (1990) supports the view that the sugar industry in Mauritius is efficient. Mauritius has had no difficulty in meeting its annual quota to the EC, except in the two years when cyclones hit the island.

Mauritian sugar quality is one of the highest, with a 98.5 polarization (the intensity of sugar content). Sugar recovery (the ratio of sugar to cane production) is about 11.5 per cent. This compares favourably with 11.0 per cent in Australia and South Africa.

The sugar industry in Mauritius is largely privately owned, but it is highly regulated. The Mauritius Sugar Syndicate, a producers' organization, is the sole marketing agency for all domestic and export sugar sales. The Syndicate pays producers after deducting statutory levies such as crop insurance premiums; contributions to various government agencies involved in sugar production and marketing; the export duty on sugar; and marketing and freight expenses. Sales to the domestic market are made directly to wholesalers and industrial users. Prices for domestic consumption are fixed by the government. They usually approximate the world price.

Export markets and prices of sugar

Sugar production in Mauritius is predominantly for export, with sugar exports accounting for 93 per cent of the total production. This constitutes 2.3 per cent of world exports. The exports of Mauritian sugar are highly concentrated by market. Seventy-nine per cent of total exports go to the EC. Of this, 96 per cent goes to the United Kingdom. In a typical year 14 per cent goes to Canada, 1 per cent to the United States, and the remaining 6 per cent is sold to the rest of the world.

Table 3.8 **Mauritian exports of sugar by major destination, 1984-85 to 1987-88**

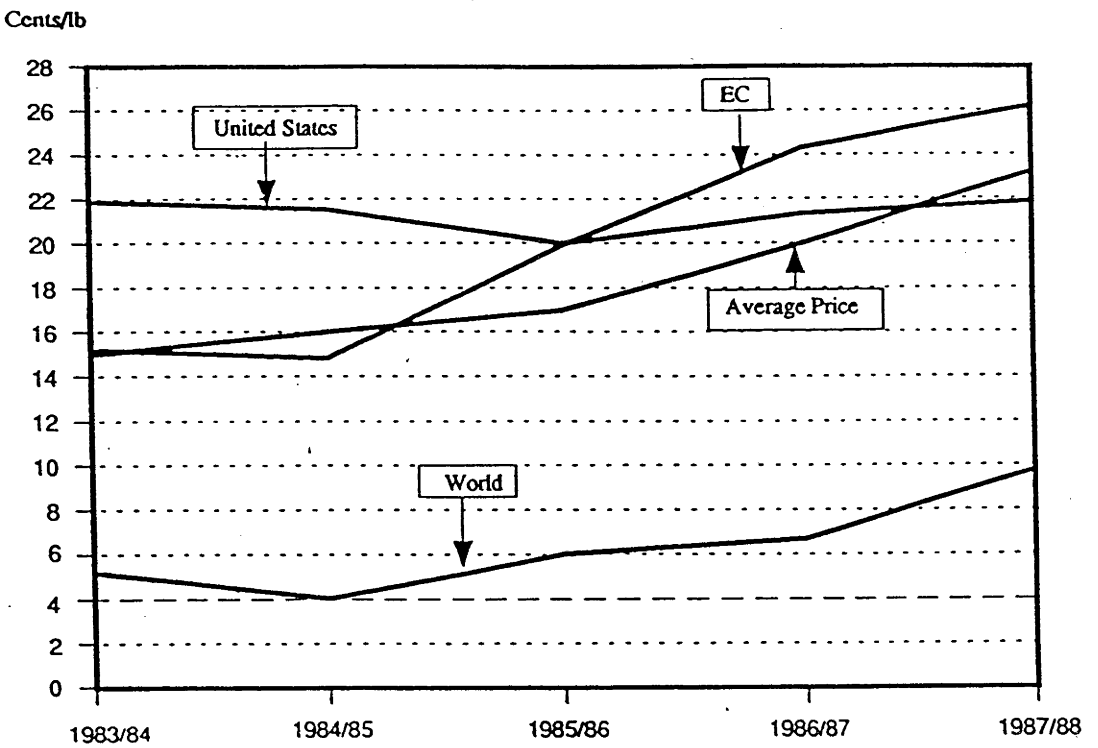
	1984-85		1985-86		1986-87		1987-88	
	tonnes	per cent	tonnes	per cent	tonnes	per cent	tonnes	per cent
UK	435	79	391	72	424	59	472	76
Other EC	88	16	82	15	96	13	19	3
United States	26	5	27	5	9	1	7	1
Canada	-	-	16	3	77	11	87	14
Other	-	-	27	5	108	15	40	6
Total exports	549	100	543	100	715	100	625	100

Source: Bank of Mauritius, *Annual Report*, Government Printer, Port Louis, 1988.

Mauritian sugar has enjoyed guaranteed markets and high prices since World War II. The Commonwealth Sugar Agreements of 1950-74, the International Sugar Agreements of 1969, the Sugar Agreement of the Lomé Convention of 1975, and the United States GSP of 1976 all support the industry in Mauritius. These agreements guarantee that Mauritius can sell determined quantities of sugar at negotiated prices. These prices are two to four times higher than the world price (Figure 3.1). As long as the Sugar Agreement lasts, export earnings are stable because volumes as well as prices are fixed.

The free market price for raw sugar is low and unstable (Figure 3.1). The free market is a residual market: only sugar which is not sold under special arrangements is marketed on the free market. As world market prices for sugar are determined by supply and demand conditions, they fluctuate widely. For instance, in periods of surplus such as 1985, prices fall dramatically, whereas in times of production short-falls, as in 1980, prices rose quickly. Though the production of sugar fluctuates with the climate, such fluctuations have not influenced export supplies to the preferential markets of the EC and United States. Quotas to these markets are filled by drawing down stocks managed for this purpose. Residual production is sold on the free market where the amount fluctuates widely.

Figure 3.1 **Sugar prices : EC , US and world markets, 1983/4-87/88**



Source: World Bank, *Mauritius: managing success*, Washington, D.C., 1989a.

The Sugar Protocol of the European Community

Not only does Mauritius obtain higher prices in the EC market, but it is also protected from the risk and uncertainties of fluctuations in world market prices. The Sugar Protocol, which is now part of the Lomé Convention, is the continuation of long-standing arrangements between Commonwealth countries and the United Kingdom. During World War II, when sugar was scarce, the world price for sugar was rising. After World War II, the government of the United Kingdom needed sugar supplies payable in sterling because of its shortage of dollars. Hence it urged its colonies and territories to increase sugar production.

To end sugar rationing while developing its own sugar-beet industry, the United Kingdom imported sugar from Commonwealth countries. This enabled it to obtain regular supplies of raw sugar for its refineries. The agreement suited the Commonwealth sugar producing developing countries. They wanted stable export markets because, for several countries (Fiji, Mauritius and Swaziland) sugar was a major export. The first Commonwealth Sugar Agreement was negotiated from 1949 to 1951. The agreement enabled members (Australia, West Indies and Guyana, Fiji, Mauritius, South Africa, British Honduras, East Africa, India, South Rhodesia and Swaziland) to sell fixed quantities of sugar at negotiated prices, which were to be revised annually. The quota for Mauritius was 386,000 tonnes, about 60 per cent of its sugar production.

The agreement lasted until the end of 1974 when the United Kingdom joined the EC. One of the conditions of EC membership for the United Kingdom was that sugar exports from members of the old Commonwealth Sugar Agreement should continue to be exported to the EC market. The Commonwealth Sugar Agreement was replaced by the Sugar Protocol of the Lomé Convention implemented in 1975. Under the Convention, as in the Commonwealth Sugar Agreement, predetermined amounts of sugar were sold at negotiated prices. Mauritius subsequently signed the Lomé II, III, and IV Conventions in 1979, 1984 and 1990, respectively. The negotiated quantity of sugar sales for Mauritius in 1987 was 507,00 tonnes. The advantages of an assured long-term outlet and remunerative prices were thus extended. Under the Sugar Protocol the EC annually purchases and imports sugar at negotiated prices within the EC's price range. In response to assured demand Mauritius expanded its sugar production.

The price is set in European Currency Units (ECUs) at an equivalent to that received by EC beet producers per tonne of raw sugar less freight cost. This price has not changed greatly during the last five years, but the devaluation of the rupee and the Monetary Compensatory Amount have resulted in an increase of sugar export

earnings in rupees. The condition for implementing the guarantee to purchase and import sugar was subject to re-examination in the seventh year of the Protocol (1981), but it was not changed.

Among the African, Caribbean and Pacific (ACP) countries that have special quota access to the EC and enjoy favourable prices for their sugar exports, Mauritius benefited the most because of its high quota level. Almost 40 per cent of the total quota is allocated to Mauritius (see Table 3.9).

Table 3.9 **Sugar Protocol: export quotas by country, 1975-76 and 1987-88**

	1975/76		1987/88	
	('000 tonnes)	per cent of total	('000 tonnes)	per cent of total
Barbados	49.3	3.9	50.3	3.9
Belize	39.4	3.1	40.4	3.1
Congo	10.0	0.8	10.2	0.8
Fiji	163.6	12.8	165.4	12.8
Guyana	157.7	12.3	159.4	12.3
Ivory Coast	-	0.0	10.2	0.8
Jamaica	118.3	9.2	118.7	9.2
Kenya	5.0	0.4	-	-
Madagascar	10.0	0.8	10.8	0.8
Malawi	20.0	1.6	20.8	1.6
Mauritius	**487.2**	**38.1**	**491.0**	**37.9**
St Christopher -Nevis-Anguilla	14.8	1.2	15.5	1.2
Suriname	4.0	0.3	-	-
Swaziland	116.4	9.1	117.8	9.1
Tanzania	10.0	0.8	10.2	0.8
Trinidad and Tobago	69.0	5.4	43.8	3.4
Uganda	5.0	0.4	-	-
Zimbabwe	-	0.0	30.2	2.3
Total	1279.7	100.0	1294.7	100.0

Source: T. Koch, 'The Sugar Protocol: An Appraisal' *Intereconomics*, Vol 24, (Nov/Dec), 1989.

The United States sugar market

Mauritian goods, including sugar, have duty free entry into the United States under the General System of Preferences (GSP). The United States gives Mauritius sugar prices equivalent to the support price for domestic producers for 28,000 tonnes, or about 1 per cent of Mauritius sugar exports in recent years. Under the GSP, the United States allows the exports of developing countries whose annual per capita incomes are under US$8500 to enter the US market duty free. Mauritius' share of global imports by the United States is, however, small (1.2 per cent).

The International Sugar Agreement

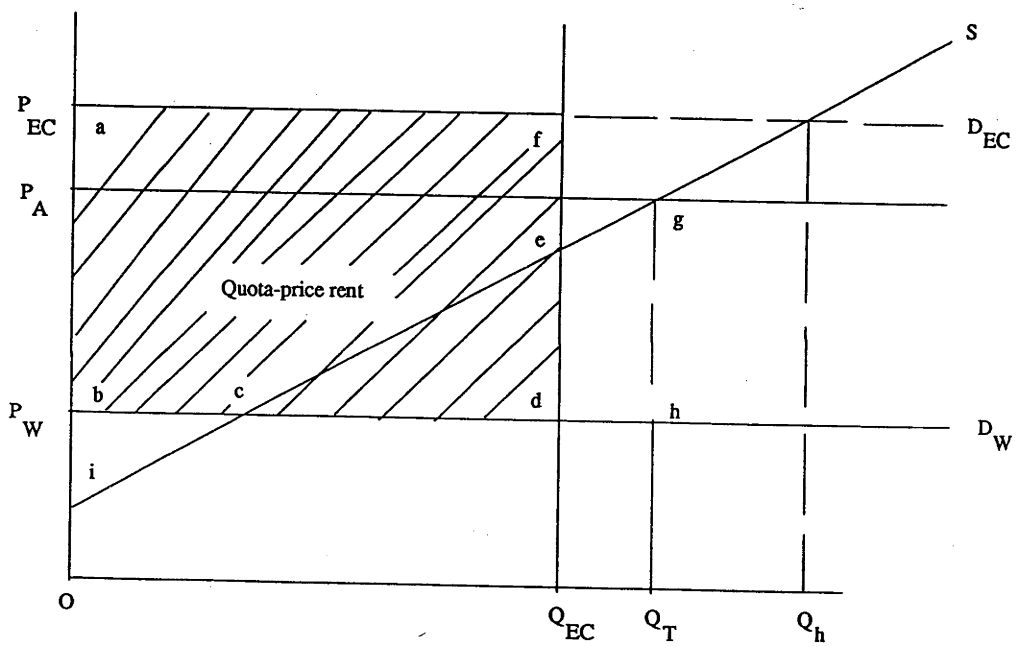
Sugar traded in the free market is covered by the International Sugar Agreement (ISA). The International Sugar Agreement has been operating since 1931 and subsequent agreements were signed in 1937, 1953, 1958, 1968, 1977, 1984 and 1987. The agreements seek to maintain a balance between demand and supply in the free market for sugar and to encourage stable and "equitable" prices. The principal aims of the agreements are to stabilize the free market price of sugar through export quotas, target prices and stocking. The amount sugar members can export to the free market is determined each year. Allocation of quotas is based on past performance and production plans. This condition contributes to the failure of the agreement to influence the market. It provides an incentive for members to over produce and thus depress the market. The nonparticipation of the EC has also contributed to the destabilization of the free market for sugar. For these and other reasons the International Sugar Agreement has failed to stabilize the free sugar market.

Mauritius became a member of the International Sugar Agreement in 1969. This agreement allowed Mauritius to sell about 165,000 tonnes of sugar on the free market. This amount was more than Mauritius could supply to the free market.

Welfare effects of the Sugar Protocol

The Sugar Protocol allows Mauritius to obtain higher than normal profits, or large rents, from sugar sold to the EC. Figure 3.2 shows the income transfer from EC to Mauritius. The figure is generated from export prices received in, and export quantities of sugar sold to, the EC and the world market from Mauritius. To simplify the presentation, it is assumed that Mauritius faces only two markets for sugar exports, the EC and the free market. The US market is omitted.

Figure 3.2 **Sugar Protocol effect on income transfers from EC to Mauritius**



As a small country Mauritius faces perfectly elastic demand for its sugar exports in both the world (D_W) and the EC (D_{EC}) markets. The supply curve is assumed to be inelastic because of fixed factors of production. The upward sloping supply curve signifies an increasing marginal cost of production with increases in output. For a unit of export, it receives a price (P_W) for its exports in the free market. However, it receives a much higher price (P_{EC}) for its exports to the EC market. At the price (P_{EC}) it is willing to supply the quantity of sugar Q_h. However, the supply of sugar to the EC market is restricted by quota to the amount Q_{EC}. For all production O to Q_{EC},

it receives a guaranteed price well above the cost of production. For this reason, it first fills its quota to the EC market. After satisfying its quota requirement of Q_{EC}, it sells the remainder, Q_T-Q_{EC} in the world market at the price P_W. which is in some years below the cost of production. Although the world price, P_W, is lower than its cost of production it nevertheless supplies to the world market at a loss if the cost of storage is higher than, or equal to, the additional revenue earned in the following year. Storage costs are not explicitly taken into account in the diagram above. Storage costs were excluded to simplify the presentation as including than does not change the flow of the argument.

Furthermore, Mauritius needs to produce more than it sells to the EC because of the uncertainty associated with sugar production. Sugar output cannot be predetermined accurately because of climatic changes. If Mauritius is to fill its lucrative EC and US quotas it has to overshoot production, and sell the excess in the world market. It may also sell in the world market to maintain its market share. By maintaining its market share it maximizes its long term profitability. Maintaining its market in the world market allows her to gain from high world sugar prices such as in 1974-75.

Selling small amounts at a loss is paid by rent earned on the EC sales. The loss in producers' surplus, *edhg*, in the world market, is more than compensated by producer surplus, *aief*, in the EC market. World market sales are cross subsidized by the EC market obtaining an average price of P_A.

$$P_A = \frac{Q_{EC} \cdot P_{EC} + P_W \cdot (Q_T - Q_{EC})}{Q_T} \qquad (3.1)$$

The Sugar Protocol transfers income from EC consumers to Mauritius (equivalent to the area *abdf*) in the form of quota-rent. This transfer amounted to US$180 million in the 1988-89 crop season (Table 3.10). The government of Mauritius received a sum of US$46 million of this transfer. The rest went to

producers[1]. In 1988-89 the income transfer from EC in the form of quota-rent amounted to US$177 for every Mauritian. Since signing the Protocol in 1975 Mauritius has received an estimated US$1.32 billion in quota-price rents.

Table 3.10 **Sugar protocol: estimated income transfer and welfare effect, 1975-76 to 1988-89**

	Receipts from EC at:				Net transfer (quota-price rent)		
	EC price (actual)		World price (hypothetical)				
	Rupee million	US$ million	Rupee million	US$ million	Rupee million	US$ million	per cap US$
1975-76	1100	168	850	130	250	38	44
1976-77	1130	169	903	135	227	34	39
1977-78	1231	193	625	98	606	95	106
1978-79	1358	226	535	89	823	137	151
1979-80	1711	236	1130	156	581	80	87
1980-81	1578	197	1926	240	-347	-43	-45
1981-82	2188	213	1834	178	356	35	37
1982-83	2175	167	975	75	1200	92	96
1983-84	2359	188	1573	125	786	63	65
1984-85	2571	169	1369	89	1202	78	80
1985-86	3017	211	1080	76	1937	136	138
1986-87	3656	282	933	72	2720	210	211
1987-88	4050	280	1370	95	2679	185	184
1988-89	4159	271	1393	91	2767	180	177
Total	32283	2969	16496	1649	15787	1320	1370

The stability effect of the Sugar Protocol

The importance of the Sugar Protocol is not limited to income transfers. The stability of the income earned is equally important. The positive impact of the Protocol on the stability of Mauritian sugar proceeds is apparent from the comparison of the variability of world price and the EC price through the years, shown in Figure 3.1.

[1] Until 1987-88 the government of Mauritius levied an export tax on sugar at the rate of around 20 per cent for the first 1000 tonnes. Any amount in excess of 1000 tonnes was exported free of tax. In 1988-89 the rate was lowered to 13.5 per cent and the threshold for tax exemption was raised to 3000 tonnes.

Sugar prices are the most volatile of all commodity prices (Newbury and Stiglitz 1981). Koch (1989) has estimated that the coefficient of variation, the ratio of the standard error to the mean, is higher for sugar (78 per cent) than for other agricultural products such as bananas (39 per cent) and wheat (42 per cent). Shafaeddin (1990) has arrived at similar measures of variability in commodity prices for the period 1960 to 1989. The estimated coefficient of variation ranged from 38 per cent for maize to 90 per cent for sugar. An agreement which allows for fixed prices has clear advantages for producers. For Mauritius, the Protocol reduced the instability of sugar earnings to only 22 per cent. If Mauritius had to rely on world market prices, instability would have been 91 per cent. This implies that the Protocol introduced a stabilization effect of 76 per cent on sugar proceeds (Table 3.11).

Table 3.11 **Sugar Protocol: instability effect of export earnings** (coefficient of variation)

	Export earnings		Stabilization
	without agreement (A)	with preference (B)	effect [(A)-(B)]/(A)
Barbados	0.92	0.43	0.533
Belize	0.81	0.30	0.630
Congo	0.73	0.62	0.151
Fiji	0.80	0.32	0.600
Guyana	0.80	0.27	0.633
Ivory Coast	1.26	0.36	0.714
Jamaica	0.78	0.34	0.564
Kenya	1.17	1.10	0.060
Madagascar	0.93	0.57	0.387
Malawi	0.84	0.49	0.417
Mauritius	**0.91**	**0.22**	**0.758**
St Christopher -Nevis-Anguilla	0.78	0.33	0.577
Suriname	1.24	0.27	0.782
Swaziland	0.79	0.40	0.494
Tanzania	1.20	0.16	0.867
Trinidad and Tobago	0.78	0.35	0.551
Uganda	2.22	0.83	0.626
Zimbabwe	1.36	0.97	0.287

Source: T. Koch, 'The Sugar Protocol: An appraisal', *Intereconomics*, Vol 24 (Nov/Dec) 1989.

This is consistent with instability as measured using equation 3.2 between 1960 and 1989 for Mauritius. The instability index (coefficient of variation) is defined as

The ratio of the standard error to the mean value of the variable.

$$I = \sqrt{\frac{\sum (X - \hat{X})^2}{n-2}} \Big/ \overline{X} \qquad (3.2)$$

Where I = instability index,

n = number of observations,

X = actual value of exports,

$\hat{X}$ = trend value of exports,

$\overline{X}$ = mean value of exports.

It is estimated that the coefficient of variation for Mauritius sugar earnings from the free markets is 0.84. However, this measure is only 0.31 for Mauritius sugar from EC market.

The sugar industry is losing its relative importance and dominant position in the Mauritian economy to export processing enterprises and tourism. The export processing enterprises are not only assuming a dominant place but also growing faster. The contribution of these enterprises to different aspects of the economy are analyzed and evaluated in the following chapter.

4

Export processing enterprises in Mauritius with particular emphasis on clothing industry

Background

In the 1960s, like many developing countries, Mauritius sought to improve its deteriorating balance of payments and to provide employment for the rapidly growing labour force, by adopting import-substituting manufacturing as its development strategy. In addition to quantitative import restrictions and protective tariffs in 1964 the government passed the Development Incentives Act to encourage the expansion of import-substituting industries. Selected firms, which manufactured primarily for the domestic market, were granted development certificates and known as development certificate firms.

Under the Act, a firm qualifying for a development certificate enjoyed tax "holidays" and other incentives in addition to protection. These incentives included five to eight years of corporate tax exemption, five years tax free dividends and tariff exemption on imported capital goods. These incentives encouraged the choice of products and techniques which were inappropriate to the country's resource endowment and resulted in excess capital intensity and inefficiency. The incentives made investment profitable for entrepreneurs, but the import-substituting industries had low social returns and failed to create employment. By 1970 the development certificate firms had created only about 1200 jobs. The balance of payments did not improve. On the contrary, the development certificate policies hindered specialization in labour-intensive manufactured exports and created a bias against agricultural and service exports. The smallness of the domestic markets, the absence of technical knowledge, managerial and entrepreneurial skills, limited investment in import-substitution.

In 1970 the government therefore explored the option of establishing manufactures for export with the assistance of foreign enterprises under the name of an "export processing zone". The objective was to reduce balance of payments constraints, generate employment and thus stimulate the overall economy through "export-led growth".

Export processing zones are an extension of the concept of free trade zones and industrial estates (Hughes 1988; International Labour Organization 1988). They were pioneered in Ireland, Puerto Rico, Taiwan and the Republic of Korea in the 1950s and 1960s. Most of the export processing zones were intended to provide areas where scarce infrastructure could be concentrated and a "free trade" environment created for domestic and foreign firms producing for export. Some economies such as Hong Kong and Singapore do not have a specially designated zone. The duty free export and import environment of Hong Kong and Singapore (after 1965) resembled economy-wide export processing zones. In Mauritius the "export processing zone" did not refer to a given area, but defined firms producing for export markets regardless of their location as an "export processing zone". Hereafter in this study they are referred to as export processing enterprises. Rabbani (1980) refers to such industries as export processing factories.

The "first best" solution in seeking export-led growth is to abandon protection. However, abolishing protection can often only be implemented gradually for political reasons. If protection were dismantled, some entrepreneurs and workers in protected industries would lose their businesses and employment. This would lead to strong political opposition. Those who would gain from the reduction of protection, consumers and workers who would obtain jobs in new export industries, are not organized. For this reason protectionist policies can usually not be removed. Export processing zones can thus be considered as a "second best" alternative to liberalizing an economy. They may provide an initial phase for outward-looking industrialization (Lee 1984; Spinanger 1984). In a small, low wage country such as Mauritius export processing enterprises may give the domestic economy access to foreign capital in the form of private direct foreign

investment with its "package" of capital, technology, management and marketing knowledge that the country could not otherwise obtain.

About 700 export processing zones have been established overall in the world, mainly in the 1970s, as a means of promoting manufactured exports and attracting foreign investment. But including Mauritius, only a dozen or so have been successful (Hughes 1988).

Conditions for success of export processing enterprises in Mauritius

Political stability

Political stability was important in stimulating the growth of export processing enterprises. Mauritius has traditionally had a stable and democratic system of government. Political stability has allowed formulation and implementation of consistent economic and social policies and attracted foreign capital.

Macroeconomic policies

Macroeconomic policies, particularly exchange and interest rates management, made production for export competitive and profitable.

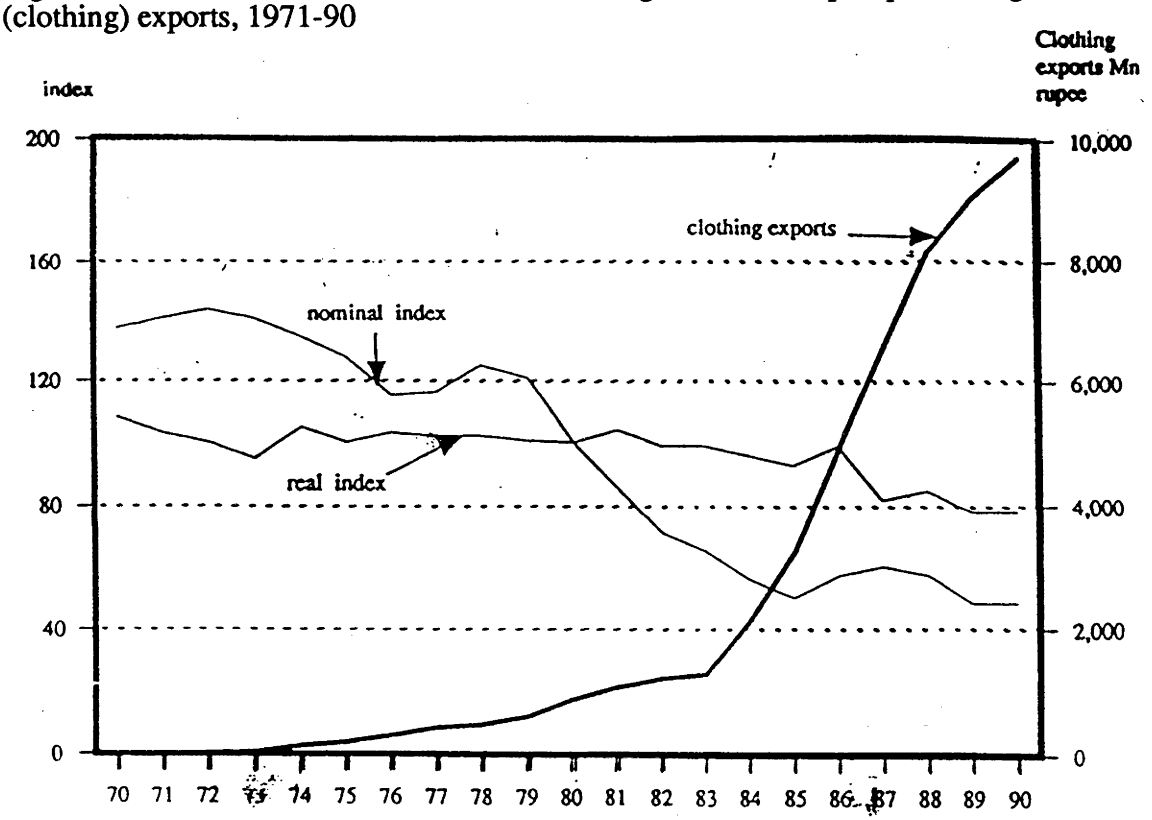
The real exchange rate has played an important role in determining competitiveness and export profitability in Mauritius. The devaluation of the real exchange rate in the late 1970s raised proceeds in domestic currency for producers of exportables whose prices were determined in foreign currencies on the world market. The nominal exchange rate was allowed to depreciate by the difference between Mauritian inflation rates and those of its major trading partners, so that the competitiveness of Mauritian exports was maintained.

Inflation was the principal cause of the need for adjustment in the nominal exchange rate, but devaluation had inflationary effects in Mauritius because of its

dependence on food and other imports. Hence, government policy focused on low inflation in the 1980s. Exchange rate controls were freed in 1984 as a consequence.

Figure 4.1 shows the real effective exchange rate has been depreciating since 1981 with the exception of 1986. The exchange rates that reflected relative inflation and balance of payments trends improved the competitiveness of exports. As a result exports have been growing rapidly since 1983.

Figure 4.1 Nominal and real effective exchange rates and export processing (clothing) exports, 1971-90



Sources: Mauritius Central Statistical Office, *Digest of Industry* (various issues) and International Monetary Fund 'Export Processing Zone for Development: the Mauritian example, Washington, D.C., 1990.

The real lending rate in Mauritius ranged from 10 to 13.5 per cent in 1986. This was higher than in Singapore (8.2 per cent) and the Republic of Korea (9.6 per cent). Lending rates have thus not encouraged the excess use of capital, reflecting the relative scarcity of capital in Mauritius and stimulating employment.

Infrastructure

Low inflation was founded on sound fiscal management. Revenues were raised to enable Mauritius to develop communications, transportation, an efficient harbour, energy supplies and social infrastructure (schools and health services). The attention to infrastructure was part of the favourable environment for exporters.

Provisions of the Export Processing Act

Export Processing Act passed in 1970 signalled the shift from protected import-substitution to export-orientation. An export enterprise certificate, making a firm eligible for the provisions of the Export Processing Act was issued to each firm participating in the program.

The most important provisions of this Act were tariff exemptions on inputs imported for use in exports. The import of inputs into exports free of import duty, that is, at world prices, is essential to offset the cost of protection (Wall 1976 and Spinanger 1984). Such exemptions from import duties are not incentives or subsidies to exports, but critical direct offsets to the cost of protection. In Mauritius they signalled a sharp change in trade policy.

Mauritius provides administrative assistance to ease "red tape" as part of the package promoting exports. Easing bureaucratic procedures offsets the administrative costs and delays created by protectionist policies. In the 1970s "first best" policy would have been to eliminate the bureaucratic impediments created by tariffs, quantitative import restrictions and quotas, but in the absence of such liberalization, administrative assistance was a useful means of reducing costs created by protection. In 1985 quantitative import restrictions and quotas were eliminated, beginning the process of trade liberalization that is required to put exports on a sound basis. To some extent tariff protection was raised to compensate for the removal of quantitative restrictions.

Mauritius was one of the minority of developing countries that had no restriction on foreign ownership of manufacturing. Capital, profits and dividends could be remitted

abroad freely. This created a welcoming environment for foreign investors that was more important than the provision of subsidies to foreign investors.

In addition to the offsets to protection and the creation of a favourable environment for foreign investors, export processing enterprises in Mauritius were, however, also offered fiscal and financial subsidies. The fiscal incentives included twenty years corporate income tax "holidays". Complete exemption of corporate tax for 10 years, 50 per cent exemption from 10-15 years and 25 per cent exemption from 15-20 years were provided. Profits distributed as dividends were not subject to company tax but were taxable as income to the recipients after a 5 year exemption. The tax incentive provision was modified in 1985 for new enterprises and established enterprises were allowed to choose between the old and new provisions. Under the new provisions corporate tax was set at 15 per cent during the life of the enterprise with dividends exempted from income tax for the first 10 years. Industries other than export processing and import-substitution were taxed at 35 per cent.

Mauritius began to recognize that tax exemptions are costly to the host country in terms of foregone revenue. Doubts about the effectiveness of tax "holidays" also began to arise. Practical experience has long suggested that tax exemptions are not effective but mostly redundant (United Nations 1968, Guisinger *et al* 1985 and Hughes 1988). Some investors, for example those from the United States, do not benefit from tax holidays. When profits are repatriated any tax unpaid in a host country because of tax "holidays" has to be paid in the United States so that there is a transfer of revenue from the host to the United States Treasury. In other words, the United States does not practice tax "sparing".

Additional subsidies included reduced rates for water, electricity and buildings for export processing enterprises. Export processing enterprises were charged at a rate of 1.32 rupee and 1.24 rupee (for the first 250,000 KWH) and 1.03 rupee (for additional KWH) per KWH on their electrical power consumption compared to the market rate of rupee 2.26 per KWH. The rate of subsidies on buildings is more complex and not readily

available. The costs and impacts of such subsidies are very complex. On the one hand, infrastructural inputs should be available at world prices. On the other hand, their production should be so efficient that they can be produced at world prices without subsidy. Otherwise they have high social costs. In Mauritius both approaches- a drive for efficiency and subsidies that brought the prices facing exporters to international levels were adopted.

