



**Macroeconomic  
Adjustment and the Poor**  

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**The Case of Madagascar**

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***MONOGRAPH 9 • DECEMBER 1990***





The Cornell Food and Nutrition Policy Program (CFNPP) was created in 1988 within the Division of Nutritional Sciences, Cornell University, to undertake research, training, and technical assistance in food and nutrition policy with emphasis on developing countries. The Nutritional Surveillance Program (CNSP), which was formed in 1980 with support from the US Agency for International Development, is part of CFNPP.

CFNPP is funded by several donors including the Africa Bureau and the Nutrition Office of the Agency for International Development, UNICEF, the Pew Memorial Trust, the Rockefeller Foundation, the Government of Indonesia, and the World Bank.

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# Abbreviations

<b>AIRD</b>	Associates for International Resources and Development (Somerville, Massachusetts)
<b>ASAC</b>	Agricultural Sector Adjustment Credit
<b>BDE (or DGBDE)</b>	Banque des Données de l'Etat (Direction Générale)
<b>CCCE</b>	Caisse Centrale de Coopération Economique (Paris)
<b>CIF</b>	Cost Insurance Freight
<b>CPI</b>	Consumer Price Index
<b>FAO</b>	Food and Agriculture Organization (Rome)
<b>FMG</b>	Malagasy Franc
<b>FOB</b>	Free on Board
<b>GDP</b>	Gross Domestic Product
<b>ICA</b>	International Coffee Agreement
<b>ILO</b>	International Labor Office (Geneva)
<b>IMF</b>	International Monetary Fund (Washington, DC)
<b>INSRE</b>	Institut National de la Statistique et de la Recherche Economique (Madagascar)
<b>ISAC</b>	Industrial Sector Adjustment Credit
<b>ITPAC</b>	Industry and Trade Policy Adjustment Credit
<b>MPARA</b>	Ministère de la Production Agricole et de la Réforme Agraire (Madagascar)
<b>NPK</b>	Nitrogen-Phosphorous-Potassium
<b>ODI</b>	Overseas Development Institute (London)
<b>OGL</b>	Open General License
<b>PE</b>	Public Enterprise
<b>PNSAN</b>	Programme National de Surveillance Alimentaire et Nutritionnelle

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<b>SAF</b>	Structural Adjustment Facility (IMF)
<b>SAP</b>	Structural Adjustment Program (Policy)
<b>UNICEF</b>	United Nations Children's Fund

# Preface

To enhance understanding of the effect of macroeconomic and sectoral policy reform on macroeconomic performance and household welfare in sub-Saharan Africa, the Cornell Food and Nutrition Policy Program (CFNPP) has begun a multicountry research effort. This has been funded by the Africa Bureau of the US Agency for International Development under a cooperative agreement with CFNPP. Country case studies are being performed to identify the growth and distributional implications of decisions being made by governments in their efforts to reform economic rules and institutions contributing to the economic stagnation and imbalances that have characterized much of sub-Saharan Africa. Despite the fact that most countries are engaged in reform programs, and that the basic policy parameters of these efforts are quite similar, there has yet to be a systematic study of the effectiveness of these efforts and of the linkages that mediate between policy and its impact on households.

Madagascar is one of the countries included in the CFNPP research program. In describing reform efforts and their implications for Madagascar, this monograph focuses on the role of the agricultural sector and reflects its importance in the macroeconomy and in generating income and consumption goods for the poor. The role of the key export crops are highlighted, along with rice policy. The predominant role of rice in the household consumption bundle and in generating revenue is of particular interest. The similarities between Madagascar and Asian economies, where rice is so important, are noteworthy. However, Madagascar also shares many of the characteristics of other sub-Saharan African countries undergoing adjustment. Of particular note is the balance of payments crisis that was precipitated by a large investment program whose benefits in terms of a temporary boom were clearly outweighed by the longer term implications. These were manifested by increased inflation and worsening debt and account imbalances. But of central importance in the Madagascar case described in this monograph is the timing and sequencing of economic reforms. The fact that stabilization efforts were predominant in Madagascar for much of the 1980s, and that structural adjustment did not take hold until late in the decade, had important implications for growth and income distribution, as discussed in the monograph.

The reader should keep in mind that this monograph is the first output of a larger research effort. This project has the objective of developing a disaggregated computable general equilibrium model for Madagascar, following the basic form outlined in CFNPP Monograph 5 by Alexander Sarris. In laying the

foundation for such a demanding modeling effort, this monograph serves to identify various functional groups of households that will be differentially affected by macroeconomic and sectoral restructuring. It also seeks to aid understanding of the evolution of the macroeconomic disequilibria, and to clarify the nature of the policy reforms that have been planned or initiated in response to these imbalances. It examines the functioning and characteristics of markets and institutions that will mediate between macroeconomic and sectoral reform policies and their household and macroeconomic impact. In addition, the monograph identifies the key linkages between policy reform and its effects in order to help in posing the correct hypotheses and to provide some preliminary conclusions that will be addressed in greater detail in later research output.

Ithaca, New York  
December, 1990

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# Executive Summary

Madagascar, an island nation of 11 million people, is sometimes considered, along with Ghana, as one of the star pupils of the International Monetary Fund (IMF). During the decade of the 1980s, Madagascar signed seven standby agreements with the IMF and a number of sectoral and structural adjustment loan agreements with the World Bank and the Caisse Centrale de Coopération Economique (CCCE). The stabilization and structural adjustment programs (SAP) achieved some notable successes in terms of lower inflation, a sustainable deficit in the balance of trade, and reduced government budget deficits. Yet the policies have so far failed to result in significant economic growth (in 1987, per capita GDP was only US\$210), and some urban low-income households are worse off now than before adjustment.

The need for stabilization and structural adjustment policies in Madagascar arose in the early 1980s following a massive investment push (the *investir à outrance* policy) launched in 1978. Because the increased investments were funded largely from foreign borrowing and domestic money creation, the immediate results of the policy were a temporary economic boom, an increased foreign debt, and higher inflation. By 1981, however, the large increase in imports of investment goods combined with a decline in the terms of trade to produce a balance of payment crisis.

Stabilization and structural adjustment policies are sometimes held to blame for Madagascar's slow economic growth in the 1980s and the country's widespread poverty. Yet apart from the short-lived and unsustainable growth spurt in 1979 and 1980, real GDP growth failed to exceed population growth in every year between 1971 and 1987. Declining per capita incomes thus have been a part of Madagascar's economic history for nearly two decades, not merely the unhappy result of externally imposed policies in the 1980s. This study goes beyond a description of how the poor have fared under stabilization and structural adjustment and attempts to separate the effects of the policy reforms from long-term trends.

## SOCIOECONOMIC BACKGROUND

Chapter 2 presents basic background material on Madagascar, summarizing the country's geography, demography, and political history. After gaining its

independence from France in 1960, Madagascar maintained close ties with France throughout the decade. Growing resentment over French influence in the country and frustration with the steady but slow growth in the economy were major factors leading to a military takeover in 1972 and a sharp change in government policies. Beginning with the new government in 1972 and continuing with the government of the current president, Didier Ratsiraka, who took power in 1975, socialist policies were adopted including the nationalization of industries and increased government expenditures on healthcare and education. The failure of the *investir à outrance* policy in the late 1970s and the ensuing balance of payments crisis led to the adoption of more market oriented economic policies in the 1980s under pressure from the IMF, World Bank, and other donors.