Mauritian firms holding export processing certificates were also granted access to credit from domestic banks at some 3.75 percentage points less than the market rate. Privileged access to credit at subsidized interest rates makes capital artificially cheap in relation to labour. This can lead to excessively capital intensive techniques of production which are not suited to a lower income country's resource endowment. Costs of production are raised and employment is repressed. But as noted above, the real lending rate in Mauritius was relatively high, and the availability of subsidized capital for export processing enterprises was limited to affect the choice of technique and hence capital to labour ratios.

Tariff exemptions on imported inputs, free repatriation of profits and easing "red tape" offset protectionist and related bureaucratic costs, while subsidy payments imposed on the economy were limited, so that they did not create major distortions in the economy.

Labour

Internationally competitive wage and labour costs are important determinants of export competitiveness. High real labour costs lead to capital-intensive production which is not compatible with the resource endowment of countries such as Mauritius. Kearney (1990) noted that labour costs in Mauritian export processing enterprises were substantially lower than in other countries, and remained so until 1988. For example, the labour costs of Mauritius were thought to be only 25 per cent of those of Hong Kong and Singapore in the 1980s (Kearney 1990). To stimulate exports, minimum wages continued to be

lower for export processing enterprises than for other sectors. To reflect the uncertainties in the world market, moreover, labour laws allowed export processing employers greater flexibility than in import-substituting manufacturing in terminating employment (Hein 1988).

Wages in manufacturing in Mauritius have been about 18 per cent of those in Hong Kong, 7 per cent of those in France and 5 per cent of those in West Germany (the home countries of the major investors) (Table 4.1). Although the ratio of Mauritius wages to wages in Hong Kong and France were somewhat higher in clothing than in manufacturing overall, they are still low.

Table 4.1 **Total manufacturing and wearing apparel earnings per hour and index of real earnings in manufactures: selected countries, 1976-85**

	Mauritius	France	Germany	Hong Kong
Earnings per hour (US$)				
Manufactures				
1976	0.22	2.9	4.1	0.7
1980	0.37	5.3	7.3	1.1
1983	0.33	4.4	5.9	1.4
1985	0.28	4.2	5.5	1.6
Wearing apparel				
1976	0.2	2.2	3.1	.7
1980	0.3	4.1	5.4	1.1
1983	0.3	3.4	4.3	1.4
1985	0.3	..	3.9	1.6
Real earnings (index)[a]:				
Manufactures				
1971-75	86.2	81.1	87.7	85.4
1976-81	100.0	100.0	100.0	100.0
1982-86	94.0	108.6	101.7	140.7
1987	115.4	111.2	109.3	163.9

a = Data for wearing apparel are not available.
Sources: ILO, *Statistical Year Book of Labour*, Geneva, 1986 and W. Ginneken, and R. Hoever, 'Industrialization, employment and earnings (1950-87): an international survey', *International Labour Review*, 128:5, 1989.

The rate of increase in real earnings in manufacturing was lower in Mauritius than in Hong Kong, the major investor. However, a low wage rate is not alone sufficient for investment to take place. Other developing countries had even lower wages than Mauritius. Mauritius has a relatively educated labour force, and hence relatively high

productivity. It also has the other aspects of the environment required by foreign investors as indicated above.

The growth of export processing enterprises

Enterprises

Export processing enterprises expanded rapidly, greatly influencing the performance of the Mauritian economy. Nearly 90 enterprises were established by the end of 1977. These enterprises created more than 17,000 jobs, with an average 200 employees per enterprise. Expansion slowed in 1978-82 with the number of enterprises increasing by only 25 to 115 and employment growing only at an average yearly rate of 7 per cent. But between 1983 and 1988 the number of exporting enterprises grew rapidly again, reaching 591 enterprises in 1988. Maximum growth occurred in 1985 when the number of firms increased from 197 to 290 (Table 4.2).

Table 4.2 **Number of export-oriented enterprises by type of product, 1983-88**

	1983	1984	1985	1986	1987	1988
Wearing apparel	64	102	174	276	364	408
Pullovers	27	37	44	53	61	64
Gloves	3	5	5	5	5	5
Under garments	34	60	125	218	298	339
Textiles	8	11	13	18	23	27
Flowers	15	16	19	21	28	28
Other[a]	59	122	84	93	116	128
Total	146	197	290	408	531	591

[a] Includes leather products, wood and furniture, optical goods, watches and clocks, jewellery, toys etc.
Source: World Bank, *Mauritius: managing success*, Washington, D.C., 1989a.

Domestic and foreign investment

Investment in export processing did not speed up until the mid 1980s when the policy reforms undertaken in the early 1980s were coupled with world economic recovery and market growth.

Table 4.3 **Total investment in Mauritius, 1982-89**

	Export processing	Other manufacturing	Total manufacturing	Total economy	Share of foreign investment in export processing
		(million rupee)			(per cent)
1982	38	277	315	710	..
1983	74	263	337	840	..
1984	210	293	503	848	26
1985	340	400	740	1105	36
1986	560	510	1070	1435	13
1987	655	805	1460	1885	28
1988	810	855	1685	2300	28
1989	845	..	..	..	35

Sources: World Bank, *Mauritius: managing success*, 1989a; and International Monetary Fund, 'Export processing zone for growth and development: the Mauritian example', 1990.

Although export processing enterprises attracted more foreign investment than the rest of manufacturing, even they have relied mostly on domestic capital. Only about a third of export processing investment came from foreign sources originating in Hong Kong, France, Sweden and Germany. Most, about 60 per cent, of the foreign capital came from Hong Kong.

Movement of capital out of Hong Kong was initially encouraged by rising local labour costs. But Hong Kong also relocated part of its investment in clothing to overcome import restrictions in industrial countries. An effect of the Multifibre Arrangement was thus to encourage relocation of clothing production from Hong Kong to Mauritius. The membership of Mauritius in the Lomé Conventions (known as Yaoundé Accords until 1975) provided duty free access to the EC market. Countries

have free access to the United States market until imports from a particular country in a particular category of clothing reach one per cent of United States production. Few exports of clothing from Mauritius to the United States have reached this limit so that most clothing exports from Mauritius have free access to the United States market.

More recently the prospect of the return of Hong Kong to the People's Republic of China in 1997 has also encouraged the flow of capital out of Hong Kong.

Exports

Between 1970 and 1978 exports by export processing enterprises grew at an average rate of 60 per cent per annum in real terms. They accounted for 25 per cent of total exports in 1978 (Table 4.4). This share peaked in 1986, reaching 70 per cent.

Table 4.4 **Export processing enterprises exports, 1978-90**

	Export processing exports (US$million)	Export processing exports as a share of total exports (per cent)
1978	79	25
1979	98	27
1980	116	29
1981	122	34
1982	114	30
1983	112	33
1984	156	41
1985	212	56
1986	368	70
1987	510	63
1988	609	64
1989	594	59
1990	662	64

Source: International Monetary Fund, 'Export processing zone for growth and development: the Mauritian example', 1990 and International Monetary Fund, *International Financial Statistics*, Washington D.C., 1991.

Clothing accounted for the bulk of exports from export processing enterprises, being 79 per cent between 1985-89 (Table 4.5). For the same period knitwear constituted

the bulk of clothing exports (81 per cent). Specialization in woollen knitwear resulted in Mauritius being ranked as the third largest exporter of woollen knitwear in the world. The share of the other categories has shown little change over the years, except for knitted underwear and women's outwear which increased markedly in 1987.

Table 4.5 **Export processing enterprises exports by category, 1970-89** (US$ million)

	1970-74	1975-79	1980-84	1985-89	Average annual real growth (per cent) 1980-89
Women's outwear not knitted (SITC 84112)	1	6	29	283	46.9
Men's underwear not knitted (SITC 84113)	2	20	51	278	36.0
Underwear knitted non-elastic (SITC 84143)	1	8	14	242	60.4
Outwear knitted non elastic (SITC 84144)	8	131	230	766	12.1
Other	30	178	278	913	..
Total	43	343	602	2482	27.5

Source: International Economic Data Bank, Australian National University, 1991.

Employment

By 1983 the number of employees in export processing enterprises increased to 25,520 and accounted for 67 per cent of total manufacturing employment. The growth during 1983-88 was even higher at 30 per cent per annum with employment in export processing enterprises accounting for 85 per cent of manufacturing employment and 31 per cent of total employment in 1988.

In the early years of the export-oriented policy, unemployment was as high as 21 per cent. By 1987 full employment had been achieved. Export processing enterprises

also created substantial employment through multiplier effects in the informal and service sectors (World Bank 1989a).

Table 4.6 **Growth and structure of employment in export processing enterprises, 1983-88**

	Employment				Average annual growth (1983-88)
	1983		1988		
	Number of workers	Per cent	Number of workers	Per cent	
Textile yarn and fabrics	1366	5.4	3670	4.0	21.8
Wearing apparel	20453	80.1	79317	87.4	31.1
Pullovers	(14454)	56.6	(34152)	37.6	18.8
Gloves	(954)	3.7	(641)	.1	- 7.6
Other garments	(5045)	19.8	(44524)	49.1	54.6
Other products	3701	14.0	7803	8.6	23.2
Total export processing	25520	100	90790	100.0	30.0
Share of export processing enterprises in total manufactures (per cent)	67		85	na	na

Source: A. Jeetun, 'Employment trends and training needs' *Prosi*, No. 244, Port Louis, 1989 (May).

Export processing enterprises and growth of the economy

The performance of the export processing enterprises greatly influenced the performance of the manufacturing sector and the Mauritian economy (Table 4.7).

During the peak growth period of 1984-88, the output of export processing enterprises expanded rapidly at a real growth rate of 30 per cent per year. The corresponding growth rate for manufacturing and the whole economy was 14 per cent and 7.2 per cent respectively (Table 4.7).

Table 4.7 **Real average annual growth of output of manufactures and the economy, 1982-88** (per cent)

	Sugar milling	Export processing	Import substitution	Total manufactures	GDP
1982	19.9	-2.8	5.1	5.2	1.5
1983	-20.0	8.8	4.8	1.0	2.0
1984	-2.4	32.9	4.1	12.2	5.4
1985	20.1	30.0	3.1	15.3	6.8
1986	8.9	32.0	3.3	15.8	8.9
1987	-4.4	22.0	11.4	14.1	8.4
1988	-15.0	20.0	7.0	11.0	6.1
1984-88	1.4	29.9	5.8	13.7	7.2

Sources: Mauritius Central Statistical Office, *Digest of Industrial Statistics*, Port Louis, 1986 and Mauritius Central Statistical Office, *Annual Statistical Yearbook*, Port Louis, 1988.

The contribution of export processing enterprises to economic growth can be estimated by the share of export processing enterprises value added in gross domestic product. Domestic value added is the sum of wages, rents and profits.

Foreign ownership of export processing firms means that domestic value added is somewhat exaggerated because profits are repatriated abroad (International Labour Organization 1988; International Monetary Fund 1990). Repatriated profits, however, are a low proportion of value added, particularly in Mauritius where the bulk of export processing is domestically owned.

Table 4.8 **Export processing enterprises value added, 1980-89**

Export processing enterprises			Share of value added by export processing enterprises in:			
	Gross domestic value added	Gross national value added	Export processing enterprises output		GDP	
			domestic gross value added	national gross value added	domestic gross value added	national gross value added
	(rupee million)		(per cent)			
1980	321	261	36	21	04	03
1981	421	338	39	31	05	04
1982	449	365	36	30	04	03
1983	548	443	42	34	04	03
1984	865	696	40	32	06	05
1985	1332	1081	41	33	09	07
1986	1900	1567	38	32	11	09
1987	2585	2116	39	32	12	10
1988	3125	2542	38	31	12	10
1989	3150	2663	35	29	11	09

Source: International Monetary Fund, 'Export Processing Zone for growth and development: the Mauritian example', 1990, Washington, D.C.

National value added, which excludes repatriated profits, provides a better estimate of the contribution of export processing enterprises to growth. As data on repatriated profits are unavailable, national value added was obtained by deducting profits accruing to foreign investors from the domestic value added. This measure of national value added understates the contribution of export processing enterprises to growth to the extent that profits of foreign owned firms are reinvested in Mauritius. Hence, the true contribution of export processing enterprises to growth lies between the two estimates.

In 1980-89 the share of domestic value added of export processing enterprises to its output was 38 per cent (Table 4.8). This ratio indicates that on the average, 38 per cent of export processing enterprises gross output is paid to factors of production in the form of

wages, rents, interest and profits. Export processing enterprises value added contributed between 3 and 5 per cent to GDP in the early 1980s. The contribution reached 12 per cent in the late 1980s (Table 4.8).

The share of value added in sugar processing halved in less than the decade ending in 1987. The share of value added in import-substitution declined almost as rapidly. The decline was taken up by value added in export processing. Export processing enterprises nearly tripled their share in value added, accounting for more than half of the manufacturing value added in the second half of the 1980s (Table 4.9). In spite of the rapid advance made in export processing enterprises value added share of manufacturing, however, the value added of sugar and import-substituting industries was growing in absolute terms during this period.

Table 4.9 **Value added in manufacturing by principal category, 1977-87**
(percentage share)

	Sugar milling	Tea processing	Export processing	Import substitution	Small establ-ishments	Total manu-facturing
1977	30	.	19	42	10	100
1982	20	1	29	42	9	100
1983	16	2	33	40	9	100
1984	15	4	40	33	8	100
1985	15	2	47	29	7	100
1986	16	1	50	26	7	100
1987	15	1	53	24	..	100

Sources: Mauritius Central Statistical Office, *Biannual Digest of Statistics*, Port Louis, 1983; Mauritius Central Statistical Office, *Digest of Industrial Statistics*, Port Louis, 1986 and Mauritius Central Statistical Office, *Annual Statistical Year-book*, Port Louis, 1988.

The clothing industry

The bulk of export processing was in clothing which has increased its share of employment, output and exports until it has become the single most important industry in Mauritius (Table 4.10). As clothing is labour-intensive it has become the major employer in Mauritius, accounting for 76 per cent of manufacturing employment and 30 per cent of total employment in 1988 (Table 4.10).

The clothing industry's contribution to exports is equally impressive. In 1988 clothing exports accounted for 78 per cent of manufacturing exports and 46 per cent of total exports.

Table 4.10 **Contribution of clothing to the Mauritian economy, 1976-88**

	1976	1983	1988
GDP at factor cost (million rupee)	4165	10613	22643
Manufacturing	669	1678	5593
Export processing enterprises	108	548	3125
Clothing	72	389	2440
Exports (million rupee)	1769	4346	13505
Manufacturing	353	1202	8318
Export processing enterprises	309	1307	8176
Clothing	205	928	6446
Employment ('000)	185	195	270
Manufacturing	28	37	106
Export processing enterprises	17	25	89
Clothing	10	21	80

Source: Mauritius Statistical Office, *Digest of Statistical Yearbook*, Port Louis, various issues and R. Alter, 'Export Processing Zones for Growth and Development: the Mauritian example', IMF Working Paper, International Monetary Fund, Washington, D.C., 1990.

Estimation of domestic factors affecting clothing exports

A partial equilibrium analysis was carried out to test the importance of various domestic factors to the export growth of labour-intensive manufactures. As the exports are predominantly clothing the impact of the domestic factors on clothing exports is analyzed for the period 1971-90. The estimation model is set out as follows:

$$\ln X_t = a \ln RE_t + b \ln RI_t + c \ln W_t + d \ln T_t + U_t \qquad 4.1$$

where:

X = real exports;
RE= real exchange rate;
RI = real lending rate;
W = real wage rate;
T = value of tariffs exemption on material inputs and
U = error term.

The equation evaluates supply side determinants of clothing exports. Mauritius is a small supplier of clothing to the world market. It faces a perfectly elastic demand. As its export growth is not yet constrained by demand conditions, supply factors only were examined in this test.

The above equation is a very partial representation of the supply situation. It does not include political stability, the relatively well developed and competitively priced infrastructure and openness toward private direct foreign investment. The main objective was to test the importance of the effect of the exemptions from tariffs on inputs and macroeconomic stability (real exchange rate, real interest rate and relatively stable prices and hence wages) on the growth of clothing exports.

Data sources

Except for the value of tariff exemptions, the rest of the data were obtained from published sources. The concessional real lending rate of interest available to export processing enterprises was used. For instance, in 1986 the concessional credit interest rate was on the average 3.75 percentage points lower than the market rate.

The value of tariff exemptions to the clothing industry was estimated by multiplying the value of imports by the prevailing tariff rate to other users (import-substituting industries). Material and capital imports were distinguished (Forget and Corson 1983 and International Monetary Fund 1990). Only tariff exemptions on material inputs were considered since capital goods imports were free of tariff for all enterprises (including import-substituting ones). As a very large proportion of material imports (about 80 per cent) were textiles (yarn and cloth), the tariff rate of textiles was applied

for all material inputs of clothing. Tariff rates estimates by Greenaway and Milner (1987) for 1980 (45 per cent) were applied to 1971-84. This should not bias the estimation greatly as there were no changes in the tariff system until the mid-1980s. For years since 1985 estimates from this study are used (53 per cent).

Duty free imports of material inputs to clothing exports raise the competitiveness of the industry by offsetting the direct costs imposed by protection. The clothing industry saves about 50 per cent on imported input costs due to the duty free provision (see Table 9.1 and 9.3).

Results

The results were as follows:

$$\ln X_t = \underset{(1.45)}{-.09 \ln RE_t} + \underset{(0.62)}{.05 \ln RI_t} - \underset{(2.77)}{.39 \ln W_t} + \underset{(7.7)}{.54 \ln T_t} \qquad 4.2$$

adjusted R^2 = 0.66
Durbin-Watson (DW) = 1.90
F (3, 16) =13.6
Figures in brackets are t statistics

The equation was tested for mis-specification of the functional form, serial correlation and heteroscedasticity as these may have caused problems.

The Ramesy RESET test of functional form which uses the square of fitted values as an additional regressor indicated that the functional form is not mis-specified. The test for heteroscedasticity, based on the regression of squared residuals on squared fitted values, also suggested that there was no problem of heteroscedasticity.

As the equation used time series data, the regression was tested for serial correlation. A Durbin-Watson statistic of 0.72 showed a high level of serial correlation. The serial correlation was corrected using the Gauss-Newton iterative method. After the correction the estimates of the coefficients took on the expected signs with the exception of the interest rate and the Durbin-Watson statistic increased to 1.90 (Equation 4.2). The interest rate coefficient was not statistically different from zero.

The coefficients appear to be of reasonable magnitudes. Conventional diagnostic statistical tests as outlined in Beggs (1988) were applied to test the adequacy of the model in explaining clothing exports. The t-tests on each of the variables indicated that the tariff exemption on material inputs was highly significant at the 1 per cent level, the wage rate at 2.5 per cent level and the exchange rate at 10 per cent level respectively. The adjusted coefficient of multiple determination (adjusted $R^{2)}$ with the value of 0.66 suggests that the equation has a moderately high explanatory power. The calculated F-statistic of 14.2 exceeds the critical F-statistic value (with 3 and 16 degrees of freedoms) of 5.1 at the one per cent level of significance. This result indicates that all the coefficients are not equal to zero.

The Chow test has been performed to test for structural stability. A test of structural change was applied to the periods 1971-80 and 1981-90. The periods were divided in this way because domestic policy changes to restructure the Mauritian economy occurred around 1981.

The calculated Chow-statistic of 0.33, is lower than the critical Chow-statistic of 5.26. Therefore the hypothesis of no structural change between the two periods is not rejected. A structural shift in the equation is not required.

The statistical results suggest that the export performance of the clothing industry was highly influenced by the tariff exemptions. Real wages also have a high level of significance and large magnitude. The devaluation of the real exchange rate also contributed to exports, although to a smaller extent. This is not surprising as the exchange rate was not highly distorted before the 1980s. As expected the cost of capital (interest rate) was not found to be an important factor in determining export performance.

External factors that have influenced clothing export growth are analyzed using a general equilibrium model approach in Chapter 8.

Welfare effects of export processing enterprises

The benefits derived from the establishment of the export processing enterprises are not costless since there is an opportunity cost of allocating resources to other uses. Hence, a country's welfare is raised only if the social benefit outweighs the social cost. The welfare effects of export processing zones are theoretically indeterminate and must be left to empirical testing (Grubel 1982). One cannot establish theoretically whether export processing zones are welfare-reducing or welfare-raising for the countries establishing them. The welfare impact of export processing zones is only to be based on empirical findings. Empirical studies of export processing zones in developing countries (Warr 1983, 1987; Spinanger 1984) indicate that net benefits vary. While export processing zones in Masan in the Republic of Korea (Warr 1983), Malaysia, Singapore, and Taiwan (Spinanger 1984) have positive net benefits, those in Jakarta in Indonesia (Warr 1983) and in Bataan in Philippines (Warr 1987) and Spinanger (1984) have made little contribution to the economy. The outcomes depends on the policy, investment and administrative measures used to establish and maintain the zones.

Measuring costs and benefits of export processing enterprises

The welfare gain to the economy from the presence of the export processing enterprises can be estimated by applying cost-benefit analysis. The net gain to the economy from export processing enterprises can be estimated using the net present value of the social benefits, that is, net social benefits over the life-time of the enterprises discounted by an appropriate discount rate. An appropriate discount rate is the value of capital to the economy; it can be approximated by prices charged for capital in an undistorted, competitive market. In geographically specific export processing zones, the physical investment required and used only by the enterprises in the zones is generally high. Such a cost was not entailed in Mauritius.

Export processing enterprises make payments to cover costs such as wage bills, purchases of raw materials, taxes and service bills. The Mauritian economy gains if the

alternative use of these resources elsewhere in the economy is lower than in the export processing enterprises.

The net economic benefit (N_t) to Mauritian economy from export processing enterprises is formulated as:

$$N_t = (L_tW_t + M_tPM_t + E_tPE_t + R_t + T_t + P_t)\, SF_t^* - (L_tW_t^* + M_tPM_t^* + E_tPE_t^* + B_tSK_t^*) - A_t - K_t \qquad 4.3$$

where:

L_t employment in year t;
W_t wage paid in year t;
M_t domestic raw material used in year t;
PM_t the price paid for raw material in year t;
E_t utilities such as electricity usage in year t;
PE_t price paid for utilities in year t;
R_t interest and principal repayments of domestic loans in year t;
T_t tax paid in year t;
P_t profit of national (Mauritian) investors in year t;
SF_t^* the ratio of the social value of foreign exchange to the official exchange rate in year t;
W_t^* shadow price of labour in year t;
PM_t^* the shadow price of domestic raw material in year t;
PE_t^* the shadow price of utilities in year t;
B_t domestic borrowing in year t;
SK_t^* the ratio of the shadow price of capital to its market price in year t;
A_t administrative costs of the zone in year t and
K_t the cost of infrastructure of the export processing zone provided by the government in year t.

Equation 4.3 is adopted from Warr (1990). It is modified to include the profit on national investors (P_t). National investors' profit is included in this study because local ownership of export processing enterprises in Mauritius is substantial. In the actual estimation A_t and K_t are not included for lack of data despite two field trips to Mauritius. As a result, the net benefit will be overestimated by the amount of A_t and K_t. The

overestimation, however, would not be substantial as these costs are considered not to be large.

To ease bureaucratic interference export processing enterprises are administered separately from the rest of the economy. The opportunity cost of personnel employed to run the separate administration and running costs make up the administrative cost of the export processing enterprises.

As this information is not available the administrative cost of export processing enterprises was not accounted for. As export processing enterprises are not located in a particular zone it is unlikely that large infrastructure costs are incurred to service only the export processing zone enterprises. Some factory buildings were constructed at Port Louis by the government at the early stage of establishment of export processing enterprises. Data on costs of construction are not available. It is assumed that construction costs are equal to the discounted value of commercial rents over the life of the building. The construction of the buildings incur social cost if they are rented below commercial rent. That means the social cost equals the rental subsidy. Since it was not possible to find the rental price of these buildings the infrastructure cost is omitted from the analysis.

In calculating the cost-benefit a life of 25 years is taken for the export processing enterprises, 1976-2000.

Shadow prices

The outcome of the estimates of the net gain is influenced considerably by the ratio of shadow prices to market prices. Unlike Warr (1990) where market and shadow prices were assumed to remain constant overtime they are allowed to vary over the period 1976-87 in this study (Table 4.11). The shadow prices vary over the period 1976-87, where applicable, because they are based on historical data.

Foreign exchange. Exchange earnings represent a social gain from export processing enterprises when the exchange rate is overvalued. Since 1981 the exchange

rate regime has largely been liberalized. The shadow price of foreign exchange was hence taken to be equal to the official rate. Before 1981 due to overvaluation of the rupee, the shadow prices of foreign exchange received by the Central Bank exceeded the value of the Mauritian rupee received by enterprises at official rates. Shadow rates were calculated on the basis of successive devaluations made through time to bring the rupee to its present liberalized rate. The rupee was devalued in 1979 and 1981. Two different shadow prices, one before 1979 and another for 1979-80 were estimated relative to the rate in 1981. For instance, in 1981 the rupee was devalued by 23 per cent to get it to its current liberalized rate. Therefore, the shadow price was set at 1.23 for 1979-80 (Table 4.11).

Labour. Employment generation is perceived as one of the major gains in establishing export processing enterprises because the opportunity cost of workers is viewed as being below the actually received wage. The calculation of the opportunity cost of employment is, however, not straight forward. Scott (1976) estimated the social opportunity cost of 'surplus' labour as 40 per cent of the market wage rate for male and 50 per cent for female workers for 1971. He also estimated that the opportunity cost of fully employed worker to be 80 per cent of the market wage.

This study uses Scott's estimates as its basis and allows them to vary with the rate of employment in different years: the higher the rate of employment, the higher the opportunity cost of labour. For instance, in the late 1980s when near full employment was achieved the shadow price of labour was taken to be 80 per cent of wages. Shadow prices were set lower in times of high unemployment. When there was a low employment level in the mid-1970s the shadow price of labour was set at 54 per cent of wages.

Table 4.11 **Estimated ratios of shadow prices to market prices, 1976-2000** (per cent)

	Labour	Local material	Electricity	Domestic loan	Foreign exchange
1976	0.54	0.70	1.04	1.32	1.32
1977	0.54	0.70	1.04	1.32	1.32
1978	0.64	0.70	1.04	1.32	1.32
1979	0.69	0.70	1.04	1.32	1.23
1980	0.74	0.70	1.04	1.32	1.23
1981	0.69	0.70	1.04	1.32	1.00
1982	0.64	0.70	1.04	1.32	1.00
1983	0.54	0.70	1.82	1.32	1.00
1984	0.59	0.70	1.82	1.32	1.00
1985	0.66	0.70	1.82	1.32	1.00
1986	0.77	0.80	1.82	1.32	1.00
1987	0.80	0.80	1.82	1.32	1.00
1988	0.80	0.80	1.82	1.32	1.00
1989	0.80	0.80	1.82	1.32	1.00
1990	0.80	0.80	1.82	1.32	1.00
1991	0.80	0.80	1.82	1.32	1.00
1992	0.80	0.80	1.82	1.32	1.00
1993	0.80	0.80	1.82	1.32	1.00
1994	0.80	0.80	1.82	1.32	1.00
1995	0.80	0.80	1.82	1.32	1.00
1996	0.80	0.80	1.82	1.32	1.00
1997	0.80	0.80	1.82	1.32	1.00
1998	0.80	0.80	1.82	1.32	1.00
1999	0.80	0.80	1.82	1.32	1.00
2000	0.80	0.80	1.82	1.32	1.00

Note: Ratios between 1988 and 2000 are set at the same rate as 1987.

Domestic material inputs. Usage of domestic material was negligible. The opportunity cost of domestic material inputs used by export processing enterprises was taken as the price of similar imported goods (c.i.f. price). The opportunity cost c.i.f import price is lower than the market price by the amount of duty. The use of domestic material inputs in the export processing enterprises has, thus, a welfare gain.

Domestic loans. Export processing enterprises loans accounted for 27 per cent of commercial banks lending in 1989. Export processing enterprises are given a subsidy on loans from domestic sources. They are charged a lower rate of interest than the market rate. Assuming that there are no significant distortions in the non-concessional rate, the non-concessional rate closely reflects the opportunity cost of capital. The opportunity cost of domestic finance is higher than its market prices in export processing enterprises.

The use of domestic finance in export processing enterprises has, thus, a welfare loss to the Mauritian economy.

Electricity. Export processing enterprises are given concessions on their electricity rates. Assuming that the non-concessional rate approximates the opportunity cost of electricity the actually paid electricity bill is lower than its opportunity cost by the value of the concession. Electricity use in the export processing enterprises has a negative welfare effect similar to the use of domestic finance.

Net gain

The welfare impact of export processing enterprises is presented in Table 4.12. All columns, except the last, represent two components:

i) The difference between the value of the factor at market price and at shadow price. A positive value indicates a welfare gain because the use of the factor in the export processing enterprises at market prices has a higher value than when that factor is valued at its shadow price. A negative value indicates a welfare loss for the same reasoning.

ii) A gain from exchange earnings. Export processing enterprises need to convert foreign exchange earnings into Mauritian rupees to employ local workers, to pay off domestic loans, to purchase domestic raw materials and services from the domestic economy. An overvalued currency means that foreign exchange received by the Central Bank is higher in rupee terms than the enterprises are given in exchange. The gain from exchange earnings because of the use of these factors is obtained by multiplying the difference between the social value of foreign exchange and the official exchange rate by the market value of the factors.

Table 4.12 **Welfare impact of export processing enterprises: net present value, 1976-2000** (million rupee)

	Net discounted values					
	Employment	local material	Electricity	tax revenue	Domestic loan	Profits
1976	70.0	2.5	1.0	-	0.1	17.6
1977	81.7	2.9	1.2	-	0.1	20.5
1978	66.1	2.7	1.1	-	0.1	19.1
1979	56.5	2.5	0.8	-	-14.8	19.0
1980	61.7	3.0	0.9	-	-13.9	22.9
1981	40.0	1.7	-0.2	-	-46.7	18.8
1982	43.1	1.6	-0.2	-	-46.7	17.8
1983	50.4	1.5	-3.5	-	-52.3	16.3
1984	74.1	2.5	-5.9	-	-68.8	17.9
1985	80.0	3.2	-7.7	11.2	-76.5	23.2
1986	70.0	2.8	-9.9	14.5	-85.0	26.2
1987	81.0	3.7	-13.1	19.2	-103.6	34.6
1988	72.9	3.3	-11.8	17.3	-93.3	31.2
1989	65.7	3.0	-10.6	15.6	-84.0	28.1
1990	59.1	2.7	-9.6	14.0	-75.6	25.3
1991	53.2	2.4	-8.6	12.6	-68.1	22.8
1992	47.9	2.2	-7.8	10.4	-61.3	20.5
1993	43.2	2.0	-7.0	10.2	-55.2	18.4
1994	38.9	1.8	-6.3	9.2	-49.7	16.6
1995	35.0	1.6	-5.7	8.3	-44.8	15.0
1996	31.5	1.4	-5.1	7.5	-40.3	13.5
1997	28.4	1.3	-4.6	6.7	-36.3	12.1
1998	25.5	1.2	-4.1	6.0	-32.7	10.9
1999	23.0	1.0	-3.7	5.5	-29.4	9.8
2000	20.7	0.9	-3.3	4.9	-26.5	8.8
NPV	1319.1	55.2	-123.9	174.4	-1205.3	487.0

Further, locally owned enterprises earn foreign exchange to the domestic economy through their profits (Table 4.12, column 6). It is assumed that Mauritian nationals earn profits in proportion to their equity capital. Substantial part of the equity capital (47 per cent between 1976 and 1983, 31 per cent between 1983 and 1985 and 27 per cent between 1984 and 1985 (Lamusse 1989)) in the export processing enterprises were owned by local entrepreneurs. Therefore, exchange earnings on profits are obtained by multiplying the profits accruing to local owners by the ratio of the social value of foreign exchange to the official exchange rate.

The entries in each of the 6 columns are obtained by discounting back the net economies' gain or loss resulting from the export processing enterprises. The market interest rate is used as nominal discount rate. The market interest rate varied between

15.5 and 20 per cent. Nominal rather than real discount rates are applied because the costs and benefits of each year are at current rather than at constant prices.

The tax revenue column in Table 4.12 is zero until 1985 because export processing enterprises did not pay tax before 1985. Until the mid-1980s export processing enterprises were exempted from corporate income tax for ten to twenty years. Since 1985 they have paid 15 per cent income tax throughout their productive life. As more than 90 per cent of the 563 companies operating in 1989 started operations after 1974, corporate income tax in this exercise is calculated from 1985. Corporate income is estimated from the tax rate and the share of gross operating surplus in output in the 1987 input-output table. As there are no data on the breakdown of gross operating surplus it was divided between profits and returns to capital by a two to one ratio.

The presence of export processing enterprises resulted in a net gain to the economy. There was a small net gain from the use of domestic material inputs. The largest net gain to the economy came from foreign exchange earnings followed by employment generation and eventually by tax receipts. The net present value (NPV) row represents the column sums over the years 1976-2000. The overall effect is estimated to be a net gain of 706 million rupees.

5

Measurement of assistance to Mauritian industries: methodology

Trade protection and assistance, including tariffs, import quotas and subsidies influence a country's industrial characteristics by providing advantages to some industries at a cost to others. This chapter develops an analytical framework which is then applied to examining the effects of government intervention on Mauritian industries in Chapter 9. Nominal and effective protection analysis is applied to measure border interventions. The measurement of protection is then extended to the measurement of forms of assistance that include non-border intervention.

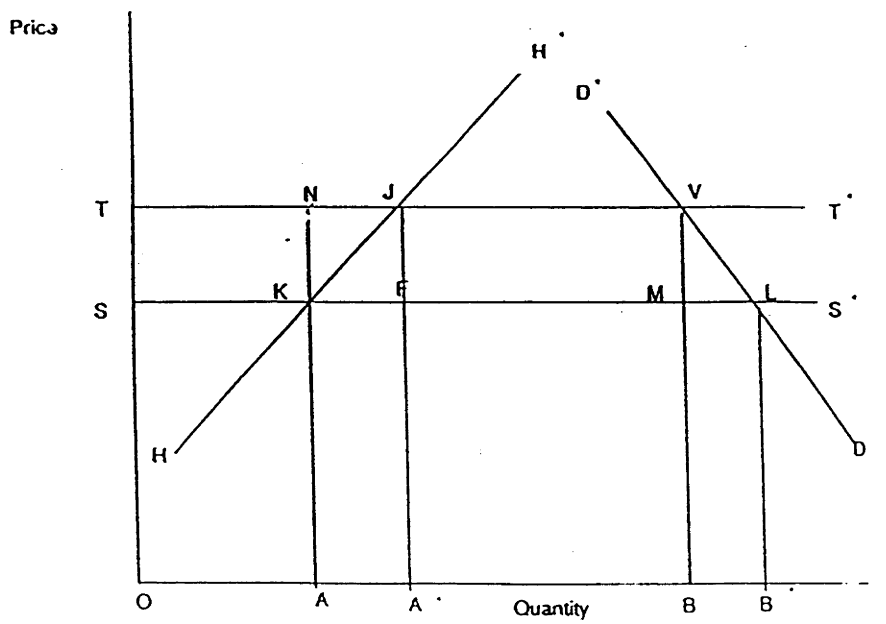
As noted manufacturing enterprises in Mauritius fall into two major groups; export promoting and import substituting. Export promoting (export processing) enterprises function in a competitive international environment whereas import substituting (non-export processing) enterprises enjoy a protected domestic environment. Protection also affects other economic activities by creating biases against them.

As export processing and non-export processing enterprises may belong to the same industry, estimation of the assistance level for the whole industry would be an average for the industry. To show the disparities in the protection levels between export processing and non-export processing enterprises within an industry, the two sets of enterprises are treated separately in the estimation procedure.

The theory of protection

The theory of protection explains the relationships between protection and consumption, production, international trade and income transfers (Figure 5.1). The domestic aggregate demand and domestic supply curves are represented by DD' and HH', respectively. SS' represents a perfectly elastic world supply curve. The price of imports is not affected by domestic demand, but determined by world prices at the level OS. If free trade prevails OB' is demanded, OA is supplied from domestic sources and AB' from imports. The effect of an ad valorem tariff (ST) is to raise the price of an imported commodity from OS to OT. Assuming imported and domestically produced commodities are perfect substitutes for each other, the tariff also raises the price received by domestic producers and paid by domestic consumers by the rate ST/OS. The increase in price encourages producers to raise output by AA', and consumers to reduce consumption by B'B. The tariff also restricts imports from AB' to A'B.

Figure 5.1 **Production, consumption, international trade and income transfer effects of a tariff**



Source: W. Corden, *The Theory of Protection*, Oxford University Press, London, 1971, p 6.

In addition, tariffs redistribute income from consumers to government and producers. Because of the tariff there is a consumer surplus loss of STVL. Part of the loss, FJVM, is transferred to government in the form of tariff revenue while, STJK, goes to producers in the form of higher revenue. The rest is a net loss to the economy (welfare loss). There is an efficiency loss in production (KJF) due to a misallocation of resources through de-specialization, and a welfare loss in consumption (MVL) due to the higher domestic price charged for the commodity and corresponding reduced consumption.

Since the price to domestic producers has risen at the expense of consumers (either final consumers or industrial users) the consumer is subsidizing the output of domestic product. This is the subsidy equivalent of the tariffs (STJF). If the purpose of the tariff is to assist production, a direct government subsidy of the amount STJF would have resulted in the same level of protection. But, unlike the tariff, the subsidy would not raise the price faced by consumers and would not have an effect on consumption.

Quotas and import licences also have a tariff equivalent. By restricting the quantity supplied they raise prices and have all the subsequent effects of a price rise that apply for tariffs.

Assumptions made in measuring protection

Input-output coefficients are assumed fixed. This precludes any material input substitution effects resulting from relative price changes that follow from protection. However, there is substitution among primary inputs of labour and capital.

Traded goods are assumed to be homogeneous, that is, there is perfect substitution between imports and domestically produced importable goods.

The small country assumption implies infinite elasticity of supply of imports. Under this assumption the prices of imports and import substitutes are not affected by domestic demand, but determined by world prices plus the price raising effect of protective measures.

The protective measures are not prohibitive; trade continues after protection.

Nominal protection

The nominal rate of protection (NRP) is the percentage change in gross returns per unit of output relative to the free trade situation.

$$t_j = (P'_j - P_j) * 100 / P_j \qquad j = 1....m \qquad 5.1$$

where:

t_j = the nominal rate of protection on output j;

P'_j = value of output of commodity j after protection;

P_j = value of output of commodity j before protection.

The nominal rate of protection is sometimes referred to as the price raising effect of the tariff, because it measures the proportional price increase due to a tariff. The nominal rate of protection indicates the potential distortion in consumption arising from the tariff, but, not the potential distortion in production.

The nominal rate of protection does not indicate the production effects of the tariff because production decisions are influenced by both the price of the final product and the cost of production. The revenue increase for an industry's output due to a tariff, could be offset by higher costs of production if the industry uses inputs facing high tariffs. While tariffs assist the local manufacturers of an import-competing commodity, by enabling them to raise the price of the commodity, it is a form of tax to the users of

the commodity. Therefore tariffs on inputs constitute an implicit production tax on the using industries.

As the nominal rate of protection does not take into account the taxing effect of tariffs on inputs, it is not a good indicator of the degree of protection enjoyed by an industry. To measure the full effect of tariff protection on industries, changes in input costs due to tariffs have to be included.

The tax effect of the tariff on an industry's inputs is derived in the same manner as the nominal rate of protection on output. The nominal rate of tax on inputs to industry j (t'_j) is the percentage change in the average value of inputs:

$$t'_j = \sum (P'_{ij} - P_{ij}) * 100 / \sum_i P_{ij} \qquad i = 1....m;\ j = 1....m \qquad 5.2$$

where:

t'_j = the nominal rate of input protection;

P'_{ij} = value of input i used in producing output j after protection;

P_{ij} = value of input i used in the production of output j before protection.

Effective protection

Effective protection considers the effect of tariffs on both output and inputs. The theory of the effective rate of protection (ERP) deals with measurement of protection on value added. Pioneering work has been done in this area by Barber (1955), Humphrey (1962), Johnson (1965), Balassa (1965) and Corden (1966a, 1966b). Since then, an extensive literature regarding the theory and empirical estimation of effective protection has developed; Corden (1969, 1971), Finger (1969), Johnson (1969), Balassa (1971), Grubel and Johnson (1971), Grubel and Lloyd (1971), Jones (1971), Gamir (1971), Ray (1973), Hamilton (1984), Greenaway (1988) and Greenaway and Milner (1989).

Many countries calculate effective protection and assistance for their industries. The Australian Industry Commission produces estimates of effective rates of protection and assistance for most Australian industries (Industries Assistance Commission 1987 and 1988).

Effective protection measures the net protection to value added in production, including the cost of protection on inputs in production as well as outputs. It is this impact of the protection structure on value added which affects the allocation of resources in production. The calculation of the effective rate of protection takes into account the nominal rate of protection on output, the nominal rate of protection on the various inputs, and the share of each input in the cost of producing the final product.

The effective rates of protection standard formula is:

$$H_j = \frac{t_j - \sum_i a_{ij} t'_j}{1 - \sum_i a_{ij}} \qquad 5.3$$

where:

H_j = effective rate of protection;

a_{ij} = share of commodity i in total cost of producing commodity j;

t_j = tariff rate on commodity j;

t'_j = average tariff rate on the various inputs used in producing commodity j.

The effective rate of protection calculation in equation (5.3) uses input-output data. Alternatively effective rate of protection can be estimated using value added as in equation (5.4).

$$H_j = V'_j - V_j / V_j \qquad 5.4$$

where:

V'_j = value added after protection and

V_j = value added before protection, also defined as

$$V'_j = P'_j - \sum_i P_{ij} \qquad 5.5$$

$$V_j = P_j - \sum_i P_{ij} \qquad 5.6$$

Equations 5.5 and 5.6 can be written per unit of output:

$$V'_j = (1 + t_j) - \sum_i a_{ij} (1+t'_j) \qquad 5.7$$

$$V_j = (1-\sum_i a_{ij}) \qquad 5.8$$

Substituting equations 5.7 and 5.8 in equation 5.4 will give equation 5.3.

The effective rate of protection indicates the incentive for resources to relocate in the industries where they obtain the highest return. High levels of effective protection encourage movement of resources into an industry even if the resources could have been utilized more efficiently in less protected industries.

The effective rate of protection is only a relative measure. It indicates that if industry A has a higher effective rate of protection than industry B, resources tend to shift to industry A. For this reason the effective rate of protection is considered as a measure of "resource pull" (Corden 1971).

Effective assistance

The concept of protection can be extended to include the effects of other governmental non-border interventions such as taxes and subsidies. The effective rate of non-tariff assistance can be derived in the same way as the effective rate of tariff protection:

$$K_j = \frac{S_j - \sum_i a_{ij} S'_j + r_j}{1 - \sum_i a_{ij}} \qquad 5.9$$

where:

K_j = effective rate of non-tariff assistance on output j;

S_j = average rate of subsidies less taxes on output j;

S'_j = average rate of taxes less subsidies on the various inputs, in producing output j;

r_j = direct assistance to value adding factors as a proportion of unassisted value of output j.

The combined effect of tariff protection (equation 5.3) and non-tariff assistance (equation 5.9) gives the total assistance accorded to an activity. The proportionate change in returns per unit of output to an activity's value adding factors due to the entire assistance structure is given as:

$$G_j = \frac{t_j + S_j + r_j - \sum_i a_{ij} (t'_j + S'_j)}{1 - \sum_i a_{ij}} \qquad 5.10$$

where G_j is the effective rate of overall assistance.

The discussion so far assumes there are only importable commodities. Theoretical problems arise in dealing with non-traded goods and exportables.

Non-traded goods

A theoretical problem arises when non-traded goods are intermediate inputs into tradable inputs. As no protection is levied directly on non-traded inputs, protection would not have direct effects on the cost of non-tradables. However, protection can

indirectly increase non-tradable prices in two ways. First, this increase comes through the use of protected tradable inputs in the production of the non-tradable inputs. The effect of protection on non-tradable inputs through indirect traded material inputs in producing commodity j is:

$$\sum_k \sum_i a_{kj} a_{ik} (1 + t_k) \qquad 5.11$$

where:

a_{kj} = input coefficient of non-traded inputs k, which are used in industry j;

a_{ik} = input coefficients of traded material inputs in the production of the non-traded input k;

t_k = the tariff rate on indirect traded material inputs.

Second, if protection is given to a commodity it increases the demand for the commodity's inputs (both traded and non-traded). The increase in demand for tradable inputs is satisfied from external supplies and therefore does not affect prices because of the small country assumption. But a rise in demand for non-tradable inputs may or may not increase their prices depending on the assumption of the elasticity of supply of non-tradable inputs.

Balassa's method (1965) assumes that the supply curve of non-traded inputs is perfectly elastic so they can be treated like traded inputs. A perfectly elastic supply implies that, when demand for these inputs increases in the production of a protected commodity, the price of the non-traded inputs remain unchanged. Hence, protection of a traded commodity would not have indirect effects on the price of non-traded inputs.

The value added per unit of output of commodity j for Balassa's method before and after protection are given in equations 5.12 and 5.13, respectively:

$$V_j^B = 1 - (\sum_i a_{ij} + \sum_k a_{kj}) \qquad 5.12$$

$$V_j^{'B} = (1 + t_j) - [\sum_i a_{ij} (1 + t_j') + \sum_k \sum_i a_{kj} a_{ik} (1 + t_k) + \sum_k \sum_r a_{kj} a_{rk}] \qquad 5.13$$

where a_{rk} is value added coefficient in the production of the non-traded input k.

Therefore, Balassa calculates the value added of the protected industry by subtracting both the tradable and non-tradable inputs from output.

Corden's method assumes a less than perfectly elastic supply of non-tradable inputs (Corden 1971). Under this assumption, the increase in demand for non-tradable inputs raises their prices. Therefore, protection of a commodity indirectly protects industries producing non-tradable inputs used in the protected industry. Accordingly, Corden estimates value added of the protected industry by subtracting the tradable input and the indirect tradable input component of the non-tradable inputs. Corden's value added before and after protection are presented in equations 5.14 and 5.15, respectively:

$$V_j^C = 1 - (\sum_i a_{ij} + \sum_k \sum_i a_{kj} a_{ik}) \qquad 5.14$$

$$V_j^{'C} = (1 + t_j) - [(\sum_i a_{ij} (1+t_j') + \sum_k \sum_i a_{kj} a_{ik} (1+t_k)] \qquad 5.15$$

By doing so, Corden lumps together the value added of the protected industry and that of the non-traded input:

$$V_j^C = V_j^B + \sum_k \sum_r a_{kj} a_{rk} \qquad 5.16$$

where the non-traded input coefficient can be split into material input and value added coefficients:

$$\sum_k a_{kj} = \sum_k \sum_i a_{kj} a_{ik} + \sum_k \sum_r a_{kj} a_{rk} \qquad 5.17$$

As Corden's method takes into account changes in value added of both tradable and non-tradable goods, it may be regarded as measuring the overall "domestic resource cost".

Measurement of effective rate of protection: the Balassa and Corden methods

The effective rate of protection for Balassa's method is obtained by substituting 5.12 and 5.13 in equation 5.4

$$H_j^B = \frac{(1+t_j) - [\sum_i a_{ij}(1+t'_j) + \sum_k \sum_i a_{kj} a_{ik}(1+t_k) + \sum_k \sum_r a_{kj} a_{rk}] - (1-(\sum_i a_{ij} + \sum_k a_{kj}))}{1-(\sum_i a_{ij} + \sum_k a_{kj})} \qquad 5.18$$

$$= \frac{t_j - (\sum_i a_{ij} t'_j + \sum_k \sum_i a_{kj} a_{ik} t_k)}{1 - (\sum_i a_{ij} + \sum_k a_{kj})} \qquad 5.19$$

Similarly, substituting 5.14 and 5.15 in 5.4 gives Corden ERP (H^C_j).

$$H_j^C = \frac{(1+t_j) - [\sum_i a_{ij}(1+t'_j) + \sum_k \sum_i a_{kj} a_{ik}(1+t_k)] - (1-(\sum_i a_{ij} + \sum_k \sum_i a_{kj} a_{ik}))}{1 - (\sum_i a_{ij} + \sum_k \sum_i a_{kj} a_{ik})} \qquad 5.20$$

$$= \frac{t_j - (\sum_i a_{ij} t'_j + \sum_k \sum_i a_{kj} a_{ik} t_k)}{1 - (\sum_i a_{ij} + \sum_k \sum_i a_{kj} a_{ik})} \qquad 5.21$$

The numerators in both methods are identical, but they differ in the denominator by the value added component of the non-tradable inputs, included in the Corden method. Balassa's method, having a smaller denominator, leads to a higher measure of effective rates of protection.

Balassa's assumption that non-tradable inputs prices are unaffected by protection has been criticised. Corden's method raises problems of interpretation, however, when the effective rate is to be assigned to a particular activity. This occurs because the effective rate calculated for a particular activity will also include the value added of non-traded inputs coming from a separate activity.

A third, alternative approach to Balassa's and Corden's method is to treat non-traded inputs in the same way as primary factors as in equation 5.3. In this case the value added in the protected industry implicitly includes the total value of non-tradables in addition to the primary factors. This third approach is likely to understate the effective rate since value added is overstated compared with either Balassa's or Corden's method. An example of treatment of non-tradables in the three methods is demonstrated in Table 5.1.

Suppose the production cost of a non-tradable (electricity) consists of 60 per cent value added and 40 per cent tradables. If the clothing industry (tradable) spends 10,000 rupees on electricity, the Balassa method adds the cost of the electricity to the clothing industry input costs. Corden's method adds 4,000 rupees to the clothing industry input costs, and 6,000 rupees to the clothing industry value added. The third method adds it all to the value added of the industry.

Table 5.1 **The treatment of non-tradable inputs in calculating effective rates of protection: an example**

	Balassa method	Corden method	General method
Input	10,000	4,000	-
value added	-	6,000	10,000

From a practical point of view the choice among these methods is generally determined by data availibility. Limited data favours the general method, ease of interpretation favours Balassa's method and the strength of the conceptual framework favours Corden's method.

Exportables

The effective rate of protection in equation 5.3 assumes that protection raises the price of all products. This is true only if all output is sold on the domestic market. However, if some of the output is exported, protection has no effect on the export price if the export price is determined internationally. Hence, protection can raise the price of only that part of the output that is sold domestically. To estimate the price increase of the commodity, the nominal rate of protection on the commodity has to be multiplied by the share of domestic sales to total sales of the output. The effective rate of protection which excludes export sales is

then specified as:

$$H_j = \frac{d_j t_j - \sum_i a_{ij} t'_j}{1 - \sum_i a_{ij}} \qquad 5.22$$

where d_j refers to the ratio of domestic to total sales. The average price of commodity j is raised by $d_j t_j$ with a tariff rate t_j.

Using the analytical framework set out in equations 5.1 to 5.22 estimation methods of nominal rates of protection, effective rates of protection, nominal rates of assistance, and effective rates of assistance are developed.

Estimation method

In all estimations, enterprises are grouped into export processing, non-export processing and all enterprises. This grouping was made to indicate the scale of assistance on import substituting and export promoting enterprises separately. The separate estimation of assistance for the export processing enterprises and the non-export processing enterprises was particularly important to the analysis of the assistance given to export-oriented industries received. The estimation of assistance for all enterprises indicates the average scale of assistance to industry.

All manufacturing industries are regarded as producers of tradables. Among the aggregate sub-sectors only construction and services are considered non-tradables. By including assistance measures other than tariffs, the effective protection rates are extended to assistance rates.

Effective protection and assistance apply the input-output method. The effective rate of assistance was determined by the nominal rates of assistance on an industry's output ($t_j + s_j$), inputs ($t'_j + s'_j$), concessions to value adding factors, r_j (credit and tax

concessions), and the industry's input to output ratio ($Sa_{ij} + Sa_{kj}$), measured in terms of unassisted prices. As observed data were inclusive of the tariff, they were deflated by the average tariff rate to obtain the unassisted values. For instance, the unassisted value of output was estimated as:

$$P_j = P'_j / (1 + t_j) \qquad 5.23$$

The estimation method treated non-traded inputs as they are treated in the Balassa method for ease of interpretation. Estimations also took into account the distinction between exports and domestic sales for non-export processing enterprises.

Price effect of the tariff

A tariff raises the price of imported inputs to import-substituting industries (non-export processing enterprises) by the size of the average tariff rate. However, tariffs have no price or cost effects on imports to exporting (export processing) enterprises as these enterprises obtain their inputs duty free. The price effect on total imports would be the weighted average increase in prices of duty free (export processing enterprises) imports and dutiable (non-export processing enterprises) imports. It is derived by dividing the duty paid by non-export processing enterprises by the (c.i.f.) value of total imports.

Nominal assistance

Assistance to outputs. Producers of import-competing goods are able to mark up the price of products sold in the domestic market by the amount of the tariff. Accordingly, where all production is for the domestic market, the nominal rate of protection equals the tariff rate (NRP = t_j). This is the case for non-export processing

enterprises, as almost all their produce is for domestic consumption. The nominal rate of protection to export processing enterprises is nil. In estimating the nominal rate of protection to the whole industry the price increase to only that part of output consumed domestically is considered. As exports are sold at international prices, tariffs do not raise their prices. The nominal rate of protection to the whole industry is then calculated by multiplying the tariff rate for the whole industry, t_j, by the ratio of domestic to total sales at free trade prices, d_j, that is $d_j t_j$.

$$O_j = t_j + s_j \qquad 5.24$$

In equation 5.24, O_j refers to the rate of assistance to outputs. This increases the gross receipts to producers. Tariffs, import quotas, export incentives and production subsidies fall into this category. Tariffs on competing imports are the only form of output assistance to Mauritian industries. Hence, $S_j = 0$; $O_j = t_j$. That is, the total rate of assistance to output equals the rate of protection to output.

Assistance to inputs. This can be written as

$$M_i = t'_j + s'_j \qquad 5.25$$

where M_i consists of the additional rate paid by industrial users for domestically produced and imported goods as a result of overall assistance to inputs.

A tariff on imported inputs (t'_j) represents tax on the user industry. To obtain the overall assistance or tax on inputs, M_i, t'_j is added to the rate of taxes less subsidies on inputs (s'_j). Electricity concessions are the only assistance (subsidy) to inputs. Therefore, M_i constitutes tariff rates on inputs, t'_j and electricity concession rates, s'_j.

To calculate the average tax effect of a tariff on an industry's inputs, data on inputs and tariff rates on each input are required. For the summary industries, input data are obtained from the input-output data of Mauritius. For the detailed

manufacturing industries the modified input-output coefficient matrices for export processing enterprises, non-export processing enterprises, and all enterprises are used separately.

The gross tax equivalents (negative assistance) on inputs are obtained by multiplying the intermedate inputs of each industry by their respective tariff rates. These effects are then aggregated by industry to reflect the tax equivalent faced by each industry. The average nominal rates of tax on inputs are estimated by dividing the gross tax equivalents on inputs by the unassisted value of inputs. This is done for non-export processing industries in the manufacturing sector and for all industries in the sector. For export processing enterprises the gross tax equivalents and the average nominal rate of tax on inputs are zero, as imported inputs for these industries enter duty free.

In addition to assistance to outputs and inputs other forms of government intervention provide assistance directly to value adding factors. This includes income tax and credit concessions. This direct assistance to value adding factors needs to be included in estimating net assistance to industries.

Effective protection and assistance

The effective rate of protection and the effective rate of assistance are estimated according to the methodology discused above. The estimation of the effective rate of protection and the effective rate of assistance are specified as in equations 5.26 and 5.27, respectively.

$$H_j = \frac{d_j t_j - (\sum_i a_{ij} t'_j + \sum_k \sum_i a_{kj} a_{ik} t_k}{1 - (\sum_i a_{ij} + \sum_k a_{kj})} \qquad 5.26$$

$$G_j = \frac{d_j O_j + r_j - (\sum_i a_{ij} M_i + \sum_k \sum_i a_{kj} a_{ik} t_k)}{1 - (\sum_i a_{ij} + \sum_k a_{kj})} \qquad 5.27$$

Equations 5.26 and 5.27 are modified forms of equations 5.3 and 5.10, respectively. They are modified by accounting for non-tradable inputs as in equation 5.19 and exportables as in equation 5.22.

The analytical framework established in equations 5.26 and 5.27 is used to estimate the effective rate of protection and effective rate of assistance, respectively, in Chapter 9. The assistance estimates are developed in Chapter 9 to present the estimated levels of protection and assistance along with the economy-wide effects of reductions in tariff rates simulated in Chapter 9.

6

Multi-sector computable general equilibrium model of Mauritius

This chapter sets out the analytical framework of the computable general equilibrium (CGE) model used to analyse the effect of changes in the international trading environment and domestic policies on the Mauritian economy. The analysis draws out the implications of bilateral trade arrangements for Mauritius' major exports of sugar and clothing. The modeling exercise also examines the effectiveness of tariff protection measures aimed at promoting import-substituting industries.

The model quantifies short-run and long-run effects of each policy and of various policy mixes on sectoral (industrial) and key macroeconomic variables.

Principal features of the model

The model follows inter-industry models of Johansen (1960), Shoven and Whalley (1972), Taylor and Black (1974), Dixon *et al.*, (1982), de Melo and Robinson (1989), and Robinson (1989).

The model is based on the ORANI family of models which follow the Johansen style. The standard short-run ORANI model of the Australian economy (Dixon *et al.* 1982) has been modified to include foreign investment (Dixon *et al.* 1984); long-run closures (Horridge 1985); financial markets (Vincent 1985); forecasting (Dixon and Parmenter 1986); income distribution analysis (Meagher and Agrawal 1986); the fiscal system (Meagher 1986; Meagher and Parmenter 1985); and exchange rates (Vincent 1986; Martin 1990). A detailed literature survey of ORANI studies is found in Powell and Lawson (1986).

The model is applicable to a wide range of policy problems and it is operationally flexible. Applications of the ORANI model include the study of the effects of protection (Powell 1977; Meltzer 1980; Higgs 1986); of exchange rates

(Hagger *et al.* 1983; Horne 1985; Vincent 1986); of international trade (Warr and Lloyd 1983; Dixon and Johnson 1986); and of government taxes and expenditure (Castle and Guest 1980; Agrawal 1986).

These models are general equilibrium comparative static models. All factor and product markets are assumed to be in equilibrium unless disequilibrium behaviour is imposed. They simulate moves from one equilibrium to another as a result of policy changes or external exogenous shocks.

The model constructed for Mauritius is used to generate conditional projections, that is, to address "what if" types of questions. For example, given a policy change to a given macroeconomic environment, a variable "z" will change by "y" per cent from the value it would have had in the absence of the shock. The model focuses on the effects of one or more policy changes while holding constant all other factors affecting economic outcomes. For instance, if a 10 per cent decline in the price of clothing exports occurred at time 0, the model simulates the effect of this change at time t, the Mauritian economy having fully adjusted to the fall in export prices of clothing. This means that a 10 per cent decrease in the export price of clothing would, after period t, cause the rate of output in other manufacturing to be, say, 1 per cent more than it otherwise would have been.

In comparative static models such as this, the time t is not strictly defined. When t refers to a short-run period it generally refers to about two years; the long run is from five to ten years. The short run is defined as the time in which policy change (shock) does not induce changes in capital stocks. But it is long enough for producers and consumers to adjust their decisions in response to the shock. The long run is a long enough period for capital stocks to respond to the shock.

The results of the policy change are conditional on the changes taking place in the given economic environment and on the choice of exogenous variables. For instance, a tariff cut will have different outcomes under full and partial wage indexation. Under full indexation an increase in the consumer price index, induced by

an increase in the tariff rate, is fully passed on to the wage bill. However, under partial wage indexation only part of the increase in the consumer price index is passed on to wages. Therefore, everything else remaining constant, a tariff increase under full wage indexation results in higher costs of production and less competitive industries than under partial wage indexation. The choice of exogenous variables also has important implications for the results obtained from a given shock. For example, if real wages are exogenous and employment is endogenous, economic changes are expected to affect the level of employment while real wage rates remain unchanged. Conversely, if employment is exogenous the level of employment would not be affected.

The model is multi-sectoral and handles production, consumption and trade-related issues for as many commodities as are included in the data set. A disaggregated industry structure also allows solutions by industry. The model captures demand and supply effects. It allows outputs to be used as intermediate inputs, or to meet investment demands, final consumer demands, export demands, or government demands.

The theoretical structure of the model is sufficiently complex to account for important interactions within the economy. The underlying demand and supply curves are non-linear although they are approximated by a system of linear equations in percentage changes of the variables. Thus the model involves the introduction of a linear system through logarithmic differentiation. The linear system is then solved for changes in endogenous variables due to changes in the exogenous variables by matrix manipulation. Hence one of the advantages of using this type of model is that the linearized form enables model solutions from different shocks to be added together or subtracted from one another. The linear systems also have smaller computational requirements than non-linear systems.

The model allows considerable flexibility in the choice of exogenous variables. This flexibility in the closure is found in Johansen-style models because the solution

procedure is independent of the closure. In many non-linear models, the solution procedure depends upon the closure and therefore cannot be changed without reconstructing the model. Recent software improvements are diminishing the workload created by this problem.

Features that distinguish Mauritian model from the ORANI model

Modifications have been made to the ORANI model to reflect the Mauritian economic environment. Certain economic features are included in the external market to capture the rather distinct conditions facing Mauritius.

In the model Mauritian sugar has two outlets on the world market: the EC market and the rest of the world. Trade agreements allow Mauritius to sell its sugar in the EC market at prices paid to EC domestic sugar producers (two to four times those of world market prices). Because of this high price, Mauritius first satisfies the EC market and then sells the residual in the world market at international prices. But the supply of Mauritian sugar to the EC is restricted by a quota.

In modelling the export market of sugar, it is divided between the EC and the rest of the world to allow simulation of policy changes peculiar to sugar exports to the EC market. However, only one export market (the world) is modelled for commodities other than sugar.

Clothing and other manufacturing industries producing for export are separated from import-competing manufacturing industries (see below).

Model notation

All variables in the model are written in lower case letters, representing percentage changes of the levels. For example x = dX/X*100. A system of subscripts and superscripts is used to define variables by their type, source of origin and use. For

instance, $x^{k}_{(is)j}$ denotes use of commodity i from source s by industry j for the purpose k. Commodities range from 1 to g. Sources take the value of 1 for domestic and 2 for imports. Industries range from 1 to h. The value of k ranges from 1 to 5, where 1 is intermediate demand for current production, 2 is investment demand, 3 household demand, 4 is export demand and 5 is other demand. Similarly, primary factor inputs are represented by x^{p}_{vj} and x^{p}_{1qj}. The former describes demand for a primary input v, where v=1, 2 and 3 (representing demand for labour, fixed capital and land), by industry j. Demand for labour by occupation is represented by x^{p}_{1qj} in industry j and where q takes the value of 1 for skilled and 2 for unskilled labour.

In the data base each industry produces only one commodity and each commodity is produced in only one industry. Therefore h (the number of industries) and g (the number of commodities) are the same and equal to eight.

Sectoral composition of the Mauritian economy

The original input-output data of Mauritius consists of 15 sub-sectors (Appendix 6.1). These groupings were reclassified into eight sub-sectors or industries.

Table 6.1 **Sectoral composition of the Mauritian economy**

Agriculture	Industry	Services
1. *Sugar*	3. *Non-export processing manufacture*	7. *Tourism*
2. *Other agriculture*	4. *Export processing enterprises clothing*	8. *Other services*
	5. *Other export processing enterprises manufacture*	
	6. *Utilities and construction*	

Industries were reclassified to allow policy issue simulations. Industries which are directly affected by a policy change addressed in this study, such as export processing enterprises, have been identified separately. Industries that do not have particular importance in terms of the economic issues analysed were aggregated.

The three major sectors of agriculture, industry, and services were thus disaggregated into eight sub-sectors. This disaggregation was determined by the cost structure, the sets of policies applied and the market orientation of the industry (i.e, production for exports or for domestic markets).

Agriculture

Agriculture was divided into two sub-sectors: *sugar* and *other agriculture. Sugar* faces different policy interventions to *other agriculture.* About 90 per cent of sugar production is for export; the comparative figure for *other agriculture* is only 2 per cent. The *other agriculture* category is protected by import interventions. The principal components of *other agriculture* include tobacco, tea, flowers, and livestock management.

Industry

The industrial sector in Mauritius consists of manufacturing, construction, power generation and water supply. There is no mining in Mauritius (except limited salt extraction). For modeling purposes the industrial sector is divided into two classifications manufacturing and utilities and construction. Manufacturing has been further divided into import-substituting (non-export processing enterprises) and export-oriented (export processing enterprises) activities based on the destination of final products (domestic or foreign markets). Firms producing for the domestic market are separated from firms producing for export because they have different cost and sales structures. One of the major differences in their cost structure lies in the different costs they face for imported inputs. Export-oriented firms are eligible for import inputs free of duty while firms producing for the domestic market have to pay

import tariffs. Export-oriented firms also tend to be more labour-intensive than those producing for domestic use. Further, in 1988, export earnings from manufacturing products were attributed exclusively to export processing industries.