The structure of the economy is also described in chapter 2. Agriculture dominates the Malagasy economy, accounting for over 40 percent of GDP and employing 87 percent of the labor force. Land distribution in the country is relatively equal and average farm size is only 1.2 hectares. Rice is by far the most important crop, accounting for more than half of both total area cultivated and total calories consumed. Coffee and vanilla are the leading exports, but world prices for these commodities have been highly variable; exports of cloves, Madagascar's second leading export in the early 1980s, have dropped dramatically in recent years due to declining world import demand. The industrial sector is small, accounting for about 15 percent of GDP, and is heavily dependent on imported intermediate inputs. Trade taxes account for about half of total government revenues.

## **MACROECONOMIC POLICIES**

Macroeconomic policies and their outcomes are discussed in chapter 3. The investment push begun in 1978 marked an end to the conservative fiscal and foreign borrowing policies of previous Malagasy governments. Government budget deficits were partly financed through domestic money creation, which led to a sharp increase in inflation from 9.1 percent in 1977 to 23.8 percent in 1981. At the same time, the large increase in imports of investment goods combined with a decline in the terms of trade (lower coffee export prices and higher oil import prices) increased the current account deficit to 16.9 percent of GDP in 1981.

Madagascar signed standby agreements with the IMF in 1981 and 1982 only when continued financing of the current account deficits solely through Communist-bloc governments or commercial sources was no longer feasible. The stabilization policies adopted reduced aggregate demand through cutbacks in

public investment and other government expenditure, including the subsidy on rice for consumers. By 1984 inflation had dropped to 10.3 percent per year and the trade deficit was cut to only 5.0 percent of GDP. However, real incomes also fell sharply. Average real GDP fell by 5.4 percent between the period 1979-1981 and 1982-1984, and average per capita real GDP fell by 12.7 percent. As supplies of imported inputs fell, industrial output suffered most — industrial value-added fell by 28.0 percent from its peak of FMG 280.0 billion (1984) in 1979 to FMG 201.5 billion (1984) in 1982.

No clear distinction is possible between structural adjustment policies, which in broad terms can be thought of as being designed to increase aggregate supply, and stabilization policies, which focus more on reducing aggregate demand. Reforms in rice marketing begun in 1982 were an initial step towards increasing rice production, but major efforts at structural adjustment began only after 1984, and a major piece of the structural adjustment strategy — trade liberalization — was not implemented until 1987. Real economic growth increased slightly from an average of 0.27 percent per year between 1982 and 1984 to 1.66 percent per year between 1985 and 1987. Given that in many cases, a lag of several years can be expected between changes in production incentives and significant increases in investment, it may still be too early at this writing (1990) to see much of the effect of policies designed to increase supply.

The cost of adjustment in terms of official foreign debt has increased substantially with the change in emphasis from stabilization to structural adjustment. Madagascar's official foreign debt increased by only 15 percent from 1981 to 1984 during the first years of stabilization policies, but large sectoral adjustment loans contributed to a 48 percent increase in debt by 1987. Madagascar's foreign debt in 1987 of almost US\$4 billion was equal to 151 percent of GDP at the official exchange rate. The increase in Madagascar's debt from multilateral institutions has been partially offset by debt forgiveness from the US and France.

## **POVERTY**

As described in chapter 4, most of the poor in Madagascar live in rural areas. Using the results of a national household survey and an estimate of an absolute poverty line constructed from the cost of a rice-based diet, 34 percent of households nationwide had expenditure below the poverty line (37 percent of rural households and 18 percent of the households in the largest urban centers). Of households below the poverty line in Madagascar in 1980, 88 percent lived in rural areas.

Little direct evidence is available on nutrition of lower income groups. Clinical records, as well as a number of small sample nutritional surveys, show

that malnutrition among children is a serious problem. A national sample (Andrianasolo 1986) of children two years old and under in 1983/84 found that 33 percent of the children in urban areas and 38 percent of children in rural areas exhibited evidence of long-term malnutrition. There is no statistically unbiased time-series evidence from which to draw definite conclusions about whether malnutrition among children (or adults) has increased during the 1980s.

## RICE POLICY

The most direct, and perhaps the most important, effects on household welfare derive from rice pricing and trade policies described in chapter 5. Under the state controlled marketing system in place before 1982, consumers benefitted from subsidized sales of imported and domestic rice through the official marketing channels. Raising the market price of rice and allowing private traders to purchase rice from producers reduced rice subsidies and led to higher prices for both producers and consumers. Open market prices for rice in 1987 were 75 percent higher in real terms than the official consumer price in 1982. Producer prices increased by 5 percent in real terms between 1982 and 1985 before jumping by another 87 percent in 1987.

Urban consumers had been major beneficiaries of the subsidized rice sales. Among those surveyed in urban areas in 1982/83, per capita consumption of subsidized, officially distributed rice was 121 kilograms per person compared with a per capita consumption of only 4 kilograms in rural areas surveyed. Reduced supplies of officially distributed rice combined with greatly reduced per-unit subsidies contributed to a 58 percent drop in per capita consumption of officially distributed rice for urban areas in 1986/87 and a 15 percent drop in their overall per capita consumption of rice. The poorest 25 percent of households in Antananarivo were especially hard hit—their per capita consumption of rice fell by 31 percent as their per capita purchases of officially distributed rice fell by 53 percent.

Rice production increased by 16.8 percent (3.1 percent per year) between 1982 and 1987, in part due to higher farmgate prices. At least 30 to 40 percent of farm households own less than the 0.1 to 0.15 hectare of land per person required for self-sufficiency in rice and so have received little benefit from higher paddy prices. Those farmers that have produced a marketable surplus have enjoyed higher revenues due to the price increases. But there appear to be significant nonprice barriers to increased production. These include continued uncertainty over future prices, lack of high-yielding varieties, lack of access to credit and fertilizer, and inadequate water control.

## EFFECTS OF STRUCTURAL ADJUSTMENT POLICIES ON THE POOR

Other channels by which stabilization and structural adjustment policies affected the poor are discussed in chapter 6. Exchange rate devaluations had little direct effect on agricultural production and incomes in Madagascar because agricultural trade and pricing policies were adjusted to keep domestic producer prices relatively stable and substantially below border prices. The three major export crops—coffee, vanilla, and cloves—were all taxed heavily (e.g., coffee taxes averaged 50 percent of the border price from 1972 to 1987). Real producer prices of the three major export crops fell by 10 percent between 1982 and 1986, despite a 93 percent depreciation of the nominal exchange rate (and a 34 percent depreciation of the real exchange rate). This effective decline in producer prices until 1987 caused production of the three major export crops to stagnate and it increased by only 1 percent between 1982 and 1987. However, it made sense not to raise these real producer prices as the world demand for all three crops was weak and Madagascar's share in world exports of cloves and vanilla was large. Excluding coffee, of which Madagascar produced less than its International Coffee Agreement (ICA) quota, large increases in production and exports could have resulted in less, not more, export revenues.