Within the export processing enterprises the clothing industry is separated from other export-oriented manufacturing because of its relative labour intensity. Accordingly, the manufacturing sector is divided among *non-export processing enterprises manufactures, export processing enterprises clothing* and *other export processing enterprises manufacture*. The fourth sub-sector is *utilities and construction.*

Services

Services were divided into *tourism* and *other services* on the basis of cost and sales structure. While tourism is a highly export-oriented industry, *other services* are generally not traded.

The eight sub-sectors (Table 6.1) into which the overall economy is divided can be regrouped as exportables (*sugar, export processing enterprises clothing, other export processing enterprises* and *tourism*), import competing industries (*other agriculture* and *non-export processing manufacture*) and non-tradables (*utilities and construction,* and *other services*).

Theoretical structure of the model

The theoretical structure of the model is derived from assumptions about the behaviour of economic agents (producers and consumers) and about the technological and/or institutional constraints (production and utility functions, market structure, etc.) within which the agents operate. The assumptions generally made in the model follow standard neo-classical assumptions of competitive markets, utility maximization and cost minimization.

Major behavioural assumptions underlying the theoretical structure of the model are as follows.

- Producers are assumed to be efficient (cost minimizing) and competitive (price taking) in choosing their input mixes to produce any given level of output. They are constrained by constant returns to scale production technology. They also face two different production functions in combining intermediate and primary inputs - Leontief and Constant Elasticity of Substitution (CES) production functions.
    - Each intermediate input and an aggregate of primary factors are assumed to be combined in a fixed proportion to output (Leontief production technology), that is, there is no substitution between different material inputs or between material inputs and primary factors. For instance, in making a piece of textile one cannot substitute woollen fibre for man-made fibre or woollen fibre for capital and labour.
    - Producers can substitute between domestic and imported sources of each input; between primary factors of labour, capital and land (where applicable); and between the different skill groups within the labour category. These substitutions are assumed to be described by CES functions. It is assumed that imported inputs may not be perfect substitutes for domestic inputs. This imperfect substitution assumption also applies to primary factors and to different skill groups of labour.
- Households are assumed to maximize their utility from consumption of commodities subject to an aggregate expenditure constraint. With aggregate expenditure held constant, consumers maximize utility by substituting between different categories of goods as well as between domestic and imported sources of each category.

The equations of the model can be classified into six major groups as set out below. The full specification of the equations, the variables, parameters and coefficients of the model are presented as Appendices 6.2, 6.3, and 6.4, respectively.

Industry demands

Industry demands for inputs into production are specified in equations (1)-(4) (Appendix 6.2). Producers' demand functions for intermediate and primary inputs are derived as functions of output levels and input prices. It is assumed that material inputs are used in fixed proportions, that is, metal cannot be substituted for wood, but domestic metal can be substituted for imported metal. Equation (1) shows that producers choose intermediate inputs from domestic and imported sources, $x^1_{(is)j}$, to minimize the cost of production.

The demand for intermediate inputs is proportional to each industry's output and inversely related to the relative price changes of inputs from domestic and imported sources. For any level of demand for good i, an increase in the price of imports of good i relative to a share weighted average of the imported and domestic prices will lead to a reduction in the demand for imports and an increase in the demand for domestically produced good i. The same holds true for goods for the domestic markets. The extent of the substitution depends on the size of the relative price change and the elasticity of substitution, σ^1_{ij}, between domestic and imported goods. If there is no change in the relative price of good i from domestic and imported sources, then industry j's demand for good i from source s will move with industry j's output.

Equation (2) models demand for primary factors (capital, labour and land) and follows the same logic as equation (1) in that demand is explained by a scale effect (the size of the output) and a substitution effect among labour, capital and land. If the price of labour increases relatively to capital and land, the demand for labour will fall. The extent of the fall depends on the relative price changes and the elasticity of substitution among the primary factors, σ^p_j.

Equation (3) expresses demand for labour by type of labour (skilled and unskilled) as a function of the industry's demand for labour in general, x^{p}_{1j}, and relative occupational wage rates. Substitution between skilled and unskilled labour is, again, determined by the price differential and elasticity of substitution, σ^{p}_{1j}, between the two types of labour. Other costs of production such as production taxes are modelled in equation (4). They depend only on industry output levels.

Final demands

Final demands are shown in equations (5), (6), (7), (10), (11) and (12). In equation (5) industry demand for intermediate inputs in capital creation is derived as a function of industry investment levels and relative input prices. Investing industries are assumed to minimize investment costs by choosing between domestic and imported intermediate inputs according to the elasticity of substitution for capital goods, σ^{2}_{ij}.

Though the specification in equation (5) identifies investment demands by industry, the available investment data are not disaggregated by industry. For this reason, the commodity composition for each industry is assumed to be the same as for the Mauritian economy as a whole as depicted by the economy-wide investment vector, following the Asian Interdependence Computable General Equilibrium model (Cabalu, *et al* 1991).

Equations (7) and (8) represent, respectively, expenditure minimizing and utility maximizing household demand. Equation (7) models utility maximizing household demand for commodities undifferentiated by source, subject to an expenditure constraint. Consumers are assumed to change the allocation of their expenditure on different commodities depending on the aggregate expenditure and the relative prices of commodities. The responsiveness of consumer demands to a change in total expenditure is measured by the expenditure elasticity, ε, whereas the responsiveness to relative price changes is measured by price elasticities, η_{ik}. In this equation demand functions are derived by maximizing a utility function of the Stone-Geary

form, and so constitute a linear expenditure system. Under a linear expenditure system the ratio of the own price elasticity to expenditure elasticity will be the same for all goods.

Further, it is assumed that consumers minimize their expenditure on a commodity by substituting between domestic and imported goods as depicted by equation (6). In equation (6) household demand for commodities by source is expressed as a function of scale and substitution effects in minimizing expenditure. The volume of commodity demanded is determined by the scale effect, whereas the relative prices of domestic and imported commodities are determined by the substitution effect.

The price of each commodity to households is expressed in equation (8) as a share weighted average of domestic and imported prices. Equation (9) allows for consumption taxes or subsidies.

Mauritius exports its sugar to two distinct markets: the EC with residual being exported to the rest of the world (for detailed description of the sugar market see pp 49-50). EC export demand is presented in equation (10), while export demand for the rest of the world is shown in equation (11). In both cases the foreign currency price of exports is a function of the volume of exports multiplied by the respective reciprocal of the foreign elasticity of demand and an exogenous shift term. The reciprocals of the foreign elasticity of demands determine the slope of the demand curve for Mauritian exports. As Mauritius is a small country, the reciprocal of the elasticity of export demand is almost infinitely small or zero, and Mauritian export volumes have little effect on its export prices. Equation (10) is only applicable to sugar exports. Elsewhere this equation collapses to zero and export demand is represented by equation (11).

Export prices are set endogenously. Therefore, changes in export prices can not be simulated directly. They are simulated indirectly by changing the shift term. The

shift term changes the position of the demand curve for Mauritian exports and it allows simulation of changes in export prices.

Where export volumes and prices are determined largely by trade agreements, the reciprocal of the foreign elasticity of demand is set at zero. This implies that the export price is independent of the volume of exports. In addition, the export volume is set exogenously.

Government demands in equation (12) are directly tied to real household expenditure and a shift variable. The shift allows for a change in the government demand exogenously.

Commodity supplies

In contrast to the assumption that a given commodity can only be produced by one industry, and vice versa, in the real world, the same commodity can be produced by different industries and one industry can produce more than one commodity. These are specified in the model by equations (13) and (14). Equation (13) represents the supply of multi-product industries. Just as producers are assumed to have some degree of flexibility in choosing their input mixes, they are assumed to have some degree of flexibility in choosing their output mixes. The flexibility of producers in changing their output mixes is determined by output transformation possibilities. In the Mauritius input-output structure each industry is assumed to produce only one commodity. Therefore, the elasticity of transformation, σ^T, between different products of an industry is set to zero. Hence the relative price change is also zero. Equation (13) is then reduced to $x_{(i1j)} = z_j$. This equality implies the output of a commodity is the same as the activity level of industry or the output of the industry in which it is produced. Equation (14) adds up the total production of each commodity in different industries. As one commodity is produced in only one industry $D_{(i1j)}= 1$ for i=j and $D_{(i1j)}= 0$ otherwise.

Zero pure profits conditions

Commodity pricing equations are presented in equations (15) to (19). They assume constant returns to scale and are obtained by assuming perfectly competitive behaviour so that no pure profits are earned. As profits accrue only to factors of production, total revenue equals total cost in production, investment (capital creation), importing and exporting.

With constant returns to scale, the condition that total revenue equals total cost simplifies to equation (15), where a unit value of producing an output equals the sum of input costs - intermediate, primary and fixed. Similarly, a unit value of capital is defined in equation (16) as the sum of intermediate input costs. Equation (17) relates the domestic selling price of an imported commodity to the cost of importing it. The cost of importing a commodity is composed of the foreign currency price, converted into domestic price via the nominal exchange rate and the tariff rate. Similarly, equations (18) and (19) equate the domestic currency price paid by foreigners for a unit of export to revenue from exporting to the EC and the rest of the world, respectively. Any divergence from pure profit in exports is captured by the subsidy variable (v_i). The revenue from exports is made up of the foreign currency f.o.b. price converted to local currency via the exchange rate, plus export subsidies. Equation (18) is only relevant to sugar exports. Elsewhere this equation collapses to zero as there is no distinct EC and the rest of the world market. For sugar, equations (18) and (19) imply that the export prices of sugar received by Mauritius from EC in excess of the world prices for sugar are treated as export taxes to the EC market. That is, $p^{eEC}_{11} - p^{eW}_{11} = v^{W}_{1} - v^{EC}_{1}$.

Market clearing

Market clearing equations specify that supply equals demand in every domestic market. Equations (20) to (23) equate demand to supply for domestically produced commodities, labour, fixed capital and agricultural land, respectively. Equation (20) equates supply of domestically produced commodities to total demand made up of

intermediate inputs to current production, intermediate inputs to capital creation, final consumption, export and government demands. Equation (21) equates the supply of labour of each skill to the demand for it. This implies that labour of the same skill is homogeneous and is mobile across industries. Equations (22) and (23) equate supply and demand for capital, and land, respectively in each industry. Both capital and land are assumed to be industry specific and fixed in supply in the short run.

Miscellaneous equations

Allocation of investment across industries

The allocation of investment across industries is described in equations (24) to (28). Equation (24) specifies the rate of return to capital in each industry as a function of the cost of using a unit of capital relative to the cost of producing or buying a unit of capital. Equation (25) defines aggregate real private investment as the sum of investment expenditures across industries. In equation (26) private investment by industry is determined as a function of capital stocks (k_j) and actual (r_j) relative to expected (λ) rates of return on capital. Private investment is allocated across industries to equate expected rates of return across industries in equation (26). Depending upon assumptions $I^{(1)}_j$ and $I^{(2)}_j$ take the value of one or zero. In the short run, as k_j is set to zero, $I^{(2)}_j$ is set to one and $I^{(1)}_j$ can take either values. r_j and λ are set endogenously. In the long run, $I^{(1)}_j$ is set to one and $I^{(2)}_j$ to zero as in Horridge and Powell (1984). By setting f^2_j exogenously, in the long run, $y_j=k_j$. Aggregate nominal investment is defined in equation (27). Equation (28) aggregates capital stocks across industries.

Price indices

The prices of industry outputs, the gross domestic product deflator, the capital goods price index and the consumer price index are defined in equations (29) to (32). They are expressed as weighted averages of the percentage changes in the prices of the component items.

Aggregate macroeconomic variables

Equation (33) describes aggregate volume of imports of commodity i as the sum of imports for each purpose (intermediate inputs, inputs for capital creation, household demand and government demand). Aggregate value of imports in foreign currency are defined in equation (34). The foreign currency value of exports to the EC market and to the rest of the world, respectively, are defined in equations (35) and (36). The aggregate value of exports is then calculated as the sum of the two markets in equation (37). The balance of trade in equation (38) is given as a difference between the value of exports and imports. As the nominal exchange rate is assumed to take the value of one, trade balance in foreign currency equals trade balance in domestic currency. The balance of trade can move through zero and therefore can change sign. For this reason, a first difference rather than a percentage change is calculated to solve for the balance of trade. Aggregate imports, exports, and trade balance are represented in only foreign prices. The value of these variables in domestic currency are omitted to avoid redundancy. The nominal exchange rate is set to take the value of one.

Other macroeconomic variables include household consumption, household disposable income, real gross domestic product, other aggregate demands, aggregate employment and the ratio of real investment to real consumption. These are described in equations (39) to (44). Consumption is a function of disposable income in equation (39) and the rate of change in disposable income is set to be equal to the percentage change in nominal GDP in equation (40). In equation (41) real GDP is expressed as a sum of real household consumption, investment, government expenditure and exports less imports. Aggregate government demand is obtained by summing all commodities demanded in equation (42). In equation (43) aggregate employment is expressed as the sum of employment in different skills. Real investment is modeled to change in proportion to real consumption and a shift variable in equation (44).

Nominal gross domestic product and nominal aggregate consumption are presented in equations (45) and (46), respectively. They are set as functions of the

respective real values and price indices. Equation (47) defines the price of labour to each industry.

Wage indexation

Equation (48) allows wages to be indexed to the consumer price index by occupation and by industry. The shift terms can be used in simulations involving variations in industrial and occupational wage relativities. If the indexing parameter, h, is set at 1 and the shift terms at zero, it represents full wage indexation. In this case real wages remain fixed in all occupations and in all industries. Equation (49) allows the simulation of changes in taxes on production by changing the shift variable f^{o}_{j}.

Model closure and simulation procedure

The linearised version of the model can be expressed as

$$AX = O \qquad 6.1$$

where A is the matrix of coefficients and X is the matrix of variables. X can be partitioned into a vector X_1 of endogenous variables and a vector X_2 of exogenous variables. The endogenous variables are determined within the model, whereas the exogenous variables are predetermined outside the system. The split between the endogenous and exogenous variables depends on assumptions about the economic environment. Matrix A can also be divided into corresponding coefficient submatrices A_1 and A_2.

$$A_1X_1 + A_2X_2 = 0 \qquad 6.2$$

Rearranging the equation and solving for X_1 yields

$$X_1 = - A_1^{-1} A_2 X_2$$

where:

X_1 is the vector of changes in endogenous variables (results);

X_2 is the vector of changes in exogenous variables (shocks);

A_1 is a matrix of coefficients on endogenous variables; and
A_2 is the matrix of coefficients on exogenous variables.

A solution for X_1 can be obtained only if A_1 is invertable; that is, the system of equations is neither over nor under identified.

Choice of exogenous variables

Appendices 6.2 and 6.3 indicate that the number of equations in the model (605) are less than the number of variables (740). Therefore, the model cannot be used to determine all the variables. This is overcome by reducing the number of endogenous variables to the number of equations by declaring (135) variables as exogenous (see Appendix 6.5).

The first set of exogenous variables are foreign currency prices of imports. The foreign currency prices of imports, p^m_{i2} are set exogenously because Mauritius is a small country and cannot affect the prices of its imports.

The second group of exogenous variables are tariffs, t_i, which are determined exogenously by government decisions. By setting tariffs exogenously the effects of projected changes in the government's policy of protection on various industries and macroeconomic variables, such as employment and inflation can be computed.

The third group of exogenous variables are either export volumes or export subsidies. Normally export volumes are endogenous in this type of model. But where the volume of exports is exogenously determined by trade agreements, or where only a small proportion of production is for export, the volume of exports is set exogenously. Its exogeneity is achieved by endogenizing export subsidies. By making subsidies endogenous subsidies are made to offset changes in the prices of exports. As a result, domestic prices, p_{i1}, are able to move independently of export prices, p^e_{i1}.

The fourth set of exogenous variables are industry capital stocks, k_j or rates of return. In the short run capital stocks are fixed, and therefore they are set

exogenously, whereas industry rates of return, r_j, vary endogenously. In the long run, industries are able to expand or contract capital stocks. Consequently capital stocks become endogenous and rates of return exogenous.

The next group of exogenous variables are employment variables. As employment is approaching its full employment level in Mauritius, aggregate employment is set exogenously. The aggregate real wage rate is allowed to vary to maintain the given level of employment supply in the face of changing aggregate demand for labour. However, employment in each industry is set endogenously and allowed to adjust to satisfy changing industrial demand for labour.

Other exogenous variables, including the shifts in the various demand curves, are given in Appendix 6.5.

Data requirements and sources

The model requires estimated parameters. Almost all of the coefficients are obtained from an input-output table which is the main source of data. The input-output table presents the intermediate inputs and the primary factors of production (labour, capital and land) which go into the production of commodities. It also shows how the commodities produced are allocated among different users. They may be used as inputs into current production, domestic consumption, investment or exports. Both the production and usage relationships are expressed as fixed coefficients.

Input-output data

The 1987 Mauritius input-output table is the major source of data. As indicated above, it has been modified to meet the requirements of this study (see Appendix 6.1). First, the 15 by 15 table is recalculated into an 8 by 8 matrix according to the industry classification outlined above.

Second, the modified input-output table imports for intermediate inputs, investment and final consumption were disaggregated by commodities from raw data obtained from the Central Statistics Office. In the original input-output table the import data were not disaggregated by commodity. Instead the value of imports for current production were by industry. Imports for capital formation and for final consumption were also provided in aggregate values.

Third, investment data from domestic sources were available by commodity only, without being split among industries. The investment data were used as available by assuming that the investment rate by each industry was the same as the economy-wide investment rate.

Fourth, the original input-output table did not distinguish between different types of labour. In the modified input-output table labour was split between categories of skilled and unskilled labour on the basis of employment survey data obtained from the Central Statistics Office.

From the values given in the input-output table, costs and sales shares of industries were calculated. These are generally known as input-output coefficients or costs and sales shares. For example, $S^1_{(is)j}$ represents the share of the ij element of intermediate input from sources, s, (domestic or imported) in the total cost of producing j output.

Elasticities

In addition to these coefficients, the model requires pre-estimated elasticity parameters. As such estimates of elasticities are not available for Mauritius, values for these parameters were taken from economies similar to Mauritius (or set by default).

The elasticity of substitution between domestic and imported goods, i, is given the value of 2 for all tradable commodities except sugar and export processing enterprises products. Values close to this number are used for many commodities in other computable general equilibrium models, notably by Dixon *et al.* (1982), Martin

(1990), and Vincent *et al* (1991). For sugar the value has been set to zero because there is no imported sugar in Mauritius and therefore no substitution between imported and domestic sugar. The elasticity of substitution for export processing products is also set at zero. As export processing products are only for export, they do not compete with imported products in the domestic market. These characteristics should also be picked up in the $S_{(is)j}$ shares. The elasticity of substitution between domestic and imported goods is the same for all users: intermediate input, capital input and final consumption.

The elasticity of substitution between primary factors in the short run is set at 0.75 for all industries as in other CGE models such as Dixon *et al.* (1982). In the long-run simulation a value of 1.2 is assigned. The elasticity of substitution between different types of labour is given the value 2.0 by default.

Household expenditure elasticities were taken from a household behaviour study for Mexico (Jarque 1987). There is no data available for household expenditure elasticities for Mauritius. It seems reasonable to use data from a country with similar per capita income, and presumably similar expenditure elasticities. Consumer expenditure elasticities for Mexico were taken because of similarity of per capita income during Mexico's expenditure elasticities estimation year.

The household own and cross price elasticities of demand were estimated by using the Frisch formula of:

$$\eta_{ik} = -\varepsilon_i S^3_k(1+ \varepsilon_k/L) + \delta_{ik}\, \varepsilon_i/L \qquad 6.3$$

where:

ε_i is the consumer expenditure elasticity of demand for good i.

S^3_k refers to the household budget share of good i (domestic and imported).

L is the elasticity of the marginal utility of expenditure with respect to expenditure (the Frisch Parameter). The Frisch parameter for Mauritius was derived

from the relationship between the Frisch parameter in Lhuch, Powell and Williams (1977) and per capita GNP of Mauritius.

δ_{ik} has the value of 1 for i=k and zero otherwise. The expenditure elasticity figures were then adjusted to fulfil Engel aggregation,

$$\sum_{k=1}^{g} S^3{}_k \varepsilon_k = 1 \text{ and homogeneity } \sum_{k=1}^{g} \eta_{ik} = -\varepsilon_1 \qquad 6.4$$

In equation 6.4 the sum of consumer expenditure elasticities on all consumer goods weighted by their respective household budget share equals to one. To satisfy conditions of homogeneity the sum of cross-price elasticities has to be equal to the elasticity of substitution (with negative sign). Export demand elasticities are set to 20 for all exports. The reciprocal of the export demand elasticities is therefore 0.05. A large value is given to export demand elasticities for Mauritius because of the small country assumption.

This model, like any economic model, is a simplification of reality. As a result it contains assumptions which may not be universally accepted. The assumed values of elasticities and parameters may not reflect the true values. Fixed relationships between materials input also may not be realistic all the time. For instance, substitution between man-made fibre for woollen fibre is possible. Some industries may exhibit increasing returns to scale though the model assumes constant returns to scale to all industries.

Therefore, the model results should be interpreted cautiously. The results should be taken as providing an indication of the likely response of the economy to particular policy changes (shocks) rather than as providing precise estimates of particular outcomes. However, the usefulness of the model as a simplified tool for portraying the complex real world remains. As this model is the first attempt in CGE analysis, known to the author, applied to the Mauritian economy, there is much scope for modification.

7

The impact of EC sugar trade liberalization on the Mauritian economy

Mauritius has benefited a great deal from the sugar trade distortions imposed by the EC on the world sugar market (Chapter 3). This chapter analyses the likely effects of partial trade liberalization in the EC sugar market for sugar exports from Mauritius in particular, and the economy of Mauritius in general. The estimates are simulated using the CGE model presented in chapter 6.

The rationale for EC sugar trade liberalization

There is a strong belief in Mauritius that the Sugar Protocol will remain in place permanently (Boulle 1987). However, current conditions both within the EC and internationally suggest otherwise. These conditions include:

- the formation of a single European market;
- the attainment of self-sufficiency in sugar within the EC;
- the possibility of sugar trade liberalization under the General Agreement on Tariffs and Trade (GATT) multilateral trade negotiations;
- the change in the political and economic climate in former socialist republics; and
- the development of sugar substitutes.

A single European market by the end of 1992

Since the Sugar Protocol is an EC-wide regime within the framework of the Lomé Convention, it is not inconsistent with the EC objective of a single market (Tovias 1990 and Robertson 1990). However, the formation of a single European market by the end of 1992 could indirectly lower the sugar export earnings of Mauritius from the EC. With the formation of a single market, national sugar-beet production quotas

could be removed. In the absence of production quotas there would be no support prices.

More importantly, the elimination of the quota could allow free movement of sugar within the EC. If so, cheaper supplies of sugar from low cost beet sugar producing countries within the EC could be available to British sugar refineries. If the price of these supplies of sugar beet is low relative to that of raw cane sugar supplied by Mauritius, the cane sugar fed British refineries may not remain competitive and ultimately may be forced to close, restructure, or use beet sugar instead of cane sugar.

In addition, under the single European market, harmonization of standards for food and drinks could depress the demand for sugar by tending to lower the allowable sugar content in food and drinks (Robertson 1990). Hence, European demand for sugar may decline.

EC self-sufficiency in sugar

When the Sugar Protocol was signed in 1975 the EC was 90 per cent self-sufficient in sugar. In 1987, as a result of the guaranteed price to sugar producers, it produced 30 per cent more sugar than it consumed. Despite this surplus the EC imports from the ACP countries to meet the terms of the Sugar Protocol. The imported ACP sugar, along with its own surplus, is then re-exported at subsidized prices. Since the EC is a large exporter of sugar to the world market, its dumping of sugar on the world market results in the lowering of the world sugar price. This in turn adversely affects the income of sugar exporting ACP countries which the EC is trying to help. However, Mauritius does not lose much from this action as its exports to the world market are small.

The dumping of sugar on the world market by the EC not only hurts other exporters of sugar to the world market but is also a burden to the EC tax payers who finance the export subsidies. They may not be prepared to carry this burden indefinitely.

Agricultural trade liberalization under GATT

In the Uruguay Round talks of the GATT, mounting pressure on the EC to reform its Common Agricultural Policy (CAP) is evident. The EC has begun to retreat on agricultural policies. It recently agreed to cut its farm subsidies by 30 per cent spread over a decade (*Australian Financial Review* 29-10-90).

In an attempt to discourage over-production, the EC has indicated that in the 1991-92 financial year it will freeze its subsidy support prices for agricultural products, including sugar, at the 1991 level. This will cut prices for sugar by 5 per cent in real terms. These actions suggest that the benefits to EC sugar producers from the CAP are in decline. This will affect Mauritius sugar producers as the Mauritius export prices of sugar are linked to the EC prices.

Changes in the political climate of Eastern Europe

The ACP countries gain from the Protocol due to their former ties to Europe, particularly, the United Kingdom and France. The Protocol can be taken as a form of development aid to former UK and French colonies, rather than reflecting trade relations based on economic rationality. With the recent changes in the political climate of former socialist republics in Eastern Europe, it is possible that some development aid funds could be diverted from former colonies to neighbouring Eastern European countries, including the former USSR. This could result in a reduction of funds Mauritius receives in the form of sugar price-quota rent. It may be implemented either through lower prices, lower quotas, or both.

Sugar substitutes

Consumers, particularly in industrial market countries, are increasingly aware of the health problems associated with the consumption of large amounts of sugar. As a result, they are reducing sugar consumption and artificial sweeteners are becoming popular. Producers are also finding it cheaper to produce other forms of sugar such as fructose from corn syrup. These trends indicate that the demand for beet and cane sugar is likely to decline in the EC market.

The effect of a sugar export price and an EC quota decline on the Mauritian sugar industry

The arguments raised so far all point to a reduction, if not elimination, of rents on Mauritian sugar exports to the EC market. However, the liberalization of EC sugar trade either within the framework of GATT or within the EC would not be totally disadvantageous for Mauritius. Though the loss would be likely to far outweigh the gains, Mauritius would gain somewhat from sugar trade liberalization. If the EC liberalizes its sugar trade, production within the EC would be depressed. The EC would not dump as much sugar at low prices on the world market. Therefore, following EC sugar trade liberalization there would be a tendency for world sugar prices to rise, bringing a small gain to Mauritius from its exports to the world sugar market.

As the EC is a major producer, consumer and exporter of world sugar, any reform regarding sugar in the EC affects the world sugar situation, particularly prices. As many studies have indicated (Borrell and Duncan 1990; Roberts 1982; Ronigen and Dixit 1989; Tyers and Anderson 1987) partial or full liberalization of the EC farm support policies could result in an increase in the world sugar prices of 7 to 18 per cent. Koester *et al* (1988) estimated that sugar trade liberalization would reduce the regulated EC price by 40 per cent and raise the world price by 8 per cent.

Graphic analysis of a cut in the export sugar price to the EC market builds on the theory developed in chapter 3. A cut in the export price to the EC market reduces earnings to the Mauritian sugar industry markedly (Figure 7.1). The price obtained per unit of exports to the EC market is P^{EC} and P^{W} is the unit price of sugar exports in the world market. The quantity of exports to the EC market is represented by Q^{EC} and Q^{T} is the total volume of exports. The difference between Q^{T} and Q^{EC} represents quantity of exports to the world market.

Figures 7.1, 7.2 and 7.3 The impact of price and quantity declines in the exports of sugar to the EC market on the Mauritian sugar industry

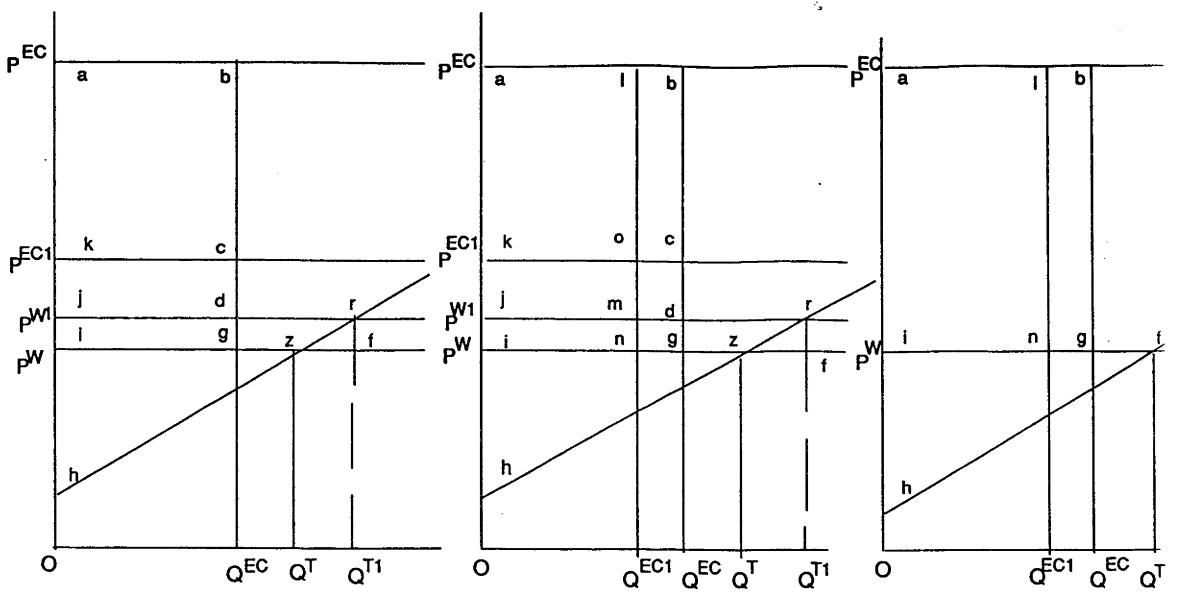


Figure 7.1

Figure 7.2

Figure 7.3

In Figure 7.1 Mauritius gains the area *abgi* in price-quota rent by selling its sugar quantity (Q^{EC}) to the EC market at higher prices (P^{EC}) than the world price (P^{W}). If the price of sugar to the EC market falls by 40 per cent to P^{EC1}, the rent reduces by *abck* to *kcgi*.

Suppose the fall in the price to the EC market is accompanied by an 8 per cent increase in the price in the world market, then the world price moves from P^{W} to P^{W1}. This reduces the rent from EC to *kcdj*. But producers gain by increasing their supply to the world market from $Q^{T} - Q^{EC}$ to $Q^{T1} - Q^{EC}$ in response to the increase in the world price. The increases in (additional gain to) the producers' surplus is *drzg*. The net gain depends on the relative sizes of *drzg* versus *abck*.

In Figure 7.3 Mauritius exports a total quantity of sugar Q^{T}. It exports Q^{EC} to the EC market and the residual $Q^{T} - Q^{EC}$ to the world market. If EC cuts Mauritius export quota from Q^{EC} to Q^{EC1}, Mauritius still exports the quantity Q^{T}. It diverts the unsold quantity $Q^{EC} - Q^{EC1}$ to the world market and loses *lbgn* in quota-rent.

The combined effect of the changes in prices and the cut in the quota to the EC market is presented in Figure 7.2. If Mauritius sells the amount cut from the EC on

the world market, it will lose its price-rent, *abck* and quota-rent, *ocng* from the cut in the EC price and quota, respectively[1]. It gains *mrzn* from the increase in world prices. The net gain due to world price increases is only *drzg* since *mdgn* is regaining the loss of quota reduction.

The economic environment for simulations

The effects of a shock on economic variables depend largely on the economic environment assumed. A major distinction in the economic environment is drawn between the short run and the long run because of the extent of the respective mobility of resources. In the short run limited mobility of resources of capital and land is assumed. Because of this assumption substitution among primary factors is small. This in turn limits the adjustment of industries and resources to the shock. In the long run resources tend to move among industries allowing more adjustment to take place.

Short-run economic environment

The major assumptions influencing the economic environment in the short run concern aggregate employment, aggregate consumption, the exchange rate, capital and land.

Fixed employment is assumed because Mauritius has been at near full employment levels since 1987. Aggregate real wages adjust so that there is no change in aggregate employment. However, occupational and industrial employment are allowed to vary while maintaining occupational and industrial wage relativities fixed. This assumption specifies that the decrease in the export price for sugar affects the distribution of employment between different occupations and industries, but it keeps aggregate employment unchanged. The economy adjusts to changes in aggregate employment demand by varying the economy-wide real wage.

[1] The area *lbco* can be counted as a loss from either price reduction or from quantity cuts not both. In this case, it is considered a loss due to price reductions.

Capital and land are assumed to remain fixed in supply in the short run. In the short run, a decline in the export price of sugar is assumed to have no effect on the level of industry specific capital stock. This is because the current supply of capital stock in each industry is assumed to be determined by investment undertaken in the past. A fall in the export price of sugar now only affects current investment plans which determine capital stock in the long run. Therefore, the short-run effects of the EC sugar price fall are assumed to be felt in industries' rates of return (r_j) rather than in the sizes of their capital stock.

The model allows to set either real aggregate consumption or trade balance exogenously. Ideally both should been set endogenously. Given the restriction of the model real consumption is set exogenously. The shares of consumption and investment spending are fixed. It is also assumed that government spending changes by the same proportion as private consumption. These assumptions imply that aggregate consumption, government consumption and aggregate investment spending do not adjust to lower export EC prices of sugar in the short run. Instead, these variables are determined exogenously. The effect of lower export prices on aggregate expenditure is therefore determined as a difference between aggregate exports and aggregate imports and is reflected in the balance of trade. Initially in the base data the balance of trade was in surplus. Therefore a fall in the balance of trade may not mean a balance of trade deficit, but a deterioration in the trade balance, that is, a reduction in the surplus.

Since the model does not have a monetary sector, the absolute level of prices is not determined. The model deals with relative price changes, that is, real price changes. For this reason, one of the price variables - the nominal exchange rate or the consumer price index (CPI) needs to be held constant as a numeraire. In this model the nominal exchange rate is held constant as in ORANI models. By holding the nominal exchange rate constant, changes in the CPI indicate changes in domestic price relative to world prices, that is, changes in the real exchange rate.

The real exchange rate is the ratio of the nominal exchange rate to the consumer price index. A fall in the export price of sugar depreciates the real exchange rate through deflation (a reduction in the CPI) leaving the economy to adjust through changes in relative prices and consumption patterns.

Long-run economic environment

In the long run, as in the short run, aggregate employment and the nominal exchange rate are assumed fixed. But the assumptions of fixed capital and aggregate consumption are relaxed. Though aggregate employment is assumed fixed in the long run, labour is assumed to move within industries. Skill categories are also assumed to expand and shrink. In the long run, rates of return on capital employed by each industry are assumed to remain unaffected by changes in the export price of sugar. Instead each industry adjusts its capital stock to maintain its real rate. Real aggregate consumption and other components of real domestic absorption are allowed to vary in the long run. The balance of trade is set exogenously to maintain the long-run equilibrium in external transactions.

Simulation scenarios and results

Three different simulations were run using the CGE model of Mauritius described in chapter 6.

1. A 40 per cent decline in the EC sugar price and an 8 per cent increase in the world price.
2. A 10 per cent decline in the Mauritius sugar export quota to the EC.
3. Reduction in the EC sugar price by 40 per cent, increase in the world price by 8 per cent and reduction in the Mauritius export quota of sugar to the EC by 10 per cent.

Scenario 1: A 40 per cent decline in the EC sugar price and an 8 per cent increase in the world sugar price:

Short-run adjustment

A 40 per cent decline in the price of sugar in the EC market more than offsets the 8 per cent increase in the world price of sugar. The impact of the increase in the world price is negligible, as only 20 per cent of the Mauritian sugar export goes to the world market, although, more would be exported to the world market as a result of the increase in the world price.

The economy-wide effects of the changes are unfavourable for almost all macroeconomic variables measured against a baseline of 1987. The changes cause declines in GDP, aggregate real wages, nominal investment (real investment is set exogenously), aggregate nominal consumption (real consumption set exogenously), aggregate exports and aggregate imports. They worsen the balance of trade. The only positive impact is on the CPI which rises less rapidly and the depreciation of the real exchange rate.

The decrease in the export price of sugar worsens Mauritian terms of trade and therefore lowers income from aggregate export sales. National income falls, but the projected fall in real GDP is only about 1 per cent (Table 7.1).

Table 7.1 **The impact on Mauritius of a 40 per cent decline in the EC sugar price and an 8 per cent increase in the world sugar price**

	Short run	Long run
	Percentage changes	
Real GDP	-0.9	-1.7
Aggregate employment	exogenous	exogenous
Aggregate wage rate	-0.6	-1.1
Import (foreign currency)	-6.4	-6.9
Export (foreign currency)	-7.4	-6.0
Trade balance (million rupee at 1987 price)	-271.5	exogenous
Real exchange rate	3.7	2.8
Consumer price index	-3.7	-2.8
Price of capital	-1.6	-1.3
Real investment	exogenous	-1.7
Real consumption	exogenous	-1.7
Skilled employment	0.0	-0.6
Unskilled employment	-0.0	0.3
Output of:		
Sugar	exogenous	exogenous
Other agriculture	-4.6	-7.9
Non-export processing enterprises manufactures	-4.0	-8.1
Export processing enterprises clothing	3.9	6.0
Other export processing enterprises manufactures	5.0	10.9
Construction and utilities	-0.3	-4.2
Tourism	1.1	1.1
Other services	-0.2	-1.9
Export volume of:		
Export processing enterprises clothing	4.2	7.0
Other export processing enterprises manufactures	5.6	12.8
Tourism	1.2	1.2

At the sectoral level, the fall in the price of sugar leads to expansion of export-oriented industries and contraction of import-competing industries and non-tradables. The contraction in import-competing industries is more marked than the decline in non-traded outputs. Export-oriented industries include sugar and clothing produced by export processing enterprises, other export processing manufactures, and tourism.

Other agriculture and non-export processing manufactures fall into import-competing industries while other services, utilities and construction are non-tradables.

An important consequence of the fall in the export price of EC sugar is a decrease in the level of domestic prices relative to foreign prices. As most of the sugar is exported, a fall in the price of sugar has little direct effect on domestic prices. The fall in relative domestic prices originates from the recessionary impact of the price cut. Assuming the nominal exchange rate is fixed, the real exchange rate depreciates with falling consumer prices. Depreciation of the real exchange rate denotes a decrease in domestic relative to world prices. The consumer price index falls by 3.7 per cent.

In this analysis aggregate imports valued in foreign currency decline by 6.4 per cent. Aggregate imports fall as a result of the shift in demand from imported goods to domestically produced goods. The real depreciation causes relatively cheaper prices for domestic goods. They also fall because of the decline in overall demand as economic activity slows down. The estimates indicate that exports in foreign currency will fall by 7.4 per cent due to the large fall in the export price of sugar.

The net effect of the decline in aggregate exports and aggregate imports is a deterioration in the balance of trade. The difference between the two aggregates amounts to 272 million rupees at 1987 prices. This lowers the balance of trade surplus to 1645 million rupees from its level of 1917 million rupees before the shock. As all the components of aggregate expenditure except exports and imports are assumed fixed, the difference between the trade aggregates determines the change in aggregate expenditure.

The other economy-wide adjustment occurs in the labour market. The slowing down of the overall level of activity tends to reduce overall employment. However, due to the assumption of full employment, the aggregate employment level is fixed. The aggregate wage rate falls by 0.6 per cent to maintain full employment.

The effect of the domestic price decrease is to make export-oriented industries more competitive and expand production for export. The sugar industry is an exception. The production of this industry can be raised very little, because the EC price decline outweighs the increase in competitiveness.

With increased demand for export commodities due to the real depreciation, exporting industries expand their output. The relative increase in the output level of export-oriented industries is determined largely by their sensitivity to the depreciation. Because Mauritian exports are only a very small proportion of total world exports, Mauritius cannot influence the foreign currency price of its exports. However, export earnings rise by increasing its volume of exports at higher domestic currency prices. As a result, export processing enterprises producing almost exclusively for the world market increase production by 3.9 per cent for clothing and by 5.0 per cent for other export processing products. The other exporting industry, tourism, expands production by only 1 per cent.

The level of activity of non-traded industries depends on the level of activity in the economy in general. As overall activity (GDP) declines by a little below 1 per cent, non-traded industries fall by about 0.3 per cent.

The level of activity of import-competing industries depends on the extent of import competition as well as on overall economic activity. While the slow down of overall economic activity has an unfavourable effect, the improved competitiveness of domestic goods due to the depreciation of the real exchange rate helps import-competing industries. The decline in activity in the import-competing industries of other agriculture and non-export processing manufactures indicates that the unfavourable effect of the slow down of overall economic activity outweighs the favourable effects of the improvement in competitiveness. Besides, the contraction of the sugar industry would have a negative impact on industries linked directly to it. These industries include industries providing inputs to the sugar industry such as fertilizer and packing materials. Simulation results show that production of other

agriculture and non-export processing enterprises manufactures declines by 4.6 and 4.0 per cent respectively.

As demand for final consumption and aggregate investment is assumed to be fixed in the short run, the only variable demand is intermediate usage. Industries which have raised their level of activity because of the shock (export processing enterprises and to some extent tourism industries) are expected to increase their inputs, including intermediate inputs, from domestic and imported sources. But the export processing industries which are the major contributors to the expansion do not increase their domestic intermediate inputs because they are largely users of imported inputs. They obtain their imported inputs free of duty. As long as domestic prices do not fall below imported prices minus tariffs, export processing industries do not substitute domestic inputs for imported inputs. As a result, import-competing industries do not benefit from the expansion of export processing industries. Output of import competing industries declines because they are used largely as inputs into the industries whose activity has declined.

The expanding industries increase their labour input by up to 17 per cent (for other export processing enterprises). This increase in labour input comes from contracting industries which have shed their unwanted labour. Large cuts of 23 and 12 per cent respectively are observed in other agriculture and non-export processing enterprises manufactures.

As capital is fixed and industry specific in the short run, the rental price of capital adjusts to reflect increasing returns to the expanding industries. The largest increase in rental price of capital is observed in other export processing enterprises.

Similarly, in the contracting industries, other agriculture and non-export processing enterprises, a fall in output price is passed onto the factors of production in the form of lower rates of return on land and capital. The simulations indicate that payments to capital and land both decline by 24 per cent in other agriculture. The corresponding figure for non-export processing manufactures is 14 per cent. As

capital and land are assumed to be fixed in supply and industry specific in the short run, they do not leave the industries despite the fall in their rental prices.

Long-run adjustment

The long-run adjustment differs from the short-run adjustment largely because of the underlying assumptions about the mobility of resources in the economy. While the direction of change is generally the same in the two simulations, larger magnitudes are observed in the long run because of the assumed high mobility of capital. The assumption of mobility of capital between industries allows for a shift of capital from the contracting to the expanding industries. This shift of capital could sometimes occur between existing firms. It could also reflect the closure of firms in contracting industries and the opening of new firms in expanding industries. As firms are not modelled explicitly, their behaviour cannot be observed from the simulation results.

The assumption of labour mobility in the long run, as in the short run, allows movement of labour within industries and between different occupations. The simulation shows that employment of skilled labour falls and that of unskilled labour increases slightly. The increase in unskilled labour reflects the large proportion of unskilled and semi-skilled labour in the expanding export processing enterprises, particularly clothing, industries.

A fall in the price of sugar lowers aggregate imports more than aggregate exports in the long run. The effect of the shock on imports remains almost the same as in the short run. However, aggregate exports do not decrease as much as in the short run due to expansion of export-oriented industries aided by the ease in mobility of capital.

A decrease in aggregate import spending (6.9 per cent) greater than that of aggregate export earnings (6.0 per cent) maintains equilibrium in the balance of trade because of the initial balance of trade surplus. By maintaining a constant balance of trade by assumption, the contraction effect of lower prices for sugar on aggregate demand is reflected in lower aggregate consumption and investment.

With the balance of trade held constant, the components of real absorption (consumption, investment and government spending) are each assumed to change proportionally to the change in GDP.

Lower aggregate consumption puts downward pressure on domestic prices, pushing down the consumer price index by 2.8 per cent. This is a smaller reduction than in the short run because the long-run simulation allows the economy to adjust more fully. Domestic price changes come closer to foreign price changes.

Falling domestic costs of production resulting from lower domestic prices are expected to enhance the competitive position of both exporting and import-competing industries. This is true for the export-oriented industries and as a result output increases by up to 10.9 per cent for other export processing enterprises. This is more than double the increase in the short run, because in the long run resources move out of the less profitable industries and thus allow further expansion of the export-oriented industries. However, for the industries producing for the domestic market, the favourable supply side effects (lower domestic costs) are more than offset by the unfavourable demand side effects of depressed domestic demand. Consequently, the activity of industries producing for the domestic market is discouraged. The expansion of activities in the export-oriented industries is more than offset by the contraction of industries producing for the domestic market, leading to a decline in GDP of 1.7 per cent.

The general contraction in economic activity tends to depress the demand for labour. However, the total number of jobs is assumed to remain constant in the long run. Therefore any tendency for a decrease in the demand for aggregate labour is offset by allowing the real wage rate to decline to maintain equilibrium in the labour market.

Scenario 2: A ten per cent decline in the Mauritius sugar export quota to the EC

Short-run adjustment

The effect of a fall in the volume of exports to the EC market on the Mauritian economy will be small because it is assumed that what is not sold on the EC market is sold on the world market. The loss to Mauritius would be the export revenue forgone due to the price difference between the EC and the world markets on 10 per cent of its sugar exports. The volume of total sugar exports does not change; the same amount of sugar is produced. As the model does not allow the simulation of export volume changes directly, it is done through price changes indirectly.

Aggregate imports fall by 1 per cent, due to the decline in overall demand and also due to substitution of relatively cheaper domestic goods for imported goods. A smaller decline in aggregate exports of 0.8 per cent is observed because of a lower export price for 10 per cent of sugar export. The net effect on aggregate exports and imports under the short-run assumption is reflected in a marginal decrease in GDP.

Export revenue declines from the cut in the sugar quota to the EC market. This leads to a drop in overall income meaning depressed overall activity. The fall in the activity level of industries depresses demand for inputs which in turn depresses domestic prices. The decline in overall domestic prices is reflected by a 0.6 per cent fall in the CPI. This lowers the domestic cost of production relative to unchanged world prices and therefore raises the international competitiveness of export industries. Consequently, the activity level of export processing enterprises increases. The expansion in the export processing enterprises to some extent offsets the small contraction (in value terms) of the sugar industry.

Other agriculture output, which is the major loser (-4.6) in the price shock scenario (scenario 1) falls by only 0.6 per cent. This could be because the demand for other agriculture does not decline much in this scenario. The main reason for this could be that the major user of other agriculture, non-export processing manufacturing, does not decline in this scenario as much as in the price shock case. In

this shock non-export processing manufactures decline by only slightly more than a half of the magnitude in the price shock.

The demand for labour in the sugar industry falls by approximately 4 per cent. Because of the assumption of fixed capital and land in the short run, the demand for these inputs has not changed. However, due to the fall in the profitability of the industry, the return to both capital and land decreases substantially by 7 per cent each.

Table 7.2 **The impact on Mauritius of a 10 per cent decline in its sugar export quota to the EC**

	Short run	Long run
	Percentage changes	
Real GDP	-0.1	0.2
Aggregate employment	exogenous	exogenous
Real wage	-0.1	-0.2
Import (foreign currency)	-1.0	-0.5
Export (foreign currency)	-0.8	-0.4
Trade balance (million rupee at 1987 price)	32.2	exogenous
Real exchange rate	0.6	0.3
Consumer price index	-0.6	-0.3
Price of capital	-0.4	-0.2
Real investment	exogenous	0.2
Real consumption	exogenous	0.2
Skilled employment	0.2	0.5
Unskilled employment	-0.1	-0.2
Output of:		
Sugar	exogenous	exogenous
Other agriculture	-0.6	-0.5
Non-export processing enterprises manufactures	-0.7	-0.6
Export processing enterprises clothing	0.3	0.8
Other export processing enterprises manufactures	0.4	1.4
Construction and utilities	-0.1	-0.2
Tourism	0.3	0.4
Other Services	-0.2	-0.3
Export volume of:		
Export processing enterprises clothing	0.3	1.0
Other export processing enterprises manufactures	0.4	1.6
Tourism	0.3	0.5

Long-run adjustment

As in the short run, exports of sugar to the EC market are cut by 10 per cent. But, unlike the short run, resources are released by the sugar industry in response to declining returns. These resources are employed in the more profitable export processing enterprises and to a lesser extent in tourism. The increase in the activity level of export processing industries is larger than under short-run conditions. Import-competing industries have also regained some of the resources they shed in the short run.

The movement of resources from where they are paid less to where they earn more reduces the average overall price level change from -0.6 per cent in the short run to -0.3 per cent in the long run (Table 7.2). This indicates a smaller decrease in domestic costs relative to the rest of the world in the long run than in the short run. The relative increase in domestic costs in the long run, coupled with a small increase in overall demand, reduces aggregate imports by only -0.5 per cent. The real exchange rate depreciates in the long run by half as much in the short run. The foregone revenue in sugar exports lowers aggregate exports by 0.4 per cent compared to 0.8 per cent in the short run. As in the short run all exports have expanded in volume but at a bigger magnitude.

The effect of scenario 2 in the long run on individual industries output and volume of exports is similar to scenario 1 but of smaller in magnitude. Major macro-variables, except real GDP and real investment, are also influenced in the same way in the two scenarios, in the long run. Real GDP and real investment have fallen in scenario 1 while they have increased in scenario 2.

In both the short run and the long run the gainer and loser industries from the shocks remain unchanged. The gainers are export-oriented industries whereas the losers are import-substituting and non-tradable industries. The supply of exports grow as resources move out of import-substituting and non-tradable industries and move into export-oriented industries. Import-substituting industries contracted less in the long run than in the short run. The reverse is true for non-tradable industries.

Scenario 3: Price and quantity reduction of sugar export to the EC

The combined effects of the export price and quota decline in the EC markets on the Mauritian economy are presented in Table 7.3. The figures in the table are obtained by adding those in Table 7.1 and 7.2, as the model allows the addition of the results of different shocks.

The combined effect is estimated to reduce real GDP by 1 per cent in the short run and by 1.5 per cent in the long run. All macro-variables fall. This fall is generally less severe in the long run than in the short run. The outcome on individual industries is bigger in the long run than in the short run. In the long-run, industries that contracted in the short run, contract more in the long run, and those that expand, expand more in the long run because of the mobility of capital. Import-competing industries are the major losers. The import-competing industries are estimated to contract by almost 9 per cent in the long run, with generally smaller contraction in the short run. The export-oriented industries are the only beneficiaries from the change. The largest gain goes to Other export processing enterprises which expand in the long run by 12.3 per cent with an expansion of 14.4 per cent in export volume.

Lower export prices depressed the value of exports in terms of foreign currency receipts despite the substantial rise in export volume.

Table 7.3 **The impact on Mauritius of a 40 per cent EC sugar price decline, 8 per cent world sugar price increase and 10 per cent quantity decline**

	Short run	Long run
	Percentage changes	
Real GDP	-1.0	-1.5
Aggregate employment	exogenous	exogenous
Real wage	-0.7	-1.3
Import (foreign currency)	-7.4	-7.1
Export (foreign currency)	-8.2	-6.4
Trade balance (million rupee at 1987 prices)	-240.3	exogenous
Real exchange rate	4.3	3.1
Consumer price index	-4.3	-3.1
Price of capital	-2.0	-1.5
Real investment	exogenous	-1.5
Real consumption	exogenous	-1.5
Skilled employment	0.2	-0.1
Unskilled employment	-0.1	0.1
Output of:		
Sugar	exogenous	exogenous
Other agriculture	- 5.2	- 8.3
Non-export processing enterprises manufactures	-4.7	-8.9
Export processing enterprises clothing	4.2	6.8
Other export processing enterprises manufactures	5.4	12.3
Construction and utilities	-0.4	-4.4
Tourism	1.4	1.5
Other Services	-0.4	-2.2
Export volume of:		
Export processing enterprises clothing	4.5	8.0
Other export processing enterprises manufactures	6.0	14.4
Tourism	1.5	1.7

8

The impact of the Multifibre Arrangement on the Mauritian economy

We saw in Chapter 4 the importance of the clothing sector in the development of the export processing industries. That development has been significantly influenced by the Multifibre Arrangement.

Global aspects of trade in clothing

Clothing has been one of the early manufacturing industries to develop in both industrial and developing countries (Blokker 1989). It is one of the least skill and capital-intensive industries and its relative importance has declined in industrial countries as industrialization has progressed (Field 1984; Anderson 1990).

Japan was the first of the twentieth century developing countries to begin exporting textiles and clothing in the 1920s. By the 1950s other developing countries had began to develop clothing exports. Clothing exports, particularly from Asian developing countries, begun to penetrate industrial country markets on a broad scale because clothing and textiles were the least competitive component of manufactures in industrial countries. The industrial countries attempted to restrict the rate of expansion of clothing and textiles imports from the 1920s, accelerating their efforts after World War II. A series of restrictive agreements culminated in the Multifibre Arrangement in 1974.

World trade in clothing

Clothing is a small component of world trade in manufactures. In 1989, clothing comprised 4.5 per cent of world manufacturing trade (Table 8.1). But world trade in clothing has grown rapidly in absolute terms, with the share of clothing exports in total exports of manufactures nearly doubling between 1965 and 1989 (Table 8.2).

Table 8.1 **Clothing exports as a share of manufactured exports, 1965-89** (per cent)

	1965	1975	1985	1989
Industrial countries	2.3	2.1	2.0	2.0
Developing countries	9.4	16.0	14.8	15.7
Centrally planned European countries	2.3	3.8	4.1	5.8
World	2.7	3.1	3.9	4.5

Sources: International Economic Data Bank, the Australian National University, Canberra, 1991.

World exports of clothing grew faster than world trade in manufactures until the early 1980s. Then their growth fell below the average growth of trade in manufactures. Much of the growth in clothing exports originated from developing countries which quadrupled their share between 1953 and 1988.

Table 8.2 **World trade in clothing: geographical distribution, 1953-88**

	1953	1963	1973	1983	1988
Exports (US$ billion)	0.8	2.2	12.6	41.0	89.5
Share of world exports			per cent		
Industrial countries	71	67	51	38	41
Developing countries	10	15	35	48	45
Eastern trading area	19	18	14	14	14
World	100	100	100	100	100
Share of world imports			per cent		
Industrial countries	56	66	78	75	84
Developing countries	26	17	10	17	10
Eastern trading area	18	17	12	8	6
World	100	100	100	100	100

Sources: N. Blokker, *International Regulation of World Trade in Textiles: Lesson for practice a contribution to theory,* London/Boston, 1989; GATT, *International Trade, 1989/90,* Geneva, 1990; and I. Trela, and J. Whalley, "Unravelling the threads of the MFA", in Carl Hamilton (ed.), *The Uruguay Round Textiles Trade and the Developing Countries: Eliminating the Multifibre Arrangement in the 1990s,* Washington, D.C., 1990.

In the last three decades world clothing exports have shifted from industrial to developing countries. In 1989, the bulk (89 per cent) of clothing exports went to industrial country markets (Table 8.3). Industrial countries also became increasingly the major markets for clothing exports from other industrial countries. In 1989, 90 per cent of clothing exports of industrial countries went to other industrial countries. In total, industrial countries absorbed almost 90 per cent of world clothing exports as compared to a little over 80 per cent in 1963.

Table 8.3 **Clothing: direction of trade, 1963 and 1988**

	Industrial countries		Developing countries		Eastern trading area	
	1963	1988	1963	1988	1963	1988
From:			US$ billion			
World	1.4	76.0	0.37	8.8	0.37	5.0
Industrial countries	1.2	33.0	0.27	2.8	0.02	0.7
Developing countries	0.2	36.0	0.09	3.8	0.0	0.9
Eastern trading area	0.04	6.8	0.01	2.3	0.35	3.5
			Percentage of total exports			
Industrial countries	81	90	18	8	1	2
Developing countries	69	89	31	9	0	2
Eastern trading area	10	54	3	18	87	28

Source: J. Field, *Trade and textiles: an analysis of the exchanging international division of labour in textile and clothing sector, 1963-78*, Quezon City, Philippines, 1984; and GATT, *International Trade*, 1989/90, Geneva, 1990.

The share of developing countries in the clothing trade grew strongly in the 1960s and early 1970s, albeit from a low initial base (Wolf 1986). The increase in the developing countries share of exports of clothing reflected their increasing exploitation of comparative advantage. Clothing is one of the most labour-intensive manufacturing industries (Cline 1987).

Leading exporters and importers of clothing

The world's leading clothing exporting developing countries (Hong Kong, the Republic of Korea, China and Taiwan) accounted for over 37 per cent of world exports in 1989. World clothing imports in 1989 were also concentrated with five industrial countries taking 80 per cent of world imports (Table 8.4).

Table 8.4 **Exports and imports of clothing of leading developing country exporters and industrial country importers, 1965-89**

	Value US$ billion			Share in world exports/ imports (per cent)			Average annual change (per cent)	Share in country exports/ imports (per cent)
	1965	1975	1989	1965	1975	1989	1980-88	1989
Exporters								
Hong Kong[a]	0.3	2	14	12	12	15	12	19
Korea, Republic of	.	1	9	1	7	10	15	15
China	.	0.3	13	2	2	14	14	12
Taiwan	.	0.9	5	1	6	5	9	7
Turkey	.	0.1	3	.	1	3	44	24
Portugal	.	0.2	3	1	1	3	18	21
Thailand	.	.	2	.	.	3	27	12
India	.	0.2	2	1	1	2	13	12
Greece	.	0.1	2	.	1	2	15	20
Importers	-							
United States	0.5	3	26	20	15	27	16	6
Germany, Rep	0.4	4	15	10	22	15	7	6
Japan	.	0.5	9	0.3	3	9	5	..
France	0.1	0.9	6	3	5	7	11	4
United Kingdom	0.2	1	6	6	7	6	9	3
USSR	0.1	0.7	0.8	3	4	1	6	4
Netherlands	0.2	1	4	8	8	4	4	4

[a] includes re-exports. In 1989 re-exports were valued at US$4.8 billion.
Source: International Economic Data Bank, the Australian National University, Canberra, 1991; and GATT, *International Trade*, 1989/90, Geneva, 1990.

Developing country clothing exports were initially concentrated in a few East Asian countries. A large part of the growth in clothing exports from developing countries originated from Hong Kong, the Republic of Korea and Taiwan. In 1984 these countries supplied 70 per cent of clothing exports from developing countries to industrial countries. In the 1980s China also become an important exporter. In 1988, China and the three other major developing country exporters accounted for 75 per cent of clothing exports from developing to industrial countries. In the 1960s and 1970s the share of exports from developing countries to industrial countries on average increased by 6 per cent every year. However, in the 1980s this growth declined to 3 per cent.

The domination of clothing exports by East Asian countries does not mean that clothing exports are not important to other developing countries. In 1988 clothing exports accounted for more than half of manufactures exports for six developing countries (Table 8.5). The share of Mauritian clothing exports in total manufactured exports is the highest among developing countries (84 per cent). For all 20 countries listed, clothing exports made up 20 per cent or more of manufactures exports.

Table 8.5 **Exports of clothing for selected developing countries, 1980 and 1988**

	Value (US$ million) 1988	Average annual increase 1980-87	Share of manufactured exports (per cent) 1980	1988
Hong Kong	11786[a]	12	28	21
Korea Republic	9100	10	6	7
China	4872	12	56	21
Taiwan	4700	11	13	8
Turkey	2415	50	17	32
Portugal	2218	19	19	27
Thailand	1834	28	16	21
India	1578	15	13	20
Greece	1444	20	17	42
Macao	967	11	72	66
Pakistan	623	29	8	21
Tunisia	550	7	42	42
Morocco	490	23	19	27
Sri Lanka	436	22	64	74
Mauritius	434	29	59	84
Bangladesh	416	120	0	48
Costa Rica	205	40	7	52
Dominican Republic	200	177	0	62
Haiti	163	13	29	38
Uruguay	154	4	30	30
Jamaica	106	47	10	59
Syria	85	19	19	20

[a] includes re-exports from China.

Source: GATT, *International Trade 88/89*, Geneva, 1990.

The Lomé Convention

The Lomé Convention establishes a relationship between the EC and the developing African, Caribbean and Pacific countries (ACP) based on the legacies of colonialism. Most of the ACP countries (of which Mauritius is one) were once colonies of either Britain or France. France sought to preserve colonial trading arrangements to maintain its political

commitment of fostering social and economic development in its former colonies. The colonies also provided France with low cost labour, land and natural resources. The implementation of these mutual benefits was initially agreed between the parties involved under the Yaoundé Conventions.

Objectives and historical perspective

The Lomé Convention was built on the Yaoundé Agreements which were signed between the EC and politically independent francophone African countries in 1963 and 1969. The East African Common Market member countries (Kenya, Tanzania and Uganda), the Commonwealth African and Pacific developing countries and the former Dutch colonies of the Caribbean had bilateral trade arrangements with the EC members at that time. By merging these countries with the Yaoundé signatories, Lomé was created in 1975. The Yaoundé Agreement focused on aid and trade, although it had some elements of economic diversification and industrial development. These latter characteristics were to become integrated into the Lomé Conventions later.

Four separate Lomé Conventions have been signed. The Lomé Conventions of 1975, 1979, and 1984 maintained the broad features of the trade and aid regime. The latest Convention, Lomé IV was signed in 1990 and is to run until 1994. By June 1991 the Lomé Convention represented an Agreement between 12 EC countries and 69 ACP countries (see Appendix 8.1 for the list of ACP member countries).

The latest Convention has the following provisions :

1. Non-reciprocal preferential access of Africa, Caribbean and Pacific exports to EC market

In principle the Lomé Convention allows free and unlimited access of ACP exports to EC markets, whereas the ACP countries are not required to grant similar concessions in return. EC exports only have access to ACP markets on a Most Favoured Nation (MFN) basis (Lister 1988). However, in practice there are certain restrictions on ACP exporters

entering the EC market. These include the Common Agricultural Policy, rules of origin and national safeguards.

The EC retains the right to suspend trade preferences if it considers that agricultural exports from ACP countries threaten its Common Agricultural Policy.

Processed goods are subject to rules of origin. According to a World Bank (1989) study, among the number of restrictions contained in the Lomé Convention, the rules of origin and the safeguard clause are the most serious hindrances to ACP exports, including clothing exports. Rules of origin ensure that most of the value added of exports originates in ACP or EC countries. Restrictive rules of origin are applied to prevent trade diversion from third party countries to the EC through ACP countries. Products are considered as originating in ACP states if they are produced from inputs wholly produced in ACP states or in the EC. In addition, inputs which have originated elsewhere but have undergone major processing in ACP states or in the EC are considered to have been produced in ACP states. Thus, imported inputs from other ACP countries or the EC are considered to have originated in producer ACP countries. The rules of origin require that at least 50 per cent of the value added originate in ACP states.

The rules of origin have serious consequences for the clothing industry. The World Bank (1989) pointed out that the rules of origin have encouraged vertical integration in the textile and clothing industry. For instance, knitwear does not satisfy the rules of origin if made from imported yarn but it satisfies the rules if it is made from imported wool manufactured into yarn domestically (in the EC) or in the ACP states.

Some consider that rules of origin encourage the process of adding value in ACP countries. Others argue that the value added requirement is too high to achieve. For instance, Twitchett (1980) argued that in most ACP states manufacturing adds only some 25-40 per cent of value, and rules of origin "constitute an almost impossible hurdle". It could also encourage the use of inputs from the EC where capital is relatively abundant making manufacturing relatively capital intensive.

The EC reserves the right to impose tariff or quantitative limitations on preferential imports to protect its domestic producers. The EC introduced national safeguards against individual ACP exporters in the late 1970s to protect domestic jobs in the EC textile and clothing industry. These safeguard measures allow importing countries to impose tariffs or quotas when domestic producers face serious competition from increased imports. The EC also puts ceilings on overall ACP exports of textiles and clothing to its member countries.

Quantitative restrictions are highest on imports which compete with domestic products. According to the degree of competition with domestic products, imports are classified as sensitive, semi-sensitive or non-sensitive (Borrmann *et al.* 1981). Sensitive products, such as textiles and clothing, are subject to strict surveillance of imported quantities and as soon as the EC quota is reached the MFN tariff is applied. Semi-sensitive products receive more liberal treatment. There is no regular surveillance of preferential imports of non-sensitive products.

The restrictiveness of the EC towards imports of textiles and clothing from ACP countries is pointed out in the *Courier* (1986: 90)

> *However, even this comparatively minor threat to domestic jobs in the EC textile industry from the ACP exports did not deter the Community from introducing national safeguards against individual ACP exporters in the late seventies (knitwear exports of Mauritius to the UK, for instance). Later on, the Community went further by establishing a similar network of intra-EC member country ceilings on overall ACP exports as it was fixed for each MFA signatory country in "hyper-sensitive" items on a quota basis.... In the case of pullovers, which includes knitwear from Mauritius, the ceiling was almost fully utilized.*

These set-backs undoubtedly caused considerable difficulty to some ACP exporters to the EC.