The combination of exchange rate devaluations and restrictions on imported inputs that raised costs and reduced input supplies contributed to the sharp fall in industrial output. The available data suggest that workers were most affected through declining real wages rather than through loss of jobs, as private-sector employment continued to increase, albeit slowly. The decline in the real wage (as reflected in the official minimum wage) is a long-term phenomenon in Madagascar, though. Real wages fell by 27 percent from 1975 to 1981 and by 26 percent from 1981 to 1987.

Reductions in government expenditure fell largely on government investment and the rice subsidy, but other expenditure affecting the poor was also cut. Although employment levels continued to increase slowly in the 1980s, real expenditure on personnel fell by 20 percent between 1982 and 1987, implying a decline in real incomes of government workers. Current expenditure on education was cut back to the pre-1978 levels. Real expenditure on health was not increased during the spending boom between 1978 and 1980 and budget cuts in the early 1980s reduced health expenditure by 38 percent in real terms compared with the period between 1975 and 1977. Whether these cuts in education and health expenditure fell mainly on the poor or higher-income groups is not, however, clear.

## SUMMARY AND CONCLUSIONS

Chapter 7 summarizes the major findings of the first six chapters and discusses policy implications. Overall, low-income urban households seem to have been worst affected by the stabilization and structural adjustment policies. The loss of rice subsidies sharply increased consumer prices. On the income side, the minimum wage continued to fall in real terms, and the stagnation of the industrial sector and lower aggregate demand slowed growth in employment in both the formal and informal sectors. There was steady growth in agricultural GDP between 1981 and 1987, which compares favorably with agriculture's performance in the pre-1981 period. Farmers who sell more rice than they buy are likely to have benefitted by increased rice prices, and output of rice increased by 17 percent between 1982 and 1987. However, many small households are net purchasers of rice or have only small net sales. Most producers of export crops enjoyed little gain in real revenues until 1988.

A major reason for the relatively poor overall growth performance is the partial and recent nature of most of the structural adjustment reforms. There is evidence that many structural constraints limiting growth remain, although preliminary data from 1988 and 1989 suggest that growth in real income may have accelerated.

Identifying groups that have reaped substantial benefits from the adjustment process in Madagascar is difficult. The appropriate comparison, however, is not between the period before and the period after adjustment. Real incomes and consumption were boosted to unsustainably high levels through massive foreign borrowing and government budget deficits in the years leading up to the balance of payments crisis of the early 1980s. A more useful comparison, though one which requires considerably more analysis, is between the outcomes of alternative policy options. For example, delaying stabilization for several years could have resulted in a far worse macroeconomic situation and a more difficult adjustment period afterward.

The question of whether policies other than those adopted could have achieved similar results in terms of price and balance of payments stabilization but with lower food prices, less foreign borrowing, higher income growth and more benefits to the poor is not merely of academic interest. Linkages between macroeconomic and sectoral policies and the microeconomy determine the potential effects on the poor of current macroeconomic and sectoral policy options for spurring real income growth. These might include further devaluations of the exchange rate or more expansionary fiscal policies to boost aggregate demand. The level of government spending on rice research and rural infrastructure may also have a significant effect on the welfare of the rural poor by affecting the level of rice output.

Some of the major linkages between macroeconomic and sectoral policies and the welfare of lower income households have been outlined in this paper. The analysis presented here, however, is mostly descriptive. In order to quantify the likely effects of policies on household welfare, a more formal modeling framework is needed in which the important linkages between the macro-economy, factor markets, and household incomes and consumption are specified.

Attempts to better conceptualize the linkages between economic sectors and to quantify the effects of policies are not an end in themselves. Rather, the goal is a policymaking process that takes into consideration the effects of policies on the poor and leads to increased welfare for lower income households in Madagascar.

# 1.

## Introduction

Madagascar, an island nation of 11 million people, is sometimes considered, along with Ghana, as one of the star pupils of the International Monetary Fund (IMF). During the decade of the 1980s, Madagascar signed seven standby agreements with the IMF, and a number of sectoral and structural adjustment loan agreements with the World Bank and France's Caisse Centrale de Coopération Economique (CCCE). This almost continuous process of reform resulted in significant reductions in inflation, budget deficits, and balance of payments deficits, but there has been little real economic growth (per capita GDP in 1987 was at only US\$210, among the lowest in the world) and the foreign debt has continued to increase (World Bank 1989b). Moreover, the evidence suggests that the poorest segments of the population are worse off now than before the reforms began.

The need for macroeconomic stabilization in Madagascar arose in the early 1980s following a massive investment push (the *investir à outrance policy*) launched in 1978. Although from the perspective of macroeconomic policy, the increased investment appeared reasonable at the time, on a microeconomic level the policy proved to be disastrous, as many of the projects undertaken were ill conceived and uneconomic. Because the increased investments were funded largely from foreign borrowing and domestic money creation, the immediate results of the policy were a temporary economic boom, an increased foreign debt, and higher inflation. By 1981, however, the large increase in investment goods combined with a decline in the terms of trade (lower coffee export prices and higher oil import prices) to produce a balance of payments crisis.

Policy reforms in the early 1980s focused on stabilization—ie, reduction of aggregate demand through cutbacks in government expenditure, efforts to increase government revenues, and limits on bank credit to the private sector. Once macroeconomic stability was achieved, the focus of reform turned to structural adjustment policies aimed at easing constraints on aggregate supply. These included rationalization of tariff structures, higher producer prices, increased input supplies, and liberalization of markets. Exchange rate devaluations played a role both in the stabilization programs (by reducing domestic demand for imports) and in structural adjustment (by increasing producer incentives for tradable goods).

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To blame the stabilization and structural adjustment policies in Madagascar for the poor growth performance of the 1980s is not justifiable. Apart from the short-lived and unsustainable growth spurt in 1979 and 1980 spurred by the *investir à outrance* policy, real GDP growth in Madagascar failed to exceed population growth in every year between 1972 and 1987. Any explanation of why the policies of the 1980s have failed to produce income growth must be able to explain the stagnation of the 1970s as well. In addition, demonstrating that certain groups of people are worse off after the adjustment process, while useful from the standpoint of targeting relief efforts, neither proves that the adjustment policies were the cause of the adverse effects nor gives much insight into how the policies could be usefully changed.

Several studies have addressed the effects of stabilization and structural adjustment policies in Madagascar. A 1986 report by the Ministère de Coopération, summarized in Hugon (1988), critiques the government's macroeconomic and sectoral policies, arguing that the IMF and World Bank recommendations overemphasized demand management and ignored important structural characteristics of the economy on the supply side. UNICEF (1984) is also critical of structural adjustment in Madagascar, on the basis of data showing adverse changes in some welfare measures for the poor during the 1980s. These studies do not discuss which, if any, specific economic policies (apart from changes in rice pricing policy) were responsible for the worsening microeconomy.

A report on poverty alleviation in Madagascar (World Bank 1989a) contains a detailed description of the poor in Madagascar and gives household-budget survey results not published elsewhere. Little emphasis is placed on the macroeconomy or economic linkages; instead the report concentrates on the evolution of poverty through the 1980s and implications for sectoral and microlevel policies for the alleviation of poverty. A recent study by the Overseas Development Institute (ODI forthcoming), while exploring in more detail the linkages between the macroeconomy and the microeconomy in rural areas, still does not isolate the effects of adjustment from those of general trends in the macroeconomy.

The focus of this paper is an analysis of the linkages between macroeconomic policy and the household sector in Madagascar. Unlike the forthcoming ODI study, the analysis covers more than just the poorest rural households. Coverage of the macroeconomy also is more detailed than in most of the earlier studies. Preliminary conclusions as to the effects of stabilization and structural adjust-

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ment policies on the poor are presented. More important, however, the paper serves as a base for further work. Written at the outset of a planned long-term project, this study identifies key linkages and policy issues on which the modeling efforts will focus.

## OUTLINE OF THE PAPER

Chapter 2 gives some basic background information on Madagascar. The geography, demography, and the political history of the country are summarized and the structure of the economy is described in some detail.

Chapter 3 is devoted to macroeconomic policy. A brief history of policies and their outcomes is presented to provide the historical context of the development policies and the balance of payments crisis that necessitated structural adjustment in the 1980s. Policies and macroeconomic performance during adjustment are discussed in greater depth.

In Chapter 4 a characterization of the poor in Madagascar is presented, identifying the major groups by region and socioeconomic characteristics. Various quality of life indicators also are discussed.

The most direct and perhaps the most important effects of structural adjustment policies on the poor derived from rice policies, analyzed in Chapter 5. The financial cost of rice subsidies in the 1970s and 1980s is calculated and the impact on various household groups of the removal of the subsidies is discussed.

Chapter 6 analyzes the effects of other major structural adjustment policies—devaluation, trade policies, fiscal policy, and other policies—on the welfare of the poor. Initial quantitative estimates of the policy effects are made, though the absence of an empirical counterfactual macro-micro framework does not permit firm conclusions on the evaluation of alternative policies.

Finally, Chapter 7 summarizes the findings of the earlier chapters and highlights key linkages and policy issues that will be the focus of the data collection and modeling efforts. Several hypotheses concerning effects of stabilization and structural adjustment policies on the poor are suggested and preliminary conclusions are discussed.

## 2.

# Socioeconomic Background

### GEOGRAPHY AND POPULATION

Madagascar, the world's fourth largest island, with an area of 587,000 square kilometers, is about the same size as Kenya. A number of smaller islands, including Nosy Be located off the northwest coast of Madagascar and Nosy Sainte Marie located off the east coast, are also part of the Republic of Madagascar.

The origins of the Malagasy people are still uncertain. Linguistic and other evidence suggests that the first inhabitants of the island came from the Indonesian archipelago 1,500 to 2,000 years ago, possibly after a period spent living in East Africa. Eighteen separate ethnic groups have been distinguished among the Malagasy, although the cultural differences between the groups are not great. A more important distinction can be made between the Merina tribe who live on the central plateau of the country<sup>1</sup> and the côtiers (coastal people) comprising all other groups. The Merina tribe comprises roughly one-fourth of the population (Bunge 1983) and its empire controlled much of the island during the nineteenth century.

Population in 1985 is variously estimated at between 9.9 million and 10.6 million (table 1). Two population censuses have been conducted in Madagascar in 1966 and 1975. (In addition, a small population survey was conducted in 1984, which has served as a basis for population projections through the year 2000 (Direction Générale du Plan 1988). In 1975 total population was 7.6 million people; estimates of average population growth rate between 1975 and 1984 or 1985 range from 2.63 to 3.37 percent per year.

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<sup>1</sup> The Betsileo people who live in the southern part of the plateau, are also sometimes included in the broad category of Merina.

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**Table 1 – Madagascar: Estimated Population and Distribution, 1975, 1984, and 1985**

	Rural Population	Urban Population	Seven Largest Cities	Other Urban	Total Population	Urban Population as a Percent of Total Population
Thousands						
1975 census <sup>a</sup>	6,364	1,239	1,059	180	7,604	16.29
1984 estimates <sup>b</sup>	7,775 (2.25)	1,833 (4.45)	1,340 (2.65)	493 (11.85)	9,608 (2.63)	19.08
1985 estimates <sup>c</sup>						
Pryor	7,587 (1.77)	2,396 (6.82)	...	...	9,983 (2.76)	24.00
World Tables	8,067 (2.40)	2,145 <sup>d</sup> (5.49)	...	...	10,212 (2.99)	21.00
MPARA agricultural census	8,359 (2.76)	2,235 (6.08)	1,910 (6.08)	325 (6.08)	10,594 (3.37)	21.10

**Sources:** *Direction Générale du Plan (1988); Agricultural Census (MPARA 1988b); Pryor (1988); World Bank (1988 a and b).*

<sup>a</sup> *Figures quoted by Pryor (1988) from the 1975 Population Census.*

<sup>b</sup> *1984 estimates from Direction Générale du Plan (1988).*

<sup>c</sup> *1985 estimates from Pryor (1988), World Bank (1988b) and MPARA agricultural census (1988b).*

<sup>d</sup> *Calculated using urbanization percentage from World Development Report (World Bank 1988a).*

**Note:** *Figures in parentheses are average growth rates between the year of the estimate and 1975.*

In 1975, 16.3 percent of the population lived in urban areas—13.9 percent in the seven largest cities (Antananarivo, Antsirabe, Antsiranana [Diego Suarez], Fianarantsoa, Mahajanga [Majunga], Toamasina [Tamatave], and Toliary [Tuléar]. Pryor (1988) estimates the proportion of urban population as 24 percent in 1985, the 1988 *World Development Report* and the agricultural census give a figure of 21 percent for 1985 and the Direction Générale du Plan gives 19 percent for 1984.<sup>2</sup> Only Antananarivo, with 683,000 inhabitants, had a population greater than 500,000 people in 1975.

### Agroecological Zones

In broad terms, the climate of Madagascar can be considered tropical, with average high and low temperatures between 20C and 30C. However, there is a wide variation of ecologies found on the island, in part due to the significant differences in altitude between regions. Rainfall is heaviest in the north (up to 3,000 millimeters per year), but about half the island receives only about 1,500 millimeters of rainfall per year (World Bank 1983). Six major agroecological regions are distinguished in the 1984 agricultural census (Ministère de la Production Agricole et de la Réforme Agraire [MPARA] 1988a-f): north and northwest, east coast, south and southwest, western littoral, high plateaus, and mid-west and western slope (table 2 and map 1).

The high plateaus are in the central part of the island. This is the most densely populated part of the country; 35 percent of the rural population live in this zone and population density is .363 rural inhabitants per square kilometer (Covell 1987; Bunge 1983; World Bank 1983). The elevation drops rapidly from the high plateaus to the Indian Ocean in the east coast zone, where much of the island's remaining forest land is found. (Much of the forest has already been cut down and destroyed by small farmers clearing the land for their crops.) Rain falls throughout the year and temperatures are generally warmer than on the high plateaus, providing a suitable climate for the production of coffee and other export crops.