The Lomé Convention trade preferences that the EC granted to the ACP countries have apparently contributed little to trade in primary products except sugar. For most primary products not produced in the EC, tariffs are negligible or zero. As most ACP

exporters were primary producers, they would have entered the EC market at low or zero tariff rates without the Convention.

The General System of Preferences and the ACP agreements offer the same customs benefits for semi-finished and finished manufacturing products. However, as General System of Preferences apply stricter rules of origin than ACP preferences, products which qualify for ACP preferences may not qualify for the General System of Preferences. Lister (1988) remarked that 90 per cent of ACP manufactures exports would have entered the EC market duty-free under the General System of Preferences arrangements. For this reason special preferences given to ACP countries were eroded by the introduction of General System of Preferences as well as the Most Favoured Nations tariff cuts negotiated during the Tokyo Round (Twitchett 1980).

2. Stabilization of commodity export earnings

The Lomé Conventions provide three forms of compensatory finance for primary commodities.

Compensatory financing facility. This is a limited form of insurance known as STABEX (stabilization of export earnings). The objective of STABEX is to support export earnings when sharp falls are caused by supply problems (such as floods or drought) or demand problems (such as a fall in demand that leads to a reduction in volume produced or prices). STABEX primarily provides temporary relief (usually for agricultural and some partially processed products) in the form of grants or interest free loans. The effectiveness of the scheme in stabilizing export earnings is limited because it covers only 30 per cent of ACP export earnings (Lister 1988). Further, the funds are usually received the year after the shortfall thus reducing stabilization effects.

Mining financing facility (SYSMIN). This is a form of project aid for mineral production for exports designed to support mineral production in ACP countries. It also helps to ensure regular mineral supplies to the EC.

Sugar guaranteed prices. The Sugar Protocol annexed to the Convention goes beyond stabilizing earnings. It ties the guaranteed price for ACP sugar to the price which European sugar producers receive as discussed in Chapters 3 and 7.

3. Financial aid

The EC provides financial aid through the European Development Fund (EDF) in the form of grants and loans at concessional interest rates(Table 8.6).

Table 8.6 **Finacial flow from EC to ACP by source and type, 1975-89** (million ECU and per cent)

	Lomé I (1975-79)		Lomé II (1980-84)		Lomé III (1985-89)		Lomé I-III (1975-89)	
	million ECU	per cent	million ECU	per cent	million ECU	per cent	million ECU	per cent
Total European Development Fund	**3.0**	**86**	**4.6**	**84**	**7.4**	**87**	**15**	**85.7**
Grants[a]	2.1	60	3.0	55	4.9	58	10	57.1
Special loans[b]	0.5	13	0.5	9	0.6	7	1.6	9.1
Risk capital	0.1	3	0.3	5	0.6	7	1	5.7
STABEX[c]	0.4	11	0.6	10	0.9	10	1.9	10.9
SYSMIN[d]	-	-	0.3	5	0.4	5	0.7	4.0
Total European Investment Fund	**0.4**	**11**	**.09**	**16**	**1.1**	**13**	**2.4**	**13.7**
Loans with interest subsidies[e]	0.4	11	0.7	12	1.1	13	2.2	12.6
Loans with outside the Convention[f]	-	-	0.2	4	-	-	0.2	1.1
Total	**3.5**	**100[g]**	**5.5**	**100**	**8.5**	**100**	**17.5**	**100**

[a]Including emergency aid for refugees. [b]Special loans have standard conditions for repayment- 40 years with a 10 year grace period. The 1 per cent interest rate is brought down to 0.75 for the least developed countries. [c]STABEX transfers are grants for the least developed countries and interest-free loans for the others. [d]Same conditions as for special loans. [e]Interest subsidies are becoming standard and automatic and mean a 3 per cent cut in the interest rate for the borrower (except in the case of investments in the oil sectors). [f]Mining and schemes of mutual interest. [g]This figure includes the running costs of the Commission delegations in the ACP countries; since Lomé II, they have been paid directly from the community budget.

Source: *The Europe-South Dialogue*, Commission of the European Communities, 1990, Geneva.

4. Industrial and technical co-operation

Industrial and technical co-operation focuses on industrial training and the development of appropriate technology for ACP countries.

ACP-EC trade under the Lomé Convention

One of the stated aims of all four Lomé Conventions has been to promote ACP trade with the EC. The main instrument is the reduction or elimination of tariffs on EC imports from ACP countries.

Table 8.7 **Share of imports from ACP and non-oil exporting developing countries to the EC and the world, 1975-89** (per cent)

	Lomé I (1975-79)		Lomé II (1980-84)		Lomé III (1985-89)		Growth of share 1975-89	
	EC	World	EC	World	EC	World	EC	world
ACP total	3.5	3.0	3.3	2.6	2.1	1.6	-5.6	-6.7
ACP Africa	3.2	2.5	3.0	2.2	1.9	1.4	-5.5	-6.3
ACP Caribbean	0.3	0.4	0.3	0.3	0.1	0.2	-8.0	-10.0
ACP Pacific	0.1	0.1	0.1	0.1	0.1	0.1	-7.5	-2.0
Non-oil exporting developing countries	6.3	9.3	6.4	10.8	7.2	13.7	..	..
Asia	2.8	5.4	3.2	7.1	4.2	10.4	2.9	4.9
Latin America	2.5	3.2	2.3	3.0	1.9	2.5	-0.3	1.7
Other	1.0	0.6	1.0	0.7	1.1	0.9	-2.0	-2.1

Source: International Economic Data Bank, The Australia National University, Canberra, 1991.

ACP countries have exported little to the EC (Table 8.7). The share of EC imports from ACP countries decreased from 3.5 per cent in 1975-79 (Lomé I) to 3.3 per cent in 1980-84 (Lomé II) and further to 2.1 per cent in 1985-89 (Lomé III). The fall in the share of EC imports from ACP countries was largely the result of a fall in the share of imports from African nations. The fall would have been more dramatic if Nigeria's exports, which were primarily petroleum products (85 per cent) and accounted for 18 per cent of ACP exports in 1988, were excluded. Only 20 per cent of ACP countries increased their share of exports to the EC from 1975 to 1989 in maintaining international competitiveness. These countries were Burundi, Cameroon, the Congo, Equatorial Guinea, Lesotho, Mauritius, Niger,

Rwanda and Grenada. With the exception of Burundi, these countries have also raised their total export shares to the world. At the same time the share of EC imports from non-ACP, non-oil exporting developing countries, particularly from Asia, has increased steadily.

The ACP countries have lost their share of exports not only to the EC market but also to the rest of the world (Table 8.7). Exports to the world fell from 3 per cent in 1975-79 to 1.6 per cent in 1985-89.

Mauritius has been a marked exception in its export performance in clothing as well as in sugar.

The preference for ACP countries over other developing countries is limited under the Lomé Convention. As the preference margin is not great, the export performance of a country largely depends on the effectiveness of domestic policies.

Table 8.8 **ACP exports to the EC by major commodity, 1970 -88** (percentage share)

	1970	1980	1988
Cash crops	24	17	25
Coffee	8	8	11
Cocoa	10	6	7
Fruits	1	1	3
Tobacco	1	1	2
Cotton	4	1	2
Petroleum	13	51	24
Petroleum products	12	46	24
Crude petroleum	1	5	-
Minerals	34	12	17
Silver, platinum	21	5	6
Pearl, precious stone	4	2	6
Iron	5	2	2
Non ferrous metal	2	2	2
Aluminium	2	1	1
Other	9	8.4	11
Wood	5	4	5
Sugar and honey	4	2	4
Clothing	-	.4	2
Above total	80	88	77
Total value (US$ million)	4586	27216	18873

Source: International Economic Data Bank, the Australian National University, Canberra, 1991.

Three main types of primary commodities are exported from the ACP to the EC. In 1988, the major export, cash crops, constituted one-quarter of total export value (Table 8.8). Petroleum and petroleum products were also important export commodities. Large amounts of different types of minerals are extracted in ACP countries and exported to the EC market. Petroleum production and export are dominated by Nigeria, while minerals exports are attributed largely to a few African nations (Zaire, and Zambia). Cash crop trade is relatively more diversified.

Clothing exports

ACP exports of clothing have increased from a mere US$ 27 million in 1975 to US$ 378 million in 1988. These exports originated mainly from Mauritius, Ivory Coast and Barbados. Mauritius was the principal source of supply. Nevertheless, Mauritian exports comprise a small share of EC imports. Mauritian clothing exports amounted to only 0.2 per cent of total EC imports in 1975 and rose to 1 per cent in 1989 (Table 8.9).

Table 8.9 **Clothing exports to the EC by major ACP exporters, 1975-89** (US$ million)

	1975	1980	1989
Total ACP	27	108	439
Mauritius	19	80	372
Ivory Coast	2	12	7
Barbados	3	2	3
Other developing countries	2076	5875	15135
Other countries	6090	13493	22608
Total EC import	8193	19476	38182
Mauritius' percentage share of clothing exports to EC of:			
Total ACP	70.0	74.0	85.0
Developing countries	1.0	1.4	2.5
Total EC import	0.2	0.4	1.0

Source: International Economic Data Bank, The Australian National University, Canberra, 1991.

The EC market absorbed as much as 93 per cent of Mauritian clothing exports during the second half of the 1970s. Though the importance of the EC market has steadily declined, it still remains the major market, taking 66 per cent of Mauritian clothing exports in 1985-89. Most of the balance, some 30 per cent of clothing exports, is sold in the US market.

Table 8.10 **Share of clothing exports to manfucturing and total exports by destination, 1970-89** (US$ million)

	SITC code	1970-74	1975-79	1980-84	1985-89
Clothing exports to EC	841	11	196	360	1210
Clothing accessories	8414[a]	8	139	263	747
Clothing not knitted accessories	8411[b]	3	35	65	334
Textiles accessories	8412[c]	0	2	9	105
Clothing exports to US	841	2	7	58	524
Clothing accessories	8414[a]	2	5	34	154
Clothing not knitted accessories	8411[b]	.	2	24	370
Textiles accessories	8412[c]	.	.	.	.
Clothing exports as per cent of manufacturing export to:					
World		37	62	72	78
EC		48	71	79	79
US		33	22	63	84
Clothing exports as per cent of total export to:					
World		2	13	24	46
EC		33	15	22	40
US		4	6	38	75

[a] Knitted non-elastic gloves, socks, underwear and outerwear.
[b] Men's and women's underwear and outerwear not knitted.
[c] Includes handkerchiefs, shawls, veils, ties, cravats etc.

Source: International Economic Data Bank, The Australian National University, Canberra, 1991.

The EC and the United States, the major markets for Mauritian clothing exports, impose Multifibre Arrangement restrictions on developing countries. Any significant supplier (supplying 1 per cent or more of EC total imports) is subject to restriction (Twitchett 1980). As a small supplier Mauritius is subject to restrictions only in the United

Kingdom and United States and only for a few categories of clothing. However, the Multifibre Arrangement, by restricting the entry of more competitive large producers, gives Mauritius an advantage in the EC markets where supply restrictions raise prices. Hamilton (1984) estimated that trade barriers against clothing imports from Hong Kong raise prices in France and the United Kingdom, the two major markets of Mauritius, by 38 and 40 per cent, respectively.

Despite Multifibre Arrangement restrictions, clothing imports from developing countries to the EC, expressed as the share of apparent consumption (production plus imports minus exports), have increased. Even the major restricted countries have improved their penetration of the EC market (Table 8.11). These trends are consistent with the Hughes (1981, 1986) findings that consumption by industrial countries of manufactures imported from developing countries increased in the 1970s and early 1980s.

Table 8.11 **Share of imports in apparent consumption of clothing in the EC (import penetration ratio) by selected country groups, 1980-87**

	Penetration ratio		
	I 1980	II 1987	II/I
Major restricted countries			
Hong Kong	0.45	0.51	1.13
Korea, Republic of	0.44	0.60	1.36
Taiwan	0.36	0.44	1.22
ACP	0.21	0.28	1.33
Mauritius	**.04**	**.06**	**1.50**
All developing	6.78	8.51	1.26
Eastern Europe	0.82	0.80	0.97
Developed countries	28.20	32.70	1.16
Intra EC-7	19.90	23.20	1.16
World	35.90	42.20	1.18

Source: International Economic Data Bank, the Australian National University, Canberra, 1991.

The Multifibre Arrangement

Exports of textiles and clothing from over 30 developing countries are regulated under the Multifibre Arrangement. The Arrangement mandates bilateral agreements between importing industrial countries and exporting developing countries to limit trade in textiles and clothing.

The Multifibre Arrangement originated from the Short-Term Agreements (1960-61) and Long-Term Agreements (1962-74) on international trade in cotton textiles and clothing. Other fibres have been included over time.

The Multifibre Arrangement has been operating since 1974. Although the Multifibre Arrangement violates the basic principle of non-discrimination among trading partners of the General Agreement on Trade and Tariffs, GATT supervises the implementation of the Multifibre Arrangement.

Under the Arrangement, developing member countries agree to limit their exports to member industrial countries through voluntary export restrictions. The importing country imposes an upper limit on foreign supply and the exporting country administers the restriction on export supply. In doing so, exporting countries obtain the rents arising from quantitative restrictions.

Voluntary export restraints create scarcity of the restricted item in the importing industrial countries. This pushes up the price of the restricted item, allowing the exporting country to charge a higher price. The exporting country collects rents (the difference between export earnings at the restricted price and at the unrestricted equilibrium price). In contrast to a tariff which benefits consuming countries' producers or a quota which benefits consuming countries' importers, the system transfers income from consumers and producers in industrial countries to exporters in developing countries, offsetting their losses due to the restrictions on volume. This is the reason why exporting countries usually prefer voluntary export restraints to other import barriers such as tariffs or quotas whose rents accrue totally to the importing countries.

Wolf (1990) noted that quota rents may not be very important for the economies of the exporting countries but still could be important for the entrepreneurs, bureaucrats, and politicians directly engaged in the industry. It is thought that much of the profits of the Hong Kong clothing industry from exports to the United States in the early 1980s may have come from quota rents. Bureaucrats also extract rent in the allocation of export quotas to firms (Wolf 1990).

In non-Multifibre Arrangement markets, prices are lower as producers are willing to sell their excess supply (production less exports to the Multifibre Arrangement markets) at lower prices than those that would prevail without quota rents. This means that producers are cross-subsidizing production to non-Multifibre Arrangement markets from Multifibre Arrangement markets.

Producers in the protected industries in the industrial countries certainly benefit. The scarcity created by the voluntary export restraint allows domestic producers of similar products to mark-up prices and raises production in industrial countries. But consumers lose in industrial countries because prices are higher than they otherwise would be. Hamilton (1984) estimated that trade barriers (tariffs and voluntary export restraints) against clothing imports from Hong Kong raised the price of the imports by 25 per cent in Italy and 49 per cent in Sweden. The variety of clothing products available is also diminished.

Developing countries that are newcomers to the export market receive a short-run benefit from the Multifibre Arrangement. They are able to enter markets freely while established exporters are limited. The latecomers only face restraints when quotas are established and exports hit quota ceilings. As export quotas are allocated among suppliers on the basis of past performance, latecomers are given low levels of quotas. Latecomers lose in the long run, because the arrangement slows down their export growth.

The Multifibre Arrangement has not achieved its main objective of progressively liberalizing the world clothing trade. It is widely recognized, (for instance Cline (1987) and Raffaelli (1990)), that dismantling the Multifibre Arrangement would result in large

efficiency gains. If the Multifibre Arrangement is abolished, countries at relatively low levels of development that are low wage exporters with cheaper fabrics and styles may increase their market share. Producers that have acquired a foothold in the clothing trade through the Arrangement, rather than efficiency, would be forced to leave the market for more efficient producers. Other producers would be able to move up market.

The political economy of protectionism, however, has worked in favour of maintaining the Multifibre Arrangement (Hamilton 1984), in both major exporting developing and importing industrial countries. Inefficient producers in developing countries want to retain the Agreement to maintain their rents. Consumers in industrial countries, the main losers from restrictions, are poorly organized and have weaker bargaining power than the groups who would like to maintain the status quo (Hughes 1986).

The Multifibre Arrangement was to expire by 31 July 1991. It was renewed to the end of 1992 in the expectation that the Uruguay Round which dealt with the trade in clothing and textiles would be completed by this time. It is now agreed within the Uruguay Round that the Multifibre Arrangement will be to phased out over 10 years from 1993 by the gradual removal of quotas towards the end of this period (Page 1991).

The effect of the Multifibre Arrangement on the Mauritian economy: simulation scenarios and results

The Multifibre Arrangement allows free market access mainly to EC and US markets for a large proportion of Mauritian clothing exports. Since it is a small producer by global standards, Mauritius has been able to take advantage of this preferential treatment. With the exception of limited categories of clothing in the UK and US markets, Mauritius has not filled its export quotas. Consequently its export supply is not yet restricted by the Multifibre Arrangement to any marked extent. The Multifibre Arrangement raises the import price of textiles and clothing from Multifibre Arrangement member developing countries to

Multifibre Arrangement restricted markets. The price increase arises from imposition of tariffs and supply constraints imposed by the voluntary export restraints (Table 8.12).

Table 8.12 **Estimates of protection effects on import price of clothing** (per cent)

	EC	United States	Average[a]
Hamilton, C. (1981-82)	38[b]	46	40
Suphachalasai, S. (1983)	48	37	44
Average	43	41.5	42

[a] Average of EC and the United States are import weighted.

[b] Refers to import price increase in France- the major export market for Mauritian clothing exports.

Sources: C. Hamilton, 'Voluntary export restriction on Asia: tariff equivalents, rents and trade barriers formation', seminar paper No 276, Institute for International Economic Studies, Stockholm, 1984; and S. Suphachalasai, 'The effect of government intervention and Multifibre Arrangement on Thailand clothing and textiles', Phd dissertation, The Australian National University, Canberra, 1989.

Assuming that Mauritian clothing exports to EC and US markets are perfect substitutes for clothing imports from other countries, the Mauritian clothing export price would increase by 42 per cent on average in the two markets due to the presence of the Arrangement (Table 8.12 above). As these markets absorb more than 95 per cent of Mauritian exports of clothing, a 40 per cent price increase on all clothing exports is a close approximation.

This implies that elimination of the Multifibre Arrangement would reduce the export price for Mauritius by about 40 per cent. The impact of this price fall on the clothing industry and the economy of Mauritius is simulated using the CGE model.

Short-run results

The principal effect of a decline in export prices of clothing would fall on the export earnings of the clothing industry.

One of the effects of a fall in export prices is a depreciation of the real exchange rate. With assumed constant nominal exchange rate (as numeraire), depreciation of the real exchange rate is reflected in lower domestic prices. Accordingly, the consumer price index falls by 0.6 per cent (Table 8.13).

Table 8.13 **Effect of a 40 per cent reduction in export price of Mauritian clothing exports to the EC market**

	Short run	Long run
	percentage changes	
Real GDP	-0.4	-1.3
Aggregate employment	exogenous	exogenous
Real wage	-1.1	-0.4
Import (foreign currency)	-1.3	-2.4
Export (foreign currency)	-1.7	-2.1
Trade balance (million rupee at 1987 prices)	-122.0	exogenous
Consumer price index	-0.6	-0.9
Price of capital	-0.4	-0.6
Real investment	exogenous	-1.3
Real consumption	exogenous	-1.3
Skilled employment	0.3	0.6
Unskilled employment	-0.7	-2.5
Output of:		
Sugar	0.7	1.2
Other agriculture	0.1	0.2
Non-export processing enterprises manufactures	0.2	0.4
Export processing enterprises clothing	-8.5	-14.0
Other export processing enterprises manufactures	4.3	9.0
Construction and utilities	-0.4	-1.8
Tourism	2.9	6.9
Other services	-0.2	-0.8
Export volume of:		
Sugar	0.7	1.1
Export processing enterprises clothing	-7.0.	-12.1
Other Export processing enterprises manufactures	4.9	11.4
Tourism	3.0	7.2

This relative decline in domestic prices is the driving force behind the changes in the economy. Export earnings of clothing are reduced substantially to the extent that aggregate export value falls by 1.7 per cent.

Lower domestic prices, induced by the fall in the price of exports, encourage substitution of domestic products for imported goods. This results in a 1.3 per cent decrease in aggregate imports. The fall in aggregate imports is more than offset by a much larger fall in aggregate exports to yield a trade balance deterioration of -122 million rupees at 1987

prices. This reduces the pre-shock trade surplus of 1917 million rupees to 1795 million rupees after the shock.

Further macroeconomic adjustment occurs in the labour market. The slowing down of overall economic activity tends to depress employment. With the assumption of full employment, however, the aggregate level of employment remains unchanged. Instead, the aggregate real wage rate falls by 1.1 per cent to maintain employment. As aggregate consumption and aggregate investment are assumed to be exogenous, real aggregate income is determined by aggregate exports and imports. The net outcome of these aggregates is a fall in real GDP by 0.4 per cent.

The fall in domestic prices makes tradables relatively more competitive than non-tradables. Exporting industries are expected to be more competitive in external markets because lower domestic prices reduce costs of production of these industries relative to their counterparts in trade-partner countries. Industries producing exportables (i.e. sugar, other export processing enterprises and tourism) expand by 0.7 per cent to 4.3 per cent. The clothing industry contracts because the fall in its export price has outstripped the gain in competitiveness.

Import-competing industries (i.e. agriculture other than sugar and non-export processing enterprises manufactures) have expanded as producers substitute cheaper domestic products for imported goods. Non-traded goods industries (i.e. construction, water, electricity and other services) are least affected by the shock. These industries have contracted marginally. The explanation is that the decrease in demand for their use in the contracting industry, clothing, is nearly offset by the increase in demand in the other expanding industries.

The contraction of the clothing industry results in a 4.0 per cent fall in its demand for labour inputs, the only input with short-run flexibility. This excess labour is employed elsewhere in the economy, with the largest share going to the industry that expands most (other export processing goods). As capital is industry specific and fixed in the short run,

the contraction of the clothing industry results in a lower return to capital employed in the clothing industry and capital intensity increases. If the shock actually occurred there could also be capacity underutilization, however this is not explicitly observed from simulation results.

Long-run results

The 40 per cent fall in export prices of clothing to the EC has similar results in the long run. The long-run simulation differs mainly because of the underlying assumptions about resource mobility. The assumed mobility of capital and land in the long run results in larger changes in most cases.

With flexible movement of capital in the long run, the contracting industries release some of their capital or do not replace their worn out capital. Overall real investment falls by 1.3 per cent leading to a slow down of economic activity. The slowing down of economic activity further results in a cut in real consumption. The decline in real investment and real consumption is reflected in a real GDP fall by 1.3 per cent. The real GDP falls more in the long run than in the short run inspite of the possibility of capital mobility. This is because capital does not move out at a higher rate from the clothing industry for there could be still some rent due to the existence of Multifibre Arrangement.

The fall in domestic absorption lowers prices as indicated by the fall in the consumer price index. The fall in domestic prices makes export-oriented and import-substituting industries more competitive and they expand (except the clothing industry). However, non-tradables contract due to lower domestic demand.

9

Estimation of assistance to Mauritian industry and the impact on the economy of removing assistance

Global trade trends in sugar and clothing are likely to affect Mauritius adversely. This Chapter seeks to examine policy measures that could offset such trends. Levels of protection and assistance to Mauritian industry are measured and analyzed in a partial equilibrium framework. This is followed by a general equilibrium (CGE) analysis of removing protection.

In the partial equilibrium framework, nominal and effective rates of protection (assistance) are estimated for manufacturing industries and for aggregate sectors of the economy. Manufacturing industries are split into export processing enterprises and non-export processing enterprises to highlight the disparities in assistance between the two sets of enterprises.[1]

In the general equilibrium framework, the economy-wide effect of a 50 per cent across the board (i.e. only for protected industries) reduction in tariff rates is simulated for the short and the long run.

The estimates of nominal and effective rates of protection and assistance are obtained using the methodology discussed in Chapter 5. The economy-wide effects of reducing protection are simulated using the CGE model discussed in Chapter 6.

The structure of assistance in Mauritius and data sources

Tariff protection is the only form of border protection currently operating in Mauritius. Quotas and import licensing were removed in 1985. Some non-border assistance measures are provided to import-substituting enterprises holding a Development Certificate, as well as to export processing enterprises. These assistance

[1] Export processing and non-export processing enterprises refer to manufacturing enterprises. The term non-export processing is used interchangably with import-substituting, and export processing, with export-oriented.

measures include corporate income tax exemptions, credit subsidies and electricity price reductions.

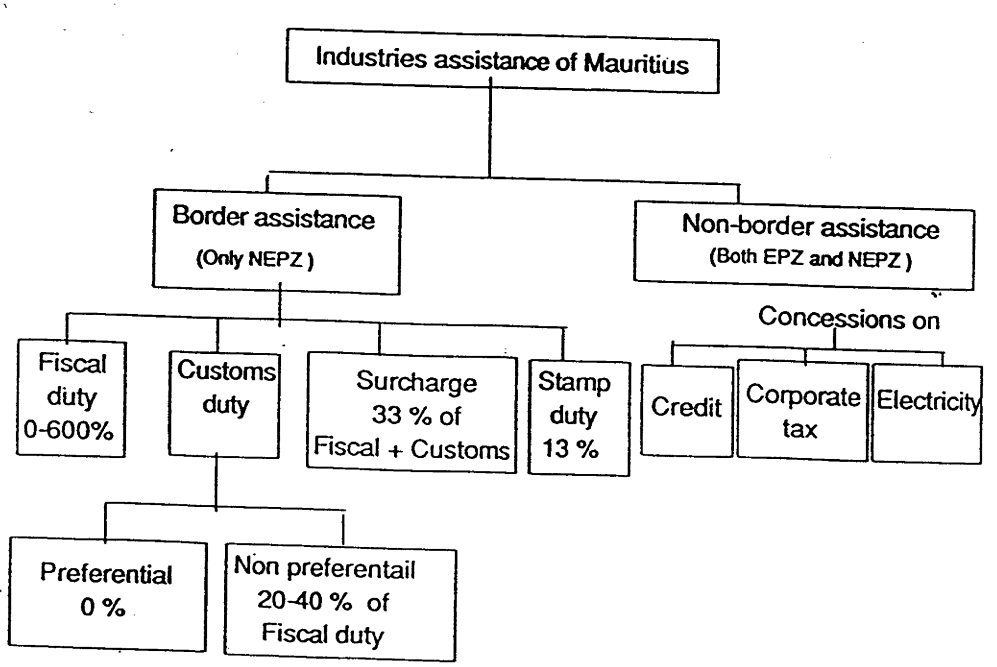
Tariff structure of Mauritius

Import tariffs are composed of a variety of border taxes.

Fiscal duty. Fiscal duty varies among commodities, ranging from 0 to 600 per cent. The highest import duty is paid on imports which are close substitutes to domestically produced goods and luxury goods. The level of the duty rises as the level of processing increases.

Customs duty. This duty is levied on goods that are imported from non-preferential tariff countries at rates ranging from 20-40 per cent of the fiscal duty. Mauritius has signed a treaty for customs tariff exemptions with most of its major trading partners, but Japan, Taiwan and the Republic of Korea are non-preferential treatment countries. The major exports from non-preferential countries to Mauritius are electronics equipment and vehicles. Almost all other imports are from preferential countries including EC member countries, India and South Africa.

Figure 9.1 **Tariff structure of Mauritius**



Stamp duty. A stamp duty of 13 per cent is charged on almost all imports. Government imports are exempted.

Surcharge. In addition a surcharge equal to 33 per cent of fiscal and customs duties is levied on virtually all imported goods.

In estimating the average tariff rate applicable to a commodity group, all types of duties were taken into account except the customs duties. Customs duties data were not available at the level of disaggregation required. The protection effect of these price changes was then estimated. That is, nominal and effective protection to manufacturing industries at the three digit ISIC level and to eight economy-wide sectors were estimated.

Data sources and manipulation

Data which enables estimation of protection rates for eight sub-sectors (*Sugar, Other agriculture, Non-export processing manufactures, Export processing clothing manufactures, Other export processing manufacture, Mining(salt), Tourism and Other Services*) of the economy and for manufacturing industries by 3-digit ISIC (International Standard Industry Classification) were collected.

To estimate protection rates, tariff rates, values of imports, outputs and inputs are required. Fiscal tariff rates by item were obtained from the Customs Tariff Act. The corresponding cost, insurance and freight (c.i.f.) values of imports, assumed to be perfect substitutes for the outputs of domestic industries, were obtained from the Chamber of Commerce (1988) for 1987. These imports were further sub-divided between imported inputs brought in by export processing enterprises and non-export processing enterprises. Average fiscal tariff rates were estimated at a certain level of aggregation by weighting the rates of the detailed items by the corresponding value of imports.

Input-output data for the eight industries was extracted from an input-output table constructed by the author with the assistance of the staff of the Statistics Office

of Mauritius. This input-output table provides the input-output coefficients used to calculate the effective rate of assistance to these industries.

Data and time limitations prevented the detailed estimation of input-output coefficients for the manufacturing industries in Mauritius. However, the total use of intermediate inputs and output statistics by industry was available from unpublished data at the Statistics Office.

Singapore's 1975 manufacturing intermediate input to output coefficients were used as a proxy to disaggregate the intermediate inputs for Mauritius by commodity. The adoption of the input-output coefficient for Singapore assumes that Singapore's production technology in 1975 was not significantly different from Mauritian production technology in 1987. The total intermediate input to output ratio of each of the Mauritian manufacturing industries in 1987 was not markedly different from those observed in Singapore's 1975 intermediate input to output ratio in corresponding industries. As the overall intermediate input and value added were taken from Mauritian data, the use of Singapore's matrix to disaggregate the intermediate inputs was unlikely to introduce a significant bias to the data set.

The intermediate input-output matrix of Mauritian manufacturing industries was calculated by multiplying the input-output coefficient of manufacturing industries adopted from Singapore by the value of Mauritian output of the respective industries. These estimates were made for export processing enterprises, non-export processing enterprises and all enterprises together.

To estimate assistance rates, additional information on major domestic credit assistance, corporate tax and electric power rate concessions by industry was required. Data on credit concessions was obtained from the Bank of Mauritius (1989). Corporate tax concessions were calculated using unpublished data from the Ministry of Industry. Power concessions were calculated from power consumption and power rates data obtained from unpublished data from the Ministry of Industry.

Assistance estimates

The only previous protection estimates for Mauritius are those obtained for 1980 by Greenaway and Milner (1989) (Table 9.1). These estimates only cover manufacturing and do not distinguish between import-substituting and export-oriented enterprises and are limited to tariffs rather than measures of assistance. The present estimates were based on improved data which made a more sophisticated methodology possible.

Table 9.1 **Nominal and effective tariffs by manufacturing industry, Mauritius, 1980**

	Nominal tariff	Effective tariff
Beverages	220	161
Tobacco	332	94
Textiles	45	77
Wearing apparel	80	99
Leather products	107	269
Footwear	82	158
Wood products	57	191
Furniture	120	130
Paper products	72	131
Printing	48	75
Basic chemicals	37	50
Other chemicals	62	26
Rubber	85	125
Plastic	52	89
Glass	72	77
Base metal	34	154
Fabricated metal	64	156
Non-electrical machinery	51	62
Electrical machinery	53	179
Transport equipment	102	23
Watches and lenses	69	266
Arithmetic mean	88	128
Standard deviation	67	66
Weighted mean[a]	83	79
Coefficient of variation	0.8	0.5
Range	34-332	23-269

[a] Weighted mean calculations were not included in the original work.
Source: D. Greenaway and C. Milner, "Nominal and effective tariffs in a small industrializing economy: the case of Mauritius", *Applied Economics*, 1989:21(995-1009)

In these estimates, protection rates for industries are applied only to that part of output which is consumed domestically. In addition, in the current estimates both border protection and other assistance are analyzed.

Further, the current study calculates average tariff rates for each of the 21 commodities by weighting the tariff rates at the detailed level by the corresponding c.i.f value of imports rather than using arithmetic averages (Greenaway and Milner 1989).

In estimating the effective rate of assistance, the current study uses an input-output method which is believed to be better than the value added method. Although the input-output method and the value added method can be proved to be equivalent algebraically, they differ in application. Unlike the input-output method, in practice the value added method does not allow for explicit estimation of assistance. Assistance to value added is calculated by taking the difference between the observed value added and the free trade value added. It relies on the assumption that the difference in value added is due to assistance which might not always be true. The use of the value added method can therefore yield biased results. Error in the Greenaway and Milner (1989) methodology could further be compounded by the use of unassisted value added of Hong Kong for Mauritius. For these reasons, the results of the two studies have to be compared cautiously.

Nominal and effective rates of protection and assistance for eight economy-wide groups of industries are given in Table 9.2. The nominal and effective rates of protection for 21 manufacturing industries are given in Table 9.3. The effective rate of assistance for these industries is given in Table 9.4.

Nominal and effective protection for sub-sectors of the economy

Of all eight sectors the largest beneficiary of the protective structure is non-export processing manufacturing (Table 9.2). The second largest beneficiary, other agriculture, receives only one-third of the rate of protection received by non-export processing manufacturing. Though the tariff rate on sugar is 109 per cent, sugar producers are able to raise the price by 109 per cent only for 10 per cent of their produce which is domestically consumed. The average price increase on the total output is then 10.9 per cent (tariff rate times share of domestic sales in total output). This average price increase on the total output of the sugar industry is the average nominal protection on sugar production.

Table 9.2 **Protection rates by major sector, Mauritius, 1987**

	Nominal rate of protection	Effective[a] rate of protection	Effective[a] rate of assistance
Sugar	11	15	16
Other agriculture	29	21	25
Non-export processing manufactures	89	115	134
Export processing (textiles and clothing)	-	-	8
Other export processing manufactures	-	-	7
Mining (salt)	21	21	21
Tourism	-	-27	-25
Other services	-	-12	-12

[a] Measured using the Balassa method.

The negative effective rate of protection for services indicates that the sector loses because of protection. Services do not gain anything from the protective structure, with zero nominal rate of protection, but they incur higher costs on their inputs because of protection, resulting in a negative effective rate of protection. The effective rate of protection for non-traded industries such as other services has been estimated to examine the extent to which such industries are penalized by the existing assistance structure.

Nominal protection for manufacturing outputs

These estimates were expected to be lower than the Greenaway and Milner (1989) findings because trade barriers have been liberalized since the mid-1980s following policy reviews in the early 1980s by the United Nations Industrial Development Organization (UNIDO) and the World Bank. Despite this expectation the nominal rate of protection has increased in 7 of the 21 industries. One explanation is that although import licensing and quantitative restrictions have been reduced, tariff barriers remain high. In fact tariff barriers have increased in some cases to compensate for the loss of protection resulting from the removal of quantitative restrictions. Within the manufacturing sector, protection is high for tobacco and beverages where tariffs are levied mainly for revenue reasons rather than for protection (Table 9.3). Other industries which have large nominal protection include leather products, transport equipment and furniture. Since these commodities, with the exception of leather products, are mainly or exclusively produced by non-export processing enterprises their nominal rate reflects the total industry rates of nominal protection.

Table 9.3 **Nominal and effective tariffs by manufacturing industry, Mauritius, 1987**

	Nominal tariff		Effective tariff	
	Non-export processing enterprises	Total manufa-mcutures	Non-export processing enterprises	Total manufa-cutures
Beverages[a]	307	307	382	382
Tobacco[a]	311	311	359	359
Textiles[b]	53	2	76	3
Wearing apparel[c]	80	1	103	2
Leather products[b]	146	3	228	5
Footwear[c]	81	38	71	31
Wood products	58	31	75	34
Furniture[a]	99	99	242	242
Paper products	63	47	90	62
Printing	40	35	15	28
Basic chemicals	21	19	17	21
Other chemicals	60	46	108	79
Rubber	93	52	93	54
Plastic	53	27	38	17
Glass	64	51	77	75
Base metal	26	23	20	23
Fabricated metal	62	56	134	103
Non-electrical machinery	66	41	76	35
Electrical machinery	79	67	79	67
Transport equipment[a]	146	146	157	157
Watches and lenses	45	3	56	4
Arithmetic mean	93	67	89	57
Standard deviation	77	85	100	108
Weighted mean	91	18	112	23
Coefficient of variation	0.8	1.2	0.84	1.3
Range	21-311	1-311	15-382	2-382

[a] Produced only for domestic market by non-export processing enterprises.
[b] Commodities which are imported in large quantity by export processing enterprises.
[c] Commodities which are exported in large quantity by export processing enterprises.

The nominal rate of protection for non-export processing enterprises with the exception of the few mentioned above are higher than the corresponding rates for overall industry. The lower total industry rates can be explained in two ways. First, substantial amounts of imports entered duty free outside the non-export processing category, but within the same industry, making the average tariff rate on the industry lower than the non-export processing. For instance, the nominal rate of protection for all output is much lower than that for non-export processing manufactures in textiles

as a large proportion (75 per cent) of the total imports was imported free of duty by export processing enterprises. Because of the large proportion of imports entering duty free, the average tariff rate on imports competing with the industry's output becomes small. Second, for the same tariff rate, a large proportion of exports leads to lower nominal rate of protection. A much lower nominal rate of protection is observed for wearing apparel, watches and lenses in the whole industry than in non-export processing enterprises because a substantial proportion of the output of these industries is exported. For instance, 98 per cent of the total output of wearing apparel is exported. As tariffs cannot raise the world price of exports, the average price increase on the overall output would be 2 per cent (the share of domestic sales in output) of the tariff rate. The weighted mean of nominal rate of protection for total manufactures is only one-fifth of the non-export processing manufactures. This occurs because the share of export processing manufactures output, with zero tariff rate, in manufacturing output is large.

A wider variation in nominal protection is also observed in the estimates for whole industries than for non-export processing enterprises. This can be observed from the higher values of the coefficients of variation for the whole industry than for non-export processing enterprises.

Effective rates of protection and assistance for manufacturing industries

As in the case of the nominal rate of protection, the effective rate of protection for textiles, wearing apparel and leather products is small when estimated for the whole industry.

The present estimates for non-export processing manufactures resulted on a higher coefficients of variation of effective rates than did Greenaway and Milner (1989), suggesting that the dispersion in assistance among industries has increased since 1980. As larger variations in protection tend to worsen distortions in resource

allocation, the results imply that resources were used more efficiently in non-export processing enterprises in 1980 than in 1987. However, this must be treated with caution because of the different estimating approaches of the two studies.

The estimates of effective rates of assistance (Table 9.4) tell a similar story to those of effective rate of protection (Table 9.3), except that export processing enterprises also obtain some assistance.

Table 9.4 **Effective rates of assistance for non-export processing and export processing enterprises, 1987**

	Effective rates of assistance	
	Non-export processing enterprises	Export processing enterprises
Beverages	395	na
Tobacco	369	na
Textiles	83	17
Wearing apparel	107	7
Leather products	246	5
Footwear	95	13
Wood products	84	8
Furniture	253	na
Paper products	98	1
Printing	21	6
Basic chemicals	19	4
Other chemicals	112	12
Rubber	107	4
Plastic	46	8
Glass	90	12
Base metal	24	5
Fabricated metal	142	8
Non-electrical machinery	83	7
Electrical machinery	91	8
Transport equipment	172	na
Watches and lenses	58	9
Arithmetic mean	98	7
Weighted mean	121	8.7
Standard deviation	102	4
Coefficient of variation	0.80	0.6
Range	19-395	1-17

The assistance takes the form of concessions given for both import-substitution and export processing enterprises. The nominal rate of interest appears to have been a market rate but import-substitution enterprises and export processing enterprises were

given discounted loans from commercial banks. In 1987 the discounts were 3.5 per cent and 3.75 per cent less than the market interest rate respectively (Bank of Mauritius 1989).

Import-substituting and export processing enterprises received the same concession in electric power consumption and corporate income tax as noted in Chapter 4.

In 1987 both import-substituting and export processing enterprises pay corporate income tax of 15 per cent whereas other industries are taxed at 35 per cent.

The difference between the estimates in Table 9.4 and 9.3 shows the effect of non-border concessions. The concessions fall into two assistance categories. Concessions of income tax and credit are direct assistance to value adding factors. Concessions on electric power rates are assistance to inputs. The estimates in Table 9.4 include these measures as well as the impacts of tariffs. Non-export processing enterprises benefit more than export processing enterprises from these concessions. The rates of direct assistance to value adding factors are estimated as a ratio of dollar value of concession to output. For a certain level of concession the higher the value of output the lower the rate of assistance. Although concessions for export processing enterprises are higher than or equal to those for import-substituting industries, export processing industries appear to obtain lower assistance per unit of output because of the higher output of the export processing enterprises. As export processing enterprises obtain a lower level of assistance per unit of output, they benefit less from the concessions than their non-export processing counterparts.

Given the large size of export processing enterprises (Table 9.5) it is neither practical due to budget constraints nor necessary to subsidize exports. Further, as a substantial proportion of export processing enterprises are foreign owned, export processing enterprises may obtain their capital requirements from international sources.

Table 9.5 **The importance of export processing and non-export processing in total manufacturing sector, 1987**

	Employment		Output		Establi-	Value added		
	'000	per cent	million rupee	per cent	shment[a] (number)	million rupee	per cent	growth
Export processing	83	80	7960	45	591	2585	53	30[b]
Non-export processing	18	17	4390	25	372	1335	28	7[b]

[a] Number of firms. [b] Between 1984-88.
Source: Mauritius Central Statistical Office, *Digest of Industrial Statistics,* 1988, Government Printer, Port Louis.

Effective rates of assistance and resource allocation

Subsidies and tax exemptions are a cost to the government in terms of increased expenditure or foregone revenue. They may distort allocation of resources away from where they are efficiently used. The potential misallocation of resources is as estimated in Tables 9.3 and 9.4 using effective rates of protection and effective rates of assistance, respectively. The effective rate of protection measures potential misallocation of resources because of tariff protection. The effective rate of assistance measures similar resource misallocation due to overall assistance (tariff and non-tariff) to industries.

Such a movement of resources is influenced by the rents (excess profit) accruing to protected industries. Greater protection implies less competition. Other things remaining unchanged, with less competition there is a tendency for a greater potential for higher rent. To examine the proposition that highly protected industries obtain a higher rent, gross operating surplus as a ratio of production costs was taken as a proxy for rent as in Greenaway and Milner (1989). Rent is generally higher for non-export processing enterprises than for export processing enterprises (see Table 9.6). Within the non-export processing enterprises those with higher effective rates of assistance also have above average rents.

Table 9.6 **Indicators of protection effects on export processing and non-export processing enterprises, 1987**

	Clothing and textiles			Total industry		
	Non-export processing	Export processing	Total	Non-export processing	Export processing	Total
Labour cost per worker('000 rupee)	17.7	14.7	14.9	21.9	15.5	16.9
Value added per output('000 rupee)	34.7	32.7	32.9	38.5	32.5	32.9
Value added per worker ('000 rupee)	36.8	29.4	30.4	68.5	31.5	43.8
Ratio of operating surplus to total cost	0.21	0.19	0.20	0.25	0.20	0.21

Source: Mauritius Central Statistical Office, *Digest of Industrial Statistics,* 1988, Government Printer, Port Louis, 1988.

Part of this rent is passed on to factors of production as in the form of higher wages. This possibility is examined by comparing earnings per worker among industries of varying levels of assistance. Labour costs per worker for non-export processing enterprises are greater than for export processing enterprises (Table 9.6). Comparing earnings per worker between export processing and non-export processing firms of the same industry is even more appropriate. Firms of the same industry are likely to employ labour of similar skill and gender. Therefore the difference in earnings could be largely associated with protection and assistance. The available data support the proposition that highly protected industries pay higher wages. For instance, the average annual wage rate in textiles and clothing industries is 17,700 rupees in non-export processing firms, where as it is only 14,700 rupees in export processing firms.

Mauritius, a densely populated country, is a labour rich nation. Therefore, it would be expected to have a comparative advantage in labour-intensive industries.

Under free trade, investment would flow into labour-intensive industries to minimize the costs of production. The higher value added per worker of 68,500 rupees for non-export processing enterprises as compared with 31,500 rupees for export processing enterprises indicates that industries with a high effective rate of assistance tend to be capital intensive. These figures are consistent with officially published figures by the Statistics Office. For example, value added per worker in non-export processing and export processing enterprises is 75,000 rupees and 31,000 rupees respectively (Central Statistical Office 1988). Value added is taken here as a proxy of overall capital (physical capital and human capital) as in Lary (1970).

Given the distorting effect of tariff protection on resource use, removing or reducing the level of tariffs is expected to improve the efficiency of resource use. Additional benefits would also be expected from increased resource utilization. However, only improved resource utilization has been modelled. A 50 per cent tariff rate reduction across the board (reduction of tariffs for protected industries, that is, *Sugar, Other agriculture and Non-export processing manufactures*) is simulated.

The impact of a 50 per cent across the board reduction in tariff rates

Short-run macroeconomic effects

The driving force behind the economy-wide changes is the fall in the prices of imported commodities. Reduction of tariffs causes the consumer price index to fall by reducing the prices of consumer goods. The consumer price index is projected to fall by 2 per cent (Table 9.7).

Falling domestic costs of production enhance the competitiveness of exports in world markets, reflected in the increase of aggregate exports by 2 per cent. The reductions in domestic costs may assist import-competing industries to gain market share from imports. However, these effects are more than offset by the substitution

effect leading to an increase in aggregate imports. The increase in exports offsets the increase in imports with little effect on the balance of trade.

Table 9.7 **A 50 per cent across the board reduction in tariffs impact on the Mauritian economy**

	Short run	Long run
	percentage changes	
Real GDP	0.2	1.4
Aggregate employment	exogenous	exogenous
Real wage	-0.5	1.2
Import (foreign currency)	1.8	3.2
Export (foreign currency)	2.0	5.0
Trade balance (million rupee at 1987 prices)	110.0	exogenous
Consumer price index	-2.0	-3.8
Real investment	exogenous	1.4
Real consumption	exogenous	1.4
Skilled employment	-0.2	0.2
Unskilled employment	0.3	-0.2
Output of:		
Sugar	-0.2	-0.7
Other agriculture	-0.9	-2.4
Non-export processing enterprises manufactures	-1.1	-4.6
Export processing enterprises clothing	0.4	1.2
Other export processing enterprises manufactures	0.6	2.5
Construction and utilities	0.6	1.4
Tourism	1.4	5.5
Other services	1.0	2.7
Export volume of:		
Sugar	-0.0	-0.3
Export processing enterprises clothing	0.4	1.2
Other export processing enterprises manufactures	0.6	2.5
Tourism	1.4	5.5

The reduction in tariffs also has some impact on the labour market. As aggregate employment is assumed fixed, real wage rates fall by 0.5 per cent to maintain the level of aggregate employment in the face of the falling demand for labour. But gross

domestic product increases as the reduction in tariffs causes labour to move from areas of low productivity to areas of higher productivity.

The reductions in tariffs are of direct benefit to all industries except to export processing industries, because, the prices of their imported inputs are not reduced. The export processing enterprises would derive no direct benefit from tariff reductions, since all of their imports of material and capital inputs enter duty free. However, export processing enterprises benefit from tariff reductions indirectly. With tariff reductions, the previously assisted industries contract, releasing resources and making them available at lower costs to export processing enterprises and other lightly assisted industries. All industries, including export processing enterprises, also benefit from overall lowering of domestic costs induced by tariff reductions.

The cut in tariff rates would lower the level and variability of assistance. Consequently industries at the extremes of distribution of assistance are most likely to be markedly affected by the change.

The main gainers from a tariff reduction are tourism and other services. It is apparent from the simulation results that tariff reduction would provide substantial incentives for services to expand. Services are expected to receive a major stimulus from tariff reductions as this sector does not receive any protection but pays high costs on its inputs because of tariff imposition. The tourism industry particularly is expected to expand, as its export performance is more sensitive to domestic cost cuts than the non-tradable other services industry which would be constrained by slowing domestic activity.

The export processing enterprises would also expand following tariff reform as domestic costs fall. A substantial expansion would not occur as they are already protected from the impediments of protection through duty free importation of their inputs. The other industry which would expand is construction and utilities.

The industries which would lose most heavily are the non-export processing manufacturing enterprises as they are highly protected industries. Other agriculture also loses. The tariff reduction does, however, bring some benefit to highly protected industries. Some of the loss due to reductions in output prices is offset by reductions in input costs. Further, with reduced protection to non-export processing enterprises, prices of non-export processing enterprises commodities decline stimulating demand for these products. These positive effects are not large enough to offset the negative effect of the substitution of imported non-export processing goods for similar domestically produced goods. Consequently, the non-export processing enterprises sub-sector contracts, although individual industries with low levels of assistance may expand.

Long-run effects

The long-run simulations indicate changes that may occur after capital stock has adjusted through changes in investment. The cuts in tariffs are projected to result in smaller capital stock in the non-export processing sub-sector and other tariff protected industries, but a larger capital stock in the economy with increases in other sectors more than offsetting the loss in the non-export processing sub-sector and other tariff protected industries.

The long-run estimates reflect changes in the same direction as in the short run but with higher magnitudes. Among the macroeconomic variables which have shown increases are real wages and GDP. Real wages increase by 1.2 per cent reflecting an increase in overall labour demand relative to labour supply. Labour combined with more flexible capital in the long run produced higher GDP. With the balance of payments assumed unchanged the increased output is spent domestically, represented by increased domestic aggregate consumption and investment. As domestic demand is met with increased output it reduces the inflationary pressure. This is reflected by a further decrease in the consumer price index than in the short run.

10

Conclusions and policy implications

In the 1960s and 1970s Mauritius was faced with problems typical of developing countries; slow economic growth, high unemployment and balance of payments deficits. By the late 1980s it had succeeded in overcoming these problems and had achieved a high level of economic growth joining the World Bank list of middle income countries. It was transformed from a mono-culture, sugar economy to a semi-industral nation. In stark contrast to neighbouring African nations, which had meagre economic growth, the Mauritian economy became one of the most rapidly growing developing countries. The growth of the economy was closely related to the growth of exports.

But with constrained labour supply and the prospect of more competitive export markets, future development is achievable only with increasing productivity, improved technology, movement to higher productivity industries, higher investment in human and physical capital, and greater managerial and worker efficiency.

Until the mid-1970s Mauritius was dominated by sugar in terms of its contributions to exports, GDP and employment. Sugar has also played an important role in the economic growth by providing a major source of domestic investment for the newly expanding manufacturing sector. The further expansion of the sugar industry was constrained by the limited amount of land available for sugar cultivation; The sugar industry was unable to provide enough jobs for the growing work force. These problems, evident in, and compounded by, a persistent balance of payments deficit, initially encouraged Mauritius to establish protected import-substituting manufacturing. This strategy failed to stimulate employment sufficiently to improve the balance of payments. Mauritius therefore turned to export-oriented labour-intensive manufacturing. The government passed an Export Processing Zone Act in 1970. This provided a critical offset to protection in giving exporters an exemption

from import tariffs on inputs into exports. The export processing enterprises took time to develop but accelerated growth came in the middle of the 1970s. Production and exports diversified away from sugar toward manufactures and tourism. The expansion of export-oriented labour-intensive industrial manufactures reduced unemployment and raised exports dramatically.

The driving force behind the economic transformation of Mauritius has been the clothing industry which evolved from a negligible base in the early 1970s to dominance in terms of its contribution to output, employment and export earnings in the late 1980s. The success of the clothing industry has largely depended on domestic policies. Domestic and foreign investment in the clothing industry were encouraged. Resources were able to move to where they were more efficiently employed.

Factors responsible for success

Mauritius became outward oriented in the early 1980s. Macroeconomic stability was not only maintained but improved, and trade policies were liberalized so that an equilibrium exchange rate could be maintained. Exchange rate regimes were also liberalized. The economy responded to these changes positively growing at 8.3 per cent a year in real terms during 1984-87.

Domestic environment

Mauritius has had a stable and democratic system of government since independence. Its political stability has allowed the implementation of consistent economic policies and hence attracted domestic and foreign capital to export-oriented industries when the bias toward protectionist import-substituting policies was lessened.

For a small nation of around one million people, it was soon evident that export-led growth was the best development choice. This development strategy was successfully implemented by appropriate macroeconomic and trade policies.

Devaluations of the Mauritian rupee raised export proceeds in domestic currency terms, making production for exports more profitable.

Mauritius has retained low labour costs that reflect productivity and ensure competitiveness. Low and competitive labour cost stimulated export growth.

Trade policies have contributed to the international competitiveness. The elimination of quantitative restrictions on all imports and free of duty imports of inputs for export processing enterprises reduced the cost of production of goods for export. However, excessive protection is still in place on products used by non-exporting industries. The elimination of these protective structures and redundant subsidies offered to "preferred industries", export processing and import-substitution industries alike, would lead to a more competitive economic environment. The main industry that would benefit would be tourism.

External environment

The export-led growth of the Mauritian economy is obviously sensitive to what happens in its export markets for sugar and clothing. It has taken full advantage of agreements with the EC concerning both industries.

Since Mauritius is a small exporter to the world sugar market, the fate of its sugar industry is highly influenced by the external environment. The Sugar Protocol has been critical to the growth of the sugar industry. It has sheltered the sugar industry from fluctuating world sugar prices, by guaranteeing fixed prices. The Protocol also allowed Mauritius access to the highly protected EC sugar market at much higher prices than on the world sugar market.

The Multifibre Arrangement, by restricting the entry of highly competitive large producers, allows Mauritius to have market access for a big proportion of its clothing exports to the EC and US markets. The Multifibre Arrangement supply restrictions raise prices, allowing Mauritius to sell its products at higher prices than it could otherwise.

Constraints to sustained economic growth

Changes in the external environment

Being a small country, Mauritius will continue to be dependent on trade. Changing trends in sugar and clothing could affect the economy adversely.

Sugar exports. ACP sugar exporters are concerned about the future of the Sugar Protocol with regard to quotas and prices. They fear that trade liberalization in the Uruguay Round and/or within the EC could reduce the quota rents.

- The formation of a common European market with a common currency in 1993 may eliminate the national sugar quota and with it the sugar price support which will lower Mauritian sugar export prices.
- The recent GATT negotiations on reducing agricultural price support to EC farmers could also lower the negotiated price of sugar for Mauritius.
- Allowing new entrants (such as Papua New Guinea, Cambodia, Dominican Republic and Haiti) into the EC sugar markets would erode quota rents if these countries became significant exporters.
- The change in political climate in Eastern Europe could divert aid away from ACP member countries which is provided in the form of sugar quota-rent. Some proportion of the EC fund used in supporting the quota-rent may be diverted to neighbouring Eastern Europe.

These events singly or in combination, could reduce the Mauritian export price and quantities of sugar exported to the EC market and marginally raise sugar prices on the world market. The impact of these export prices and quota changes on the Mauritian economy was examined in Chapter 7 using the Mauritian CGE model described in Chapter 6.

The analysis indicates that the sugar industry could suffer a large cut in earnings in both the short and long-run. The loss to the sugar industry directly and indirectly

affects the overall economy. The adverse effect of the industry is felt directly by the whole economy because of the large contribution made by the sugar industry to exports, GDP and employment. Indirectly, through the competition for resources and input-output linkages, changes in the sugar industry are transmitted to the rest of the economy. The combined direct and indirect effects result in reductions in all macroeconomic aggregates.

At the industry level, the outcome is mixed. The sugar industry loses a substantial amount of its revenue largely because of the fall in prices. The export-oriented enterprises other than sugar gain by the improvement in their competitiveness due to the depreciation of the Mauritian rupee in real terms. The import-competing industries also gain some competitiveness and tend to take some market share from imports. But the fall in domestic demand outweighs the increased substitution for imports, leading to a marginal contraction of import-competing industries. All these outcomes were observed for both short and long-runs, with the magnitude of change in the long run being larger than in the short run. Non-tradable industries also contract because of the fall in overall demand.

Clothing exports. As a result of the Uruguay Round negotiations, the Multifibre Arrangement is due to be wound down substantially at the end of the 1990s. Competition from large suppliers of clothing such as Hong Kong, Taiwan and China which now have restricted entry for their exports to the EC and United States under the Multifibre Arrangement, would lower the prices of clothing. The effect of the elimination of the Multifibre Arrangement (clothing export price fall) on the Mauritian clothing industry and overall economy was simulated using the CGE model in Chapter 8. While the main impact of the fall in export prices of clothing was felt on the industry itself, there were important consequences for other sections of the economy and these were captured by the model. The simulation results indicate that low export prices for clothing result in smaller clothing production. However, other

exporting and import-competing industries expand due to improvement in their competitiveness while non-traded goods industries contract marginally.

The spillover effect on the macroeconomic aggregates is to reduce all the variables. The fall in export price induces a fall in the real exchange rate reflected in a fall in the consumer price index. Aggregate imports, aggregate exports, real consumption and real investment decline. As a result overall economic activity slowed down.

High concentration in terms of products and markets could make Mauritius vulnerable to small fluctuations in demand. The Mauritian clothing industry is highly concentrated in knitwear and thus vulnerable to changes in the demand for knitwear in its major markets (the EC and the United States). While the clothing industry has benefited from the trading arrangements and protectionist policies of the EC and United States, new application of trade restrictions presently imposed on other countries could potentially constrain future growth as Mauritius increases its supply.

Domestic trade policy

The current levels of assistance to industries in Mauritius and the effects of a 50 per cent across the board reduction in tariffs on individual protected industries for the overall economy were examined in Chapter 9. The results of the analysis indicate that industries producing for export and industries producing for domestic markets differ substantially in terms of protection. Industries producing for the domestic market are protected from external competition through tariffs. They are also provided with other forms of domestic assistance. The incentives provided have made investment profitable for entrepreneurs, but the performance of import-substituting industries has been inadequate both in terms of production and employment creation. The tariff structure set to protect industries also raises costs of production to industries using the tariff-protected products as their inputs by increasing the price of inputs.

In contrast, export industries function in a competitive international environment. Export processing enterprises have to compete against those in many developing countries. To do so successfully they have to operate under conditions no less favourable than those of their rivals. Accordingly it was perceived in Mauritius that they should receive higher domestic assistance than import substitution enterprises. However, the findings of this study (measured in terms of nominal and effective rates of assistance) suggest that export processing enterprises receive less domestic assistance than non-export processing enterprises. This is a pragmatic outcome as favourable subsidies such as tax holidays and favourable credit are often redundant for efficient firms. The budgetary implications are, moreover, unrealistic. A country can not subsidize a major sector without high costs.

The levels of assistance vary among sectors. Generally, rates of assistance are estimated to be high in non-export processing manufacturing industries and other agriculture. However, some industries in the non-export processing manufacturing group receive little protection. The tariff structure is neutral with respect to export processing enterprises. The export processing enterprises do not benefit from protection and they are also not penalized by the tariff rate as they import their inputs duty free. The service sector, particularly tourism is the sector most disadvantaged by the protection structure. It receives no protection but it pays higher costs on its protected inputs.

The effective rate of assistance measurement however indicates only the net benefit in value added terms and the likely effect of the distortion on resource allocation. Being a partial measure, it does not indicate the impact on output, employment and other factors.

The general equilibrium model set out in Chapter 6 was used to examine the economy-wide implications of reducing tariffs. With tariff cuts the consumer price index falls. Aggregate imports and aggregate exports rise. The overall economic activity expands.

The simulation results indicate that the tariff reform gives incentives for tourism and other service industries to expand substantially with marginal expansion in export processing enterprises. As anticipated the highly protected non-export processing manufacturing enterprises and other agriculture contracted. However, there is an overall gain in the economy with reduced inflation and expanding overall output.

Comparisons across simulations

The reduction in tariffs has a positive impact on the Mauritian economy whereas the liberalization of the EC sugar market and dismantling of the Multifibre Arrangement have negative effects. The liberalization of the EC sugar market has the greatest effect on the economy as a whole with a fall in real GDP by 1.5 per cent in the long run. This fall in real GDP can almost be offset by an increase in real GDP of 1.4 per cent if tariffs are reduced across the board by 50 per cent. The 1.3 per cent decline in real GDP which is induced by the dismantling of the Multifibre Arrangement, however, remains. The negative effect of liberalization of the EC sugar market on the economy is largely offset by the positive effect of reducing tariffs. The less severe but important impact of dismantling the Multifibre Arrangement on the economy remains.

The dismantling of the Multifibre Arrangement does more harm to the clothing industry than the liberalization of the EC sugar market to the sugar industry. In the long run simulation the clothing industry contracts by 12 per cent whereas the sugar industry contracts only by 8 per cent. More industries are indirectly negatively affected by the liberalization of the EC sugar market than by dismantling of the Multifibre Arrangement. The magnitude of the unfavourable effect on indirectly related industries is also more severe with the sugar scenario. This can be explained by the stronger linkages the sugar industry has with the domestic economy than the clothing industry. With tariff reduction all industries which enjoyed tariff protection contract whereas all other industries expand. The magnitude of contraction by

individual industries following tariff reduction is smaller than in the other two scenarios. In all scenarios tourism and export processing enterprises (other than clothing in the case of the Multifibre Arrangement dismantling scenario) expand.

Policy options

Sugar

Mauritius has very little control over the prices of its exports. It can also do very little to stop its export quota to the EC market from falling. However, Mauritius can try to offset the adverse effects of export price and quota cuts through increases in productivity. The productivity of sugar could be raised further at various stages of its production from cane growing to processing. Being one of the most efficient sugar producers in the world, the Mauritian sugar industry might survive massive cuts in sugar incomes. Land could also be used more efficiently by intercropping.

Clothing

Expanding clothing exports to the EC and United States in categories that are not yet restricted by quotas has potential. Since quotas are set in volume rather than value terms, for items already affected by quota limitations there is the possibility of marketing higher value products, as Hong Kong, the Republic of Korea and other exporters have.

In the long run, the growth of Mauritius depends on the diversification of export products. To reduce the risk associated with fluctuations in demand in external markets, Mauritius needs to diversify its exports within and out of clothing.

Mauritius has currently attained full employment. Consequently, it will tend to lose its comparative advantage in labour-intensive clothing exports, unless it moves to more sophisticated products.

Mauritian firms may also consider investing in the relatively labour abundant neighbouring countries of Madagascar and Seychelles following the example of Hong Kong, Singapore and Taiwan in off shore investement.

Trade

Tariff liberalization with a goal of tariff elimination would improve the competitiveness of domestic industries. Removing tariff impediments could allow resources to flow to where they are best used and thus expand the overall output of the economy. Expansion of tourism is likely to follow and tourism exports are less likely to be concentrated in a few markets as sugar and clothing. Thus tourism would be relatively less vulnerable to changes in the external environment.