The south and southwest region is the driest of the country. Average rainfall

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<sup>2</sup> Definitions of rural and urban differ among the sources. Pryor's estimates use figures from the Banque des Données de l'Etat that define an urban center as an "agglomeration which presents an 'urban cohesion', which disposes of resources necessary for a governmental budget for the area, which has some type of urbanization plan, and which has at least 4,000 inhabitants." The agricultural census defines urban centers as any capitals of faritanies or fivondronanas where the proportion of nonagricultural households exceeds 30 percent. Differences in definitions of secondary urban centers probably account for the extraordinarily high growth rate (11.85 percent per year) of secondary urban centers between 1975 and 1984 shown in table 1.

**Table 2 – Madagascar: Major Agroecological Zones and Crop Distribution, 1984**

		Altitude	Rainfall	Rural Population	Area Total	Cultivated Area as Percent of Total	Rural Inhabitants per Hectare	Irrigated Rice	Non-irrigated Rice		
		Meters	Millimeters	Million	Km <sup>2</sup>	Hectares					
Region I:	North and northwest	0-300	2,000	0.7895	54,816	3.76	0.144	86,155	35,347		
Region II:	East coast	0-1,200	1,500-2,000	2.1356	84,452	4.87	0.253	109,254	97,788		
Region III:	South and southwest	0-500	500	0.9027	95,624	1.45	0.094	36,706	1,216		
Region IV:	Western littoral	0-300	2,000	0.8071	141,111	1.63	0.057	145,893	18,744		
Region V:	High plateaus	1,200-1,400	1,500	3.0221	83,188	6.01	0.363	320,461	20,752		
Region VI:	Midwest and western slope	300-1,200	850	1.0278	130,609	2.06	0.079	152,181	15,902		
<b>Total</b>				<b>8.6848</b>	<b>589,800</b>	<b>2.98</b>	<b>0.147</b>	<b>850,650</b>	<b>189,749</b>		
					Other Food Crops	Tree Crops	Mixed Crops	Cereals Except Rice	Roots & Tubers	Pulses	Vegetables
Region I:	North and northwest				10,081	66,528	4,697	3,102	3,526	411	4,378
Region II:	East coast				69,704	112,625	14,701	36,527	81,846	2,591	215
Region III:	South and southwest				86,657	10,533	1,731	22,594	69,998	13,461	2,366
Region IV:	Western littoral				42,068	12,864	4,274	6,485	12,990	3,671	583

*Table Continued*

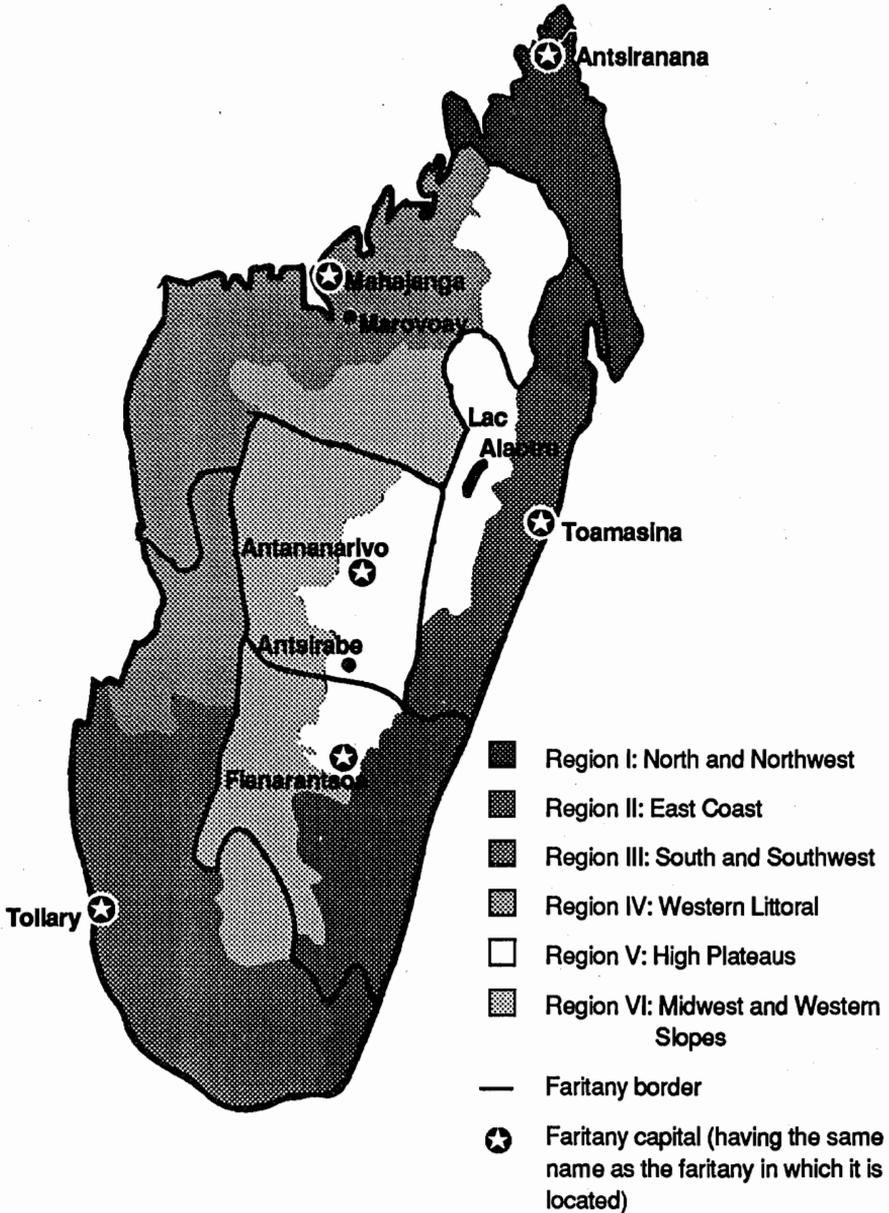
*Table Continuation*

Region V: High plateaus	121,275	16,669	8,495	35,930	94,806	20,414	4,507
Region VI: Midwest and western slope	85,357	3,912	3,084	29,952	53,090	13,880	2,490
<b>Total</b>	<b>415,142</b>	<b>223,131</b>	<b>36,982</b>	<b>134,590</b>	<b>316,256</b>	<b>54,428</b>	<b>14,539</b>

**Source:** MPARA (1987a).

**Note:** *Mixed crops are fields with both tree and other crops. thus, an area of nonrice cereals, roots and tubers, pulses, and vegetables is partly included in "other food crops" and partly in "mixed crops."*

Map 1 – Madagascar: Agroecological Zones



Source: Ministère de la Production Agricole et de la Réforme Agraire (1987a).

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ranges from 400 to 600 millimeters per year and the dry season lasts eight to nine months. The region is mostly flat, and rural population density is roughly 30 percent that of the high plateaus. Raising livestock is a major economic activity. The west littoral and the midwest and western slope zones have the lowest rural population density, about 13.6 persons per square kilometer. Much of the midwest and western slope region was uninhabited in 1900, occupied mainly by cattle herders of the Sakalave tribe. Less than 10 percent of the country's rural population lives in the north and northwest zone, which is geographically isolated from the rest of the country by rugged, hilly terrain in the southern part of the zone (Covell 1987; MPARA 1988a-f; Bunge 1983; World Bank 1983).