Appendix 6.1

Input - output table of Mauritius, 1987 (provisional)

(rupees million)

		Domestic intermediate demand A														B	C	D	E	
		1	3	4	5	6	7	8	9	10	11	12	13	14	15	Total Demand	Investment Demand	Household Demand	Export Demand	Government Demand	Total Demand
Sugar cane	1	15				2843										2858		0			2858
Foodcrops	2		1					7				40			4	53		193	12		258
Livestock & fishing	3		3	1			87	57				30			4	184		381	5		570
Other agriculture	4	26				11		119								156		3	32		191
Mining & quarrying	5		1					68		60					1	130		17			147
Sugar milling	6	4	3			39	2	55	32			10				145	133	75	4409		4762
Export Processing Zone	7						771	12								783	600	10	6567		7960
Other manufacturing	8	167	162	22	9	18	38	253	5	450	86	90	122	29	100	1563	60	3003	317		4943
Electricity & water	9	13	6	3	4	13	109	117	48	2	109	62	34	20	74	618		294			912
Construction	10	11	3	2		9	9	34	15	2	5	8	1	100	6	205	2365	0		195	2765
Whole sale & retail trade	11	49	8	6		40	35	465	67	187	35	65	278	53	100	1393	340	1508	159		3400
Resturants & hotels	12	4				5	5	3		1	3	1	6	1	10	39		150	1091		1280
Transport & communication	13	290	15	13	11	268	87	50	8	250	317	36	118	44	81	1591		875	1585		4051
Finance and insurance	14	30	1	1	1	20	55	43	6	60	64	30	72	418	5	806		2008	734		3548
Services including government	15	2	2	4	1	8	14	20	10	5	30	15	51	5	15	183		1065	78	2527	3853
Total-local intermidiate consumption		611	205	52	26	3274	1212	1303	191	1017	649	387	682	670	400	10707	3498	9582	14989	2722	41498
Imports of goods and services		102	42	18	4	154	4163	1286	184	527	301	203	951	308	343	8601	2109	3781			14491
Import duties		21	5	4	0	44	0	414	47	185	49	35	327	50	87	1270	446	1035			2751
Total intermidiate consumption		734	252	74	30	3472	5375	3003	422	1729	999	625	1960	1028	830	20578	6053	14398	14989	2722	58740
Compensation of employees		993	69	93	12	200	1275	610	193	640	735	225	935	437	2445	8895					
Net indirect tax			-7	-96		612		361		-9	-26	120	16	38	132	1131					
Gross operating surplus		1131	256	120	105	478	1310	969	297	405	1692	310	1140	2045	446	10894					
Value added at market price		2124	318	117	117	1290	2585	1940	490	1036	2401	655	2091	2520	3023	20920					
Gross output at producer prices		2858	570	191	147	4762	7960	4943	912	2765	3400	1280	4051	3548	3853	41498					

Modfied eight sectors Input- output table of Mauritian, 1987 (Provisional)

mmodties(g):	Reference for Original		A Industries(h) 1	2	3	4	5	6	7	8	Total current intermediate domestic	B Industries(h) 1	2	3	4	5	6	7
gar	1+6	1	2901	3	55	0	2	32	10	0	3003	20	8	13	22	5	12	22
er agriculture	2+3+4	2	37	8	183	0	87	0	70	8	393	0	0	0	0	0	0	0
n-EPZ manufactures	8+5	3	185	197	330	32	6	515	90	338	1693	8	4	6	10	2	6	10
Z clothing	7-sep	4	0	0	12	735	0	0	0	0	747	68	28	43	73	17	42	73
er EPZ	7	5	0	0	0	14	22	0	0	0	36	22	9	15	24	6	14	24
er industry	9+10	6	46	18	155	110	8	67	70	349	823	354	148	228	383	93	220	384
rism	12	7	9	0	3	4	1	1	1	20	39	0	0	0	0	0	0	0
er services	11,13,14,15	8	707	59	591	133	58	593	146	1686	3973	51	21	33	55	13	32	55
tal domestic intermidiate nsumption			3885	285	1329	1028	184	1208	387	2401	10707	523	218	338	567	136	326	568

mmodties (g):		F Industries(h) 1 (Import for current intermediate consumption)	2	3	4	5	6	7	8	Total current intermediate import	G Industries(h) 1	2	3 (intermediate imports for production of capital goods)	4	5	6	7
Sugar	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other agriculture	2	0	15	414	0	0	0	0	0	429	0	0	0	0	0	0	0
Non-EPZ manufactures	3	285	63	1290	3455	708	943	218	2113	9075	0	0	0	1789	510	0	0
EPZ clothing	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other EPZ	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other industry	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Tourism	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	256
Other services	8	36	8	0	0	0	0	20	303	367	0	0	0	0	0	0	0
Total import intermidiate consumption		321	86	1704	3455	708	943	238	2416	9871	0	0	0	2045	510	0	256

					K				
Compensation of employees (r)	1193	195	622	1020	255	833	225	4552	8895
Skilled	193	75	85	304	75	233	75	3500	4540
Unskilled	1000	120	537	716	180	600	150	1052	4355
Gross operating surplus	1609	566	1074	917	393	702	310	5323	10894
					L				
Capital (1)	1209	453	1074	917	393	702	310	5323	10381
					M				
Land (1)	400	113	0	0	0	0	0	0	513
					N				
Other costs (net indirect tax) (1)	612	-113	361	0	0	-9	120	160	1131
Total output	7620	1019	5090	6420	1540	3677	1280	14852	41498

Notes on matrices:
A= Flow of domestically produced goods (g) to the production of current goods by domestic industries (h).
B= Flow of domestically produced goods (g) to the production of capital goods by domestic industries (h).
C= Household consumption of domestic commodities.
D= Exports (D1 exports to Non EC countries, D2 exports to EC)
E= Government consumption of domestically produced commodities.
F= Flow of imported goods (g) to the production of current goods by domestic industries (h).
G= Flow of imported goods (g) to the production of capital goods by domestic industries (h).
H= Household consumption of imported commodities.
I= Government consumption of imported commodities.
Z= Import duty by commodities.
K= Compensation of skilled and unskilled employees.
L= Return to capital
M= Return to land
N= Other costs
Vertical sum of columns A,F,K,L,M and N gives each sector output.
Horizontal sum of rows A,B,C,D and E gives each commodties output.

(rupees million)

8	Total intermediate from domestic for capital creation	C Household consumption (domestic)	D1 Export Non-EC	D2 EC	E Government Demand	Total Demand
31	133	75	882	3527	0	7620
0	0	577	49	0	0	1019
14	60	3020	317	0	0	5090
106	450	0	5223	0	0	6420
35	149	10	1344	0	0	1540
554	2365	294	0	0	195	3677
0	0	150	1091	0	0	1280
80	340	5456	2556	0	2527	14852
	0					
820	3498	9582	11462	3527	2722	41498

8	Total intermediate import for capital creation	H Household consumption import	I Government consumption import	-Z Duty	Total imports (inc. duty)	Total imports (exc. duty)
0	0	0	0	0	0	0
0	0	2200	0	135	2629	2494
0	2299	1330	0	2616	12704	10088
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	0	0	0	0	0	0
0	256	378	0	0	634	634
0	0	908	0	0	1275	1275
0	2555	4816	0	2751	17242	14491

Identifier	Equation	Subscript range	Number	Description
	Final demands			
5.	$x^2_{(is)j} = y_j - \sigma^2_{ij}(p_{is} - \sum_{s=1}^{2} s^2_{(is)j} p_{is})$	i=1,..,g s=1,2 j=1,.,h	2gh	Demands for input for capital creation both from domestic and import sources
6.	$x^3_{is} = x^3_i - \sigma^3_i(p^*_{is} - \sum_{s=1}^{2} s^3_{is} p^*_{is})$	i=1,..,g s=1,2	2g	Household demands for commodities by source
7.	$x^3_i = q + \varepsilon_i(c - q) + \sum_{k=1}^{g} \eta_{ik} p^*_k$	k=1,..,g	g	Household demands for commodities undifferntiated by source
8.	$p^*_k = \sum_{s=1}^{2} s^3_{ks} p^*_{ks}$	k=1,..,g	g	Price of commodities to households
9.	$p^*_{is} = p_{is} + f^3_{is}$	i=1,..,g S=1, 2	2g	Allows for taxes on consumption
10	$p^{eEC}_{i1} = -\gamma_{ECi} x^{4EC}_{i1} + f^{4EC}_{i1}$	i=1,..,g	g	Export demands (EC)
11.	$p^{eW}_{i1} = -\gamma_{Wi} x^{4W}_{i1} + f^{4W}_{i1}$	i=1,..,g	g	Export demands (rest of world)
12.	$x^5_{is} = c_R h^5_{is} + f^5_{is}$	i=1,..,g s=1,2	2g	Government demands

Identifier	Equation	Subscript range	Number	Description
	Commodity supplies			
13.	$x_{(i1)j} = z_j + \sigma^T{}_{(i1)j}\ (p_{i1} - \sum_{i=1}^{g} C_{(i1)j} p_{i1})$	i=1,..,g j=1,..,h	gh	Commodity supplies by industry
14.	$x_{i1} = \sum_{j=1}^{h} D_{(i1)j}\ x_{(i1)j}$	i=1,..,g	g	Total output of good i.
	Zero pure profits conditions			
15.	$\sum_{i=1}^{g} C_{(i1)j}\ p_{ij} = \sum_{i=1}^{g} \sum_{s=1}^{2} H^1_{(is)j} p_{is} + \sum_{v=1}^{3} H^P{}_{vj} p^P{}_{vj} + H^o{}_j p^o{}_j$	j=1,..,h	h	Zero profit in production
16.	$\pi_j = \sum_{i=1}^{g} \sum_{s=1}^{2} H^2_{(is)j} p_{is})$	j=1,..,h	h	Zero profit in capital creation
17.	$p_{i2} = p^m{}_{i2} + t_i + \phi$	i=1,..,g	g	Zero profit in importing
18.	$p_{i1} = p^{eEC}{}_{i1} + v^{EC}{}_i + \phi$	i=1,..,g	g	Zero profit in exporting (EC)
19.	$p_{i1} = p^{eW}{}_{i1} + v^W{}_i + \phi$	i=1,..,g	g	Zero profit in exporting to the rest of the world

Ident-ifier	Equation	Subscript range	Number	Description
	Market clearing			
20.	$x_{i1} = \sum_{j=1}^{h} B^{1}_{(i1)j} x^{1}_{(i1)j} + \sum_{j=1}^{h} B^{2}_{(i1)j} x^{2}_{(i1)j} + B^{3}_{i1} x^{3}_{i1} + B^{4EC}_{i1} x^{4EC}_{i1} + B^{4W}_{i1} x^{4W}_{i1} + B^{5}_{i1} x^{5}_{i1}$	i=1,..,g	g	Domestically produced commodities
21.	$l_q = \sum_{j=1}^{h} B_{1qj} x^{P}_{1qj}$	q=1,..,r	r	Labour of each occupation
22.	$k_j = x^{P}_{2j}$	j=1,...,h	h	Capital
23.	$n_j = x^{P}_{3j}$	j=1,...,h	h	Land
	Miscellaneous			
	Rates of return, investment and capital stocks			
24.	$r_j = Q_j (p^{P}_{2j} - \pi_j)$	j=1,..,h	h	Rate of return on capital in each industry

Ident-ifier	Equation	Subscript range	Number	Description
25.	$i_R = \sum_{j=i}^{h} T_j y_j$		1	Aggregate real private investment
26.	$y_j = I^1 K_j + I^2 B_j (r_j - \lambda) + f^2{}_j$	j= 1,..,h	h	Investment by industry
27.	$i = i_R + \varepsilon^2$		1	Aggregate nominal investment
28.	$K = \sum_{j=1}^{h} k_j \psi_{2j}$		1	Aggregate capital stock

Ident-ifier	Equation	Subscript range	Number	Description
	Price indicies			
29.	$P_{j1} = \sum_{j=1}^{g} C_{(i1)j} P_{i1}$	j=1,..,h	h	Price of industry output
30.	$\varepsilon^1 = \sum_{j=1}^{h} a_{j1} P_{j1}$		1	GDP deflator
31.	$\varepsilon^2 = \sum_{j=1}^{h} T_j \pi_j$		1	Capital goods price index
32.	$\varepsilon^3 = \sum_{i=1}^{g} \sum_{s=1}^{2} W^3_{is} P^*_{is}$		1	Consumer price index
	Trade balance			
33.	$x_{i2} = \sum_{j=1}^{h} B^1_{(i2)j} x^1_{(i2)j} + \sum_{j=1}^{h} B^2_{(i2)j} x^2_{(i2)j} + B^3_{i2} x^3_{i2} + B^5_{i2} x^5_{i2}$	i=1,..,g	g	Import volume

Identifier	Equation	Subscript range	Number	Description
34.	$m = \sum_{i=1}^{g} (p^{m}_{i2} + x_{i2}) M_{i2}$		1	Aggregate foreign currency import
35.	$e^{EC} = \sum_{i=1}^{g} (p^{eEC}_{1} + x^{4EC}_{i1}) E^{EC}_{i1}$		1	Aggregate foreign currency export to EC
36.	$e^{W} = \sum_{i=1}^{g} (p^{eW}_{i1} + x^{4W}_{i1}) E^{W}_{i1}$		1	Aggregate foreign currency export to ROW
37.	$e = e^{EC} + e^{W}$		1	Aggregate foreign currency export (EC+ROW)
38.	$100\ \Delta B = Ee - Mm$		1	Balance of trade (real)
	Consumption-income link			
39.	$c = y_d + f_c$		1	Consumption function
40.	$y_d = gdp$		1	Household disposable income
	Other macroeconomic equations			
41.	$gdp^{r} = S_c c_R + S_i i_R + S_g x_G + S_e e - S_m m$		1	Gross domestic product (real)

Ident-ifier	Equation	Subscript range	Number	Description
42.	$x_G = \sum_{i=1}^{q} \sum_{s=1}^{2} s^5_{is} x^5_{is}$		1	Aggregate government demand
43.	$l = \sum_{q=1}^{2} l_q \psi_{1q}$		1	Aggregate employment
44.	$i_R = c_R + f_R$		1	Relationship between real consumption and real investment.
45.	$gdp = gdp^r + \varepsilon^1$		1	Nominal GDP
46.	$c = c_R + \varepsilon^3$		1	Aggregate nominal consumption
47.	$pP_{1j} = \sum_{q=1}^{2} pP_{1qj} s_{1qj}$	j=1,..h	h	Price of labour to each industry in general
48.	$P_{1qj} = h_{1q}\varepsilon^3 + f_{1qj} + f_{1q} + f_1$	q = 1,2 j=1,..h	rh	Flexible handling of occupational wages
49.	$p^o_j = h^o_j \varepsilon^3 + f^o_j$	j=1,..h	h	Sets price of other costs

Total number of equations = 5gh + 13h + 16g + 2rh + r + 19 = 605

Dimensions:
h = 8, g = 8, and r = 2

ation ent fier	Variables	Range	Number	Description
1.	$x^1_{(is)j}$		2gh	Demands for inputs for current production
	z_j	j=1,..,h	h	Industry activity levels
	P_{is}	i=1,..,g s=1,2	2g	Domestic prices of domestic and imported commodities
2.	x^P_{vj}	v=1,2,3 j=1,..,h	3h	Industry demands for labour, capital, land
	p^P_{vj}	v=1,2,3 j=1,..,h	3h	Price of labour, capital and land
3.	x^P_{1qj}	q=1,..,r j=1,..,h	rh	Industry demands for labour by occupation
	p^P_{1qj}	q=1,..,r j=1,..,h	rh	Price of labour by occupation for each industry
4.	x^o_j	j=1,..,h	h	Demands for government (other) costs
5.	$x^2_{(is)j}$	i=1,..,g s=1,2	2gh	Demands by source for capital creation
	y_j	j=1,..,h	h	Investment by industry
6.	$x^3_{(is)}$	i=1,..,g s=1,2	2g	Household demands by source
	x^3_i	i=1,..,g	g	Household demands undifferentiated by source
	p^*_{is}	i=1,..,g s=1,2	2g	Purchaser price of goods i to households
7.	q		1	Number of households
	c		1	Aggregate nominal household consumption
	p^*_k	i=1,..,g	g	Purchaser price of good to households
9.	f^3_{is}	i=1,..,g s=1,2	2g	Shift term for household consumption price
0.	$p^{eEC}_{(i1)}$	i=1,..,g	g	Foreign currency export prices f.o.b.(EC)
	x^{4EC}_{i1}	i=1,..,g	g	Export demands of EC
	f^{4EC}_{i1}	i=1,..,g	g	Shift term to EC exports
1.	p^{eW}_{i1}	i=1,..,g	g	Foreign currency export prices f.o.b.(ROW)
	x^{4W}_{i1}	i=1,..,g	g	Export demands of rest of the world

ıation ent fier	Variables	Range	Number	Description
	f^{4W}_{i1}	i=1,..,g	g	Shift term to the rest of the world exports
12.	x^{5}_{is}	i=1,..,g s=1,2	2g	Government (other) demands
	c_R	1	1	Aggregate real household consumption
	f^{5}_{is}	i=1,..,g s=1,2	2g	Government demand shift term
13.	$x_{(i1)j}$	i=1,..,g	gh	Commodity output by industry
14.	x_{i1}	i=1,..,g	g	Commodity output level
15.	$p^{(o)}_{j}$	j=1,..,h	h	Price of other costs
16.	π_j	j=1,..,h	h	Cost of unit of capital
17.	p^{m}_{i2}	i=1,..,g	g	Foreign currency import prices c.i.f.
	t_i	i=1,..,g	g	One plus the ad valorem tariff or tariff equivalent of quantitative restrictions
	ϕ	1	1	Nominal exchange rate (rupee/Foreign)
18.	v^{EC}_{i}	i=1,..,g	g	One plus the rate of export subsidy to EC
19.	v^{W}_{i}	i=1,..,g	g	One plus the rate of export subsidy to the rest of the world
21.	l_q	q=1,..,r	r	Occupational employment
22.	k_j	j=1,..,h	h	Industry capital stocks
23.	n_j	j=1,..,h	h	Agricultural land
24.	r_j	j=1,..,h	h	Industry rates of return to capital
25.	i_R	1	1	Aggregate real investment
26.	λ	1	1	Economy-wide expected rate of return
	f^{2}_{j}	j=1,..,h	h	Industry investment shift term
27.	i	1	1	Aggregate nominal investment
	ε^{2}	1	1	Capital goods price index

uation ent fier	Variables	Range	Number	Description
28.	k		1	Aggregate capital stock
29.	p_{j1}	$j=1,..,h$	h	Industry output prices
30.	ε^1		1	GDP deflator
32.	ε^3		1	Consumer price index
33.	x_{i2}	$i=1,..,g$	g	Import volumes
34.	m	1	1	Aggregate foreign currency imports
35.	e^{EC}	1	1	Aggregate foreign currency exports to EC
36.	e^{W}	1	1	Aggregate foreign currency exports to ROW
37.	e	1	1	Aggregate foreign currency exports (EC+ROW)
38.	ΔB	1	1	Balance of trade (real)
39.	y_d	1	1	Household disposable income
	f_c	1	1	Consumption function shift term
40.	gdp	1	1	Nominal GDP
41.	gdp^r	1	1	Real GDP
	x_G	1	1	Aggregate government (other) demands
43.	l	1	1	Aggregate employment
44.	f_R	1	1	Ratio of real investment expenditure to real household consumption
48.	f_{1qj}	$q=1,2$ $j=1,..,h$	rh	Occupation by industry wage shift variable
	f_{1q}	$q=1,2$	r	Occupation wage shift variable
	f_1	1	1	Economy-wide wage shift variable
49.	$f^o{}_j$	$j=1,..,h$	h	Industry other cost shift variable

Total variables = 5gh + 17h + 26g + 3rh + 2r + 24 = 740
dimensions: g = 8, h = 8, and r = 2

Appendix 6.4

Parameters and coefficients of the Mauritian model

Equation identifier	Parameter or coefficients	Description	Source
1	σ^1_{ij}	Substitution elasticity between domestic and imported sources of good i used as a current input to industry j.	Set at default value of 2.0, Dixon *et al* (1982).
	$S^1_{(is)j}$	Share of good i from source s in industry j purchase of i for input to current production.	IO[a]. $S^1_{(is)j}$ is the ij^{th} element of A divided by the sum of the ij elements of A + F. $S^1_{(i2)j} = 1 - S^1_{(i1)j}$.
2	σ^p_j	Pairwise CES substitution elasticity between primary factors in industry j.	Set according to the relationship $\delta j = \sigma_p(1-S_{fj}) / S_{fj}*H_{xj}$ where δ_j is supply elasticity for industry j, S_{fj} is share of fixed factors in total factor costs and H_{xj} is share of primary factors inputs in total costs. σ_p was set such that δ_j values were less than 1.0 for each industry.
	S_{vj}	Cost share of primary factor v (v=1, labour; v=2, capital; v=3, land) in total primary factor cost in industry j.	IO. S_{1j} is j^{th} element of column sums of K divided by j^{th} column total of K+L+M. S_{2j} is j^{th} element of L divided by j^{th} column total of K+L+M. S_{3j} is j^{th} element of M divided by j^{th} column total of K+L+M.
3	σ^p_{1j}	Pairwise CES substitution elasticity between different occupations in industry j.	Set at default value of 2.0, Dixon *et al* (1982).
	S_{1qj}	Share of labour of occupation q in total labour costs of industry j.	IO.S_{1qj} is qj^{th} element of K divided by j^{th} column total of K.
4		None.	

equation identifier	Parameter or coefficients	Description	Source
5	σ^2_{ij}	Substitution elasticity between domestic and foreign source of good i used as an input to capital creation in industry j.	Set at default value of 2.0, Dixon *et al* (1982).
	$S^2_{(is)j}$	Share of good i from source s in industry j's total purchases of i for inputs to capital creations.	IO. $S^2_{(i1)j}$ is the ij^{th} element of B divided the sum of the ij elements of B+G. $S^2_{(i2)j}=1-S^2_{(i1)j}$.
6	σ^3_i	Substitution elasticity between domestic and imported source of good i consumed by households.	Set at default value of 2.0, Dixon *et al* (1982).
	S^3_{is}	Share of the value of good i from source s in the total purchases of good i by households.	IO. $S^3_{(i1)}$ is i^{th} element of C divided by sum of the i^{th} elements of C+H. $S^3_{(i2)}=1-S^3_{(i1)j}$.
7	ε_i	Household expenditure elasticity for good i.	See text (Chapter 6).
	ηik	Household own and cross price elasticities for good i.	See text (Chapter 6).
8	S^3_{ks}	Defined in (6) = $S^3_{(is)}$.	
9		None.	
10	γ_{ECi}	Reciprocal of the foreign demand elasticity for Mauritius exports of good i to EC.	See text (Chapter 6).
11	γ_{Wi}	Reciprocal of the foreign demand elasticity for Mauritius exports of good i to the rest of the world.	See text (Chapter 6).

Equation identifier	Parameter or coefficients	Description	Source
12	$h^5_{(is)}$	Indexes government demands to aggregate real consumption.	Default setting is 1.0.
13	$\sigma^T_{(i1)j}$	Transformation elasticities between products produced by industry j.	Set zero. See text (Chapter 6).
	$C_{(i1)j}$	Revenue share of product i in the total revenue of industry j.	IO. $C_{(i1)j}$ is the ij^{th} element of O divided by the j^{th} column sum of O.
14	$D_{(i1)j}$	Share of the value of output of good i produced in industry j.	IO. $D_{(i1)j}$ is the ij^{th} element of O divided by the i^{th} row sum of O.
15	$C_{(i1)j}$	Defined in 13.	
	$H^1_{(is)j}$	Cost share of good i from source s in the total costs of industry j.	IO. $H^1_{(is)j}$ is the ij^{th} element of A divided by the total cost of industry j. These are computed as the j^{th} column sum of A+F+K+L+M+N. $H^1_{(i2)j}$ is the ij^{th} element of F divided by the total costs of industry j.
	$H^P_{(vj)}$	Cost share of primary factor v in the total costs of industry j.	IO. H^P_{ij} is the j^{th} column sum of K divided by the total costs of industry j. H^P_{2j} is the j^{th} entry of L divided by the total costs of industry j. H^P_{3j} is the j^{th} element of M divided by the total costs of industry j.
	H^O_j	Cost share of other costs in the total costs of industry j	IO. H^O_j is the j^{th} element of N divided by the total costs of industry j.

Equation identifier	Parameter or coefficients	Description	Source
16	$H^2_{(is)j}$	Cost share of good i from source s in the total costs of capital creation in industry j.	IO. $H^2_{(i1)j}$ is the ij^{th} element of B divided by the sum of the j^{th} column elements of B+G. $H^2_{(i2)j}$ is the ij^{th} element of G divided by the sum of the j^{th} column elements of B+G.
17		None.	
18		None.	
19		None.	
20	$B^1_{(i1)j}$	Share of the total sales of domestic good i absorbed by industry j as an input into current production.	IO. $B^1_{(i1)j}$ is the ij^{th} element of A divided by the total sales of domestic good i, i.e., the sum over the i^{th} row of A+B+C+D+E.
	$B^2_{(i1)j}$	Share of the total sales of domestic good i absorbed by industry j as an input into capital creation.	IO. $B^2_{(i1)j}$ is the ij^{th} element of B divided by the total sales of domestic good i.
	B^3_{i1}	Share of the total sales of domestic good i absorbed by households.	IO. B^3_{i1} is the i^{th} element of C divided by the total sales of good i.
	B^4_{i1}	Share of the total sales of domestic good i exported	IO. B^4_{i1} is the i^{th} element of D divided by the total sales of good i.
	B^5_{i1}	Share of the total sales of domestic good i absorbed by other demands.	IO. B^5_{i1} is the i^{th} element of E divided by the total sales of good i.
21	B_{1qj}	Share of the economy-wide employment in occupation q which is accounted for by industry j.	IO. B_{1qj} is the qj^{th} element of K divided by the q^{th} row total of K.

Equation identifier	Parameter or coefficients	Description	Source
22		None.	
23		None.	
24	Q_j	Ratio of gross (before depreciation) to net (after depreciation) rate of return for industry j.	Set at default value of 1.0.
25	T_j	Share of total investment accounted for by industry j.	IO. First sum the column elements of B+G. T_j is the j^{th} element in the array of the column sums of B+G divided by the sum of the elements in the array.
26	B_j	Industry investment parameter.	$B_j = 1/ \beta_j \lambda_j$ is the elasticity of the rate of return schedule for industry j and λ_j is the ratio of investment in the solution year to capital stock in the following year. Estimates compiled from Dixon *et al* (1982).
27		None.	
28	ψ_{2j}	Share of the economy-wide capital stock represented by the capital stock in industry j.	From matrix of industry capital stocks (B+G matrices totals).
29	$C_{(i1)j}$	Defined in 13.	
30	a_{j1}	Share of the total value added represented by value added in industry j.	IO. a_{j1} is j^{th} column sum of K+L+M divided by sum of all elements in K+L+M.
31	T_j	Defined in (25).	IO.

Equation identifier	Parameter or coefficients	Description	Source
32	W^3_{is}	Weight of good i from source s in the CPI.	IO. $W^3_{(i1)}$ is the i^{th} element of C divided by the sum of all elements in C+H. $W^3_{(i2)}$ is the i^{th} element of H divided by the sum of all elements in C+H.
33	$B^1_{(i2)j}$	Share of the total sales of imported good i which is absorbed by sales to industry j for current production.	IO. $B^1_{(i2)j}$ is the ij^{th} element of F divided by the total sales of imported good i, i.e., the row sum of F+G+H+I.
	$B^2_{(i2)j}$	Share of the total sales of imported good i which is absorbed by sales to industry j for capital creation.	IO. $B^2_{(i2)j}$ is the ij^{th} element of G divided by the total sales of imported good i.
	$B^3_{(i2)j}$	Share of the total sales of imported good i which is absorbed by sales to households	IO. $B^3_{(i2)j}$ is the ij^{th} element of H divided by the total sales of imported good i.
	$B^5_{(i2)j}$	Share of the total sales of imported good i which is absorbed by sales other demands.	IO. $B^5_{(i2)j}$ is the ij^{th} element of I divided by the total sales of imported good i.
34	M_{i2}	Share of the total c.i.f. cost of imports accounted for by imports of good i.	IO. M_{i2} is the i^{th} row sum of F+G+H+I+(-Z) divided by the sum of all elements in F+G+H+I+(-Z).
35	EC_{i1}	Share of the total export earnings accounted for by exports of good i to EC	IO. EC_{i1} is the i^{th} element of D1 divided by the total of all elements in D1.
36	W_{i1}	Share of the total export earnings accounted for by exports of good i to the rest of world	IO. W_{i1} is the i^{th} element of D2 divided by the total of all elements in D2.
37		None.	

Equation identifier	Parameter or coefficients	Description	Source
38	E	Aggregate value of exports f.o.b.	IO. Sum of elements in D1 and D2.
	M	Aggregate value of imports c.i.f.	IO. Sum of elements in F+G+H+I+(-Z).
39		None.	
40		None.	
41	S_c S_i S_g S_e S_m	Respectively the shares in GDP of aggregate consumption; aggregate investment; aggregate government spending; exports; and imports.	Mauritius Central Statistical Office.
42	S^5_{is}	Share of the total other demands accounted for by other demand for good i from source s.	IO. $S^5_{(i1)}$ is the i^{th} element of E divided by the total of all elements in E+I. $S^5_{(i2)}$ is the i^{th} element of I divided by the total of all elements in E+I.
43	ψ_{1q}	Share of occupation q in the total demand for labour.	IO. ψ_{1q} is the q^{th} row sum of K divided by the sum of all elements in K
44		None.	
45		None.	
46		None.	
47	S_{1qj}	Defined in (3).	
48	h_{1q}	Occupational wage indexation parameter.	Default value is 1.0
49	h^o_j	Indexes other costs.	Default value is 1.0

[a] Input-output table

Appendix 6.5

Exogenous variables (short run sugar simulation)

Variable	Number	Description
p^m_{i2}	g	Foreign currency import prices
t_i	g	One plus the ad valorem tariff or tariff equivalent of quantitative restrictions
v^W_1, v^W_4, v^W_5, v^W_7	4	Export subsidy the rest of the world.
v^{EC}_{2-8}	7	Export subsidy (EC).
x^{4W}_2, x^{4W}_3, x^{4W}_6, x^{4W}_8	4	Export volume the rest of the world.
x^{4EC}_1	1	Export volume (EC).
k_j	h	Industry capital stocks
n_j	h	Agricultural land
l_1	1	Economy-wide employment level.
ϕ	1	Exchange rate
q	1	Number of households
f^o_j	h	Industry other cost shift variable
f^2_j	h	Industry Investment shift variables
f^3_{is}	2g	Shift term for household consumption prices
f^{4EC}_{i1}	g	Shift term for exports (EC)
f^{4W}_{i1}	g	Shift term for exports (rest of world)
f^5_{is}	2g	Other demand shift term
f_{iqj}	rh	Occupation by industry wage shift variable}
f_{1q}	r	Occupation wage shift variable
f_R	1	Ratio of real investment to consumption
f_c	1	Consumption function shift term

Total variables = 4h + 8g + rh + r + 21 = 135

Appendix 8.1 Profiles of African, Caribbean an Pacific member states (August, 1991)

	Population 1989 (million)	Area '000 km^2	GNP per capita US$ 1989	Average Real GDP 1980-89 (per cent)	Share of clothing & textiles exports[a]
Africa (46)					
Angola	9.7	1247	610	..	0.0
Benin	4.6	113	380	1.8	-
Botswana	1.2	582	1600	11.3	..-
Burkina Faso	8.8	274	320	5.0	1.0
Burundi	5.3	28	220	4.3	1.0
Cameroon	11.6	475	1000	3.2	1.0
Cape Verde	0.4	4	780	..	..
Central African Republic	3.0	623	390	1.4	
Chad	5.5	1284	190	6.5	3.0
Comoros	0.5	2	460	..	..
Congo	2.2	342	940	3.9	-
Cote D'Ivore	11.7	322	790	1.2	2.0
Djibouti	0.4	22	..	..	..
Equatorial Guinea	0.4	28	330	..	..
Ethiopia	49.5	1222	120	1.9	1.0
Gabon	1.1	268	2960	1.2	-
Gambia	0.8	11	240	..	..
Ghana	14.4	239	390	2.8	-
Guinea	5.6	246	430	..	-
Guinea Bissau	1.0	36	180	..	..
Kenya	23.5	580	360	4.1	1.0
Lesotho	1.7	30	470	3.7	..
Liberia	2.5	111	..	..	-
Madagascar	11.3	587	230	0.8	6.0
Malawi	8.2	118	180	2.7	5.0
Mali	8.2	1240	270	3.8	1.0
Mauritania	1.9	1026	500	1.4	-
Mauritius	**1.1**	**2**	**1990**	**5.9**	**60.0**
Mozambique	15.3	802	80	-1.4	-
Nambia	1.7	824	1030	0.4	..
Niger	7.4	1267	290	-1.6	..
Nigeria	113.8	924	250	-0.4	-
Rwanda	6.9	26	320	1.5	-
Sao Tome and Principe	0.1	1	340	..	..
Sengal	7.2	197	650	..	1.0
Seychelles	0.1	b	4230	..	..
Sierra Leone	4.0	72	220	0.6	-
Somalia	6.1	638	170	3.0	-
Sudan	24.5	2506	..	..	..
Swaziland	0.7	17	900	..	..
Tanzania	23.8	945	130	2.6	6.0
Togo	3.5	57	390	1.4	-
Uganda	16.8	236	250	2.5	-

	Population 1989 (million)	Area '000 km^2	GNP per capita US$ 1989	Average Real GDP 1980-89 (per cent)	Share of clothing & textiles exports[a]
Zaire	34.5	2345	260	1.9	-
Zambia	7.8	752	390	0.8	-
Zimbabwe	9.5	391	650	2.7	3.0
Caribbean (15)					
Antigua and Barbuda	0.1	0.4	..	..	..
Bahamas	0.3	14	11320	..	..
Barbados	0.3	0.4	6350	..	..
Belize	0.2	23	1720	..	..
Dominica	0.1	0.1	..	..	..
Dominica Rep	7.0	49	790	2.4	35
Grenada	0.1	0.3	1900	..	..
Guyana	1.0	215	340	..	..
Haiti	6.4	278	360	-0.5	43
Jamaica	2.4	11	1260	1.2	13
St. Christopher and Nevis	0.1	0.4	..	..	..
St. Lucia	0.2	1	1810	..	..
St. Vincent and the Grenadines	0.1	0.3	..	..	..
Suriname	0.4	163	3010	..	..
Trindad and Tobago	1.3	5	5230	-5.5	-
Pacific (8)					
Fiji	0.7	18	1650	..	..
Kiribati	0.1	1	700	..	..
Papua New Guinea	3.8	463	890	2.1	-
Solomon Islands	0.3	29	580	..	..
Western Samoa	0.2	3	700	..	..
Tonga	0.1	1	910	..	..
Tuvalu	..	..	..	..	..
Vanuatu	0.1	12	860	..	..

[a] Percentage share of merchandise exports.
Source: *The Courier*, March 1990 No. 120; and World Bank, *World Development Report,* Washington, D.C. 1991.

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