### POLITICAL HISTORY<sup>3</sup>

The first known European contact with Madagascar occurred in 1500. The first chartered companies were started by the French in 1643, but the companies were largely unsuccessful. Instead of being major trade centers, the island ports functioned mainly to resupply and repair passing ships. However, the slave trade, in growing internal and external markets, increased rapidly, and by the end of the 17th century, large numbers of slaves (and cattle) were being exported in exchange for guns and other manufactured goods.

During the 19th century, a number of political states were formed by various ethnic groups on the island. The strongest of these was the Merina. Britain provided military training to the Merina state (later empire) and British missionaries set up a school system. French influence in Madagascar was greater in the coastal regions, especially after the conversion to Protestant Christianity in 1869 of the queen of the Merina and a number of government officials. Over time, however, French interest and determination to gain control of Madagascar proved stronger and in 1890 Britain exchanged recognition of French control of Madagascar for French recognition of British control of Zanzibar. The island officially became a French colony in 1896 after the French militarily defeated the Merina monarchy.

The first governor general of the new colony, Joseph Gallieni, created a new bureaucracy to replace the Merina state. Under the new colonial laws, slavery was abolished, but a system of forced labor, in theory for public works, was established. Large blocks of land along the east and north coasts were expropriated and given to French commercial companies to establish plantations.

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<sup>3</sup> This section is based on material in Covell (1987), Bunge (1983), and Rajoelina and Ramelet (1989).

Smaller lots were given to French settlers as well. Government policies regarding the structure of production varied over time and as a result, large commercial estates, smallholdings by settlers, and Malagasy farms all produced export crops.

An armed Malagasy rebellion in 1947 against the French regime resulted in more than 50,000 deaths before being put down by the colonial government. Nevertheless, Madagascar's transition to independence in the late 1950s was peaceful. Elections for provincial assemblies held nationwide were won by the Social Democratic Party in 1957. Three years later, the leader of the party, Philbert Tsiranana, became Madagascar's first president.

Tsiranana maintained close ties with France that were formalized in a series of cooperation agreements signed in April 1960. France retained the right to station troops in Madagascar, the Malagasy army would be trained and equipped by France, citizens of each country would enjoy most of the rights of nationals of the other country, and in terms of economic policy, Madagascar remained a member of the franc zone.

Frustration over relatively slow economic growth and resentment over income disparities and foreign influence in the country played major roles in the downfall of the Tsiranana government. Antigovernment riots broke out in the southern part of the country in April 1971 when local governments continued to collect poll and cattle taxes in spite of a drought that caused up to 1,000 deaths.<sup>4</sup> Other civil unrest, including student protests in Antananarivo over qualifying examinations and the slow pace of *malgachinisation*,<sup>5</sup> and the poor health of Tsiranana himself after a stroke in February 1970, all set the stage in May 1972 for the military overthrow of the government, led by General Gabriel Ramanantsoa.

The new government brought about a sharp break with past policies. Ramanantsoa's government sought greater independence from France and reduced the influence of France in Madagascar by expelling the French from its military bases in 1972 and withdrawing from the franc zone in May, 1973.<sup>6</sup>

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4 The poll and cattle taxes, instituted under the colonial regime by Gallieni in the late 1890s, were the most important source of revenue for local governments, but were much resented by the rural population.

5 Originally used to mean a demand for education in the national language, the term *malgachinisation* gradually came to encompass the ouster of the French from Madagascar (see Covell 1989).

6 As Madagascar was a member of the franc zone, its currency was backed by the French Treasury and was freely convertible. Leaving the franc zone enabled Madagascar to impose foreign exchange restrictions and adopt an independent monetary policy (see Pryor forthcoming and 1963).

Madagascar adopted a foreign policy of nonalignment, opening possibilities of aid and trade flows with the Communist bloc countries, in particular with the Soviet Union and North Korea. The Ramanantsoa government also began the process of nationalization of industries and created state marketing boards for rice and other agricultural commodities (Covell 1989).

The coalition of military rulers fell apart in late 1974 and after an unsuccessful coup attempt in 1974, there followed the resignation of Ramanantsoa in February 1975 and the assassination of his successor, Richard Ratsimandrava less than one week later. After three months of intense political bargaining, Didier Ratsiraka emerged as the new leader. On June 15, 1975, the Malagasy Republic became the Democratic Republic of Madagascar, and seven months later, in January 1976, after a national referendum, Ratsiraka was officially inaugurated president under a new constitution.

In 1978, Madagascar adopted a policy of investment to the limit<sup>7</sup> and borrowing from all directions (*tous azimuts*) in an attempt to speed the economic development of the country. When a balance of payments crisis ensued in 1980, the country was forced to turn to the IMF for loans and for its certification of creditworthiness. Despite increasing involvement with western capitalist institutions and countries, however, Madagascar continued to maintain a neutral foreign policy. The leadership has been harshly criticized because of the country's economic hardship and increasing foreign debt (see, for example, Deleris 1986), but since 1976 President Ratsiraka has twice won presidential elections, in November 1982 and in March 1989.

## MAJOR ECONOMIC SECTORS

Much of the currently available economic data on Madagascar is of questionable quality. Little macroeconomic data has been published by the Malagasy government since 1980: the last published set of detailed national accounts dates from 1973 (L'Institut National de la Statistique et de la Recherche Economique [INSRE] undated). Limited geographical coverage and small sample sizes of sectoral output and price data are also serious deficiencies. The situation is like that of many other countries in sub-Saharan Africa, however, and in some respects data problems in Madagascar are less severe. A wide range of sectoral and microlevel surveys has been conducted, including the national agricultural census in 1984/85, various industrial surveys, surveys of the informal

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<sup>7</sup> This English translation and the original in French, *investir à outrance*, are used interchangeably throughout this monograph.

**Table 3 – Madagascar: Sectoral Composition of GDP, Current Prices, 1975, 1980, and 1987**

	1975		1980		1987	
	Bn FMG	Percent	Bn FMG	Percent	Bn FMG	Percent
Agriculture	162.4	41.1	249.1	36.1	940.2	42.6
Industry	70.6	17.9	124.3	18.0	350.0	15.8
Services	147.3	37.3	281.3	40.8	826.0	37.4
Import taxes	14.9	3.8	35.1	5.1	93.2	4.2
GDP at current market prices	395.2	100.0	689.8	100.0	2,209.4	100.0
GDP at 1984 prices	1,374.4	...	1,470.2	...	1,438.5	...

**Sources:** 1975, Pryor (1988); 1980, World Bank (1986); 1987, IMF (1988).

sector in a number of cities carried out in 1984 and 1985 by the International Labor Office (ILO) and a labor survey. Construction of a new complete set of national accounts for 1984 is nearing completion as well.

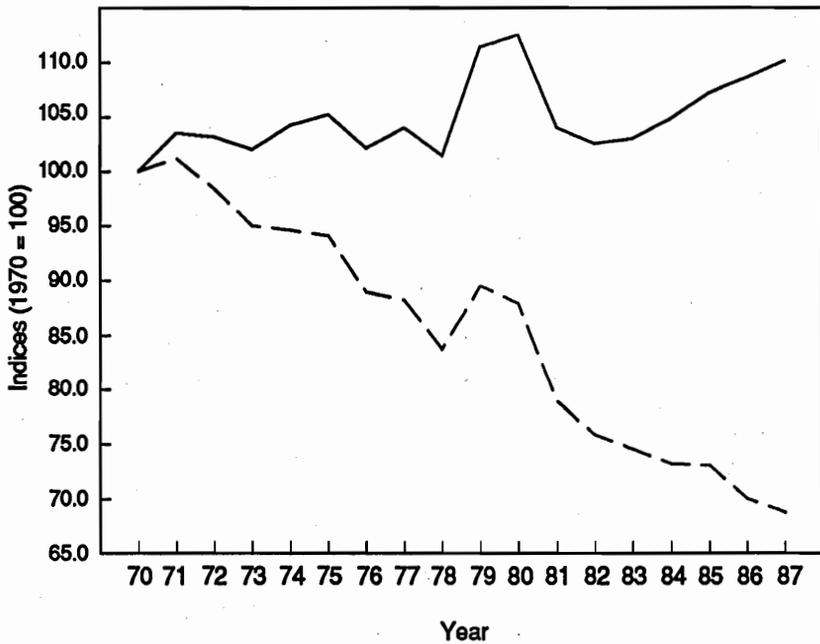
Madagascar's estimated per capita GDP of US\$210 in 1987 ranks it as one of the world's poorest countries (World Bank 1989b). Agriculture dominates the Malagasy economy, accounting for 42.6 percent of GDP in 1987. Industrial value added in that year was only 15.8 percent, slightly below its 17.9 percent share in 1975 (table 3). Real GDP increased by an average annual growth rate of 3.1 percent between 1960 and 1970 (Pryor 1988),<sup>8</sup> but increased by only 0.1 percent per annum from 1970 to 1978. In 1979 real GDP jumped by 9.7 percent as a result of the *investir à outrance* development strategy, but the higher real output was not sustained. Real GDP fell sharply in 1981, and for the 1970 to 1987 period as a whole, real GDP growth has averaged only 0.6 percent per year.<sup>9</sup> As the population increased by an average 2.8 percent per year, per capita real GDP fell an average of 2.2 percent per year from 1970 to 1987 (figure 1).

Most of the little growth that has been achieved in the 1970s and 1980s has

<sup>8</sup> Real GDP measured in constant 1970 quasi-factor prices.

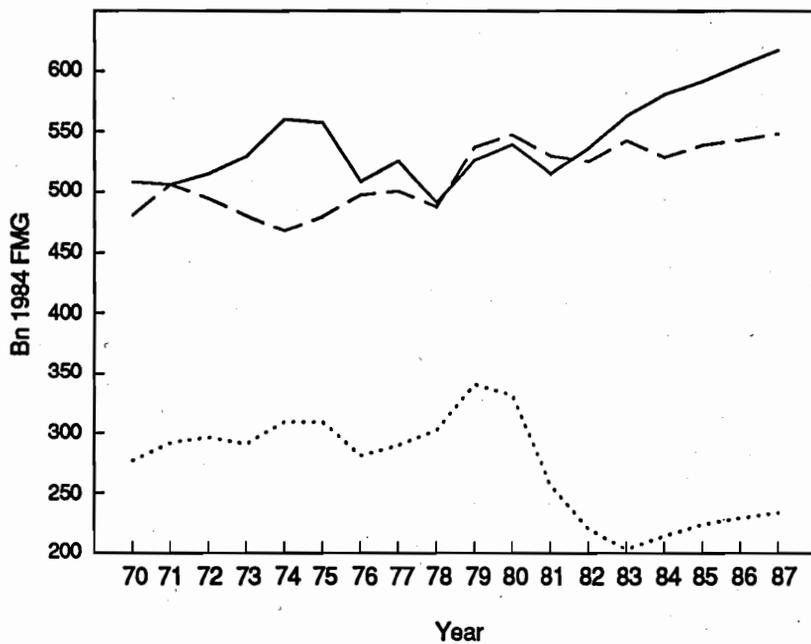
<sup>9</sup> At the time of writing, a revised GDP series, which shows GDP to have been more than 20 percent higher than earlier estimates, had not been officially published.

**Figure 1 – Madagascar: Indices of Real GDP and Per Capita Real GDP, 1970 - 1987**



**Sources:** Pryor (1988), IMF (1988).

**Note:** 1984 prices (FMG).

**Figure 2 – Madagascar: Real GDP by Sector, 1970 - 1987**

— Agriculture

- - Services

..... Industry

Sources: Pryor (1988), IMF (1988).

Note: 1984 prices (FMG).

by an average of 3.1 percent per year from 1981 to 1987, after 11 years of essentially no growth. Industrial value added fell by 40 percent between 1979 and 1983 and after four years of moderate growth (averaging 3.5 percent per year) in 1987 it was still 23 percent below its level of 1978. As a share of GDP, industrial value added in 1987 was only 15.8 percent, compared with approximately 18 percent in 1975 and 1980 (table 3).

In 1986, agriculture employed an estimated 87.0 percent of the labor force; only 1.4 percent was employed in the formal industrial sector. The remainder of the labor force, 11.6 percent, either worked in the informal or services sector or was unemployed (IMF 1988).

### Agriculture

Agricultural production in Madagascar is dominated by traditional farmers, defined in the 1984/85 census as smallholders who cultivate less than 10 hectares, employ less than five full-time paid workers, and do not use specialized modern equipment or facilities. Traditional farms account for 95 percent of total physical area cultivated (table 4).<sup>10</sup> Nationally, average physical farm size is only 1.20 hectares overall, and 1.15 hectares for the traditional holdings. The average size of a modern farm is 130 hectares. Irrigated area (planted mostly with rice or cotton) accounts for 44 percent of total area cultivated by traditional farms, but only 13 percent for modern farms. Multiple cropping (either intercropping or sequential cropping) is common for upland soils, but inadequate water control limits the amount of double cropping on irrigated land. The multiple-cropping index, which measures the ratio of total area harvested to total physical area, is only 1.19 for traditional farms and 1.12 for the modern farms. The figures for total area harvested may be overestimated, however, since for intercrops (two or more crops growing in the same field at the same time), the area of the field is counted separately for each crop, without an adjustment for planting density.

Most farmers in Madagascar own their own land. Eighty-seven percent of physical area cultivated by smallholders belongs to the farm household that cultivates the land. Only 5 percent of the physical area cultivated by traditional farms is rented.

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<sup>10</sup> Physical area cultivated, as defined in the 1984/85 census, does not include fallow land. Total area cultivated exceeds physical area cultivated because of multiple cropping on the same piece of land.

**Table 4 – Madagascar: Cultivated Land, by Farm Structure and Land Tenure**

	Traditional <sup>a</sup>	Modern	All Farms
<b>FARM STRUCTURE</b>			
Number of farms	1,458,823	612	1,459,435
Percent of all farms	99.96	0.04	100.00
Physical area of farmland <sup>b</sup> (hectares)	1,676,164	79,543	1,755,707
Percent of total area of farms	95.47	4.53	100.00
Physical area/farm (ha/farm)	1.15	129.97	1.20
Area cultivated <sup>c</sup>	1,996,013	88,767	2,084,780
Percent of area cultivated	95.74	4.26	100.00
Multiple-cropping index <sup>d</sup>	1.191	1.116	1.187
Irrigated area (hectares)	879,186	11,873	891,059
Irrigation ratio <sup>e</sup>	0.440	0.134	0.427
<b>LAND TENURE<sup>f</sup></b>			
Owner-operated			
Hectares	1,458,189	73,889	1,532,078
Percent of total by sector	87.00	92.89	87.26
Rented <sup>g</sup>			
Hectares	84,362	930	85,292
Percent of total by sector	5.03	1.17	4.86
Other <sup>h</sup>			
Hectares	133,613	4,724	138,337
Percent of total by sector	7.97	5.94	7.88
Total			
Hectares	1,676,164	79,543	1,755,707
Percent of total by sector	100.00	100.00	100.00

**Source:** MPARA (1988a-f).

<sup>a</sup> Traditional farms are defined as farms with less than 10 hectares of cultivated land, hiring fewer than five full-time paid workers and not using any specialized modern equipment or facilities. Similar definitions based on size and technology apply to farms raising livestock.

<sup>b</sup> Physical area is area cleared and cultivated, not including fallow.

<sup>c</sup> Area cultivated counts multi-crops and double-crops on the same hectare of land as two (or more) hectares.

<sup>d</sup> The multiple cropping index is the ratio of area cultivated to physical area.

<sup>e</sup> The irrigation ratio is the ratio of irrigated area to area cultivated.

<sup>f</sup> Percentages in section on land tenure read from top to bottom.

<sup>g</sup> Rented land includes payments in cash or in kind.

<sup>h</sup> Other includes free occupation of land, rental payment in labor, and cultivation of land for the family or the State.

**Table 5** — Madagascar: Share of Traditional Farms in Total Cropland (percent of area cultivated, by crops)

Crop	Total Area	Traditional <sup>a</sup>	Share
	1,000 Hectares		Percent
Rice	1,080.4	1067.7	98.8
Irrigated rice	850.7	839.3	98.7
Nonirrigated	189.7	188.4	99.3
Cereals (excluding rice)	134.6	133.4	99.1
Maize	132.5	131.6	99.3
Other	2.1	1.8	85.0
Roots and tubers	316.3	313.6	99.2
Cassava	223.4	220.7	98.8
Sweet potatoes	67.2	67.1	100.0 <sup>b</sup>
Potatoes	9.8	9.8	99.7
Saonjo (taro)	15.9	15.9	100.0 <sup>b</sup>
Grain legumes	59.1	58.8	99.5
Green beans	40.8	...	...
Butter beans	5.2	...	...
Bambara groundnuts	3.4	...	...
Other	9.7	...	...
Annual industrial crops	49.5	39.2	79.2
Groundnuts	22.4	22.2	99.2
Cotton	17.7	8.5	48.2
Tobacco	6.5	...	...
Soybeans	1.9	...	...
Other	1.1	...	...
Vegetables	14.5	10.6	72.9
Permanent industrial crops	306.0	264.7	86.5
Coffee	147.2	139.3	94.6
Clove	44.8	43.2	96.5
Vanilla	30.6	30.3	99.0
Pepper	10.4	8.5	81.6
Coconut	10.4	4.2	40.9
Sugarcane	45.7	36.9	80.8
Ylang-ylang	4.0	...	...
Sisal	10.1	...	...
Fruits	119.0	107.5	90.3
Banana	90.5	88.9	98.2
Other	5.3	0.6	10.4
<b>Total</b>	<b>2,085.0</b>	<b>1,996.0</b>	<b>95.7</b>

Source: MPARA (1988a-d).

<sup>a</sup> Traditional farms are defined as hiring fewer than 10 hectares hire fewer than five full-time paid workers, and not using specialized modern equipment or fertilizers.

<sup>b</sup> Less than 0.1 percent is cultivated by modern farms.

Table 6 - Madagascar: Agricultural Production, 1984/85

	MPARA Agricultural Statistics					1984/85 Agricultural Census					Percent Difference ((Census/Statistics)-1)*100			
	Area	Yield <sup>a</sup>	Production	Value		Area	Yield <sup>a</sup>	Production	Value		Area	Yield <sup>a</sup>	Production	Assumed Prices
	Hectare	Ton/Ha	Tons	Million FMG	Percent of Value	Hectare	Ton/Ha	Tons	Million FMG	Percent of Value	Hectare	Ton/Ha	Tons	FMG/Kg
Rice	1,183,520	1.84	2,177,680	198.8	43.3	1,080,452	2.25	2,436,300	222.4	38.1	-8.7	22.5	11.9	91.3
Coffee	223,200	0.35	78,500	25.9	5.6	147,231	0.59	86,490	28.5	4.9	-34.0	67.0	10.2	330.0
Cloves	77,160	0.17	13,500	5.9	1.3	44,840	0.63	28,125	12.2	2.1	-41.9	258.5	108.3	435.0
Vanilla	26,610	0.26	7,000	7.0	1.5	30,604	0.64	19,640	19.6	3.4	15.0	144.0	180.6	1,000.0
Pepper	6,200	0.45	2,800	0.7	0.2	10,373	0.55	5,675	1.4	0.2	67.3	21.1	102.7	255.0
Cotton	32,929	1.30	42,903	10.3	2.2	17,663	1.30 <sup>a</sup>	23,013	5.5	0.9	-46.4	0.0 <sup>a</sup>	-46.4	240.0
Cassava	350,570	6.11	2,142,000	66.4	14.5	223,352	15.92	3,556,505	110.3	18.9	-36.3	160.6	66.0	31.0
Sugar	59,000	29.56	1,744,000	20.9	4.6	45,724	29.56 <sup>a</sup>	1,351,570	16.2	2.8	-22.5	0.0 <sup>a</sup>	-22.5	12.0
Groundnuts	32,600	0.97	31,500	8.4	1.8	22,398	1.25	27,980	7.5	1.3	-31.3	29.3	-11.2	267.6
Tobacco	3,400	1.07	3,629	0.9	0.2	6,464	1.07 <sup>a</sup>	6,899	1.6	0.3	90.1	0.0 <sup>a</sup>	90.1	234.4
Cocoa	7,870	0.29	2,300	0.8	0.2	2,743	0.29 <sup>a</sup>	802	0.3	0.0	-65.1	0.0 <sup>a</sup>	-65.1	340.0
Butter beans	7,890	0.74	5,800	2.3	0.5	5,158	0.74 <sup>a</sup>	3,792	1.5	0.3	-34.6	0.0 <sup>a</sup>	-34.6	397.6
Sisal	16,700	1.19	19,800	3.0	0.6	10,112	1.19 <sup>a</sup>	11,989	1.8	0.3	-39.4	0.0 <sup>a</sup>	-39.4	150.0
Maize	140,000	1.00	140,200	20.1	4.4	132,469	0.84	10,705	15.9	2.7	-5.4	-16.5	-21.0	143.3
Dried beans	46,000	0.78	35,700	13.1	2.8	40,813	0.87	55,305	12.9	2.2	-11.3	11.5	-1.1	366.1
Potatoes	40,755	6.47	263,600	34.0	7.4	9,834	10.64	104,605	13.5	2.3	-75.9	64.5	-60.3	129.0
Sweet potat.	90,805	4.96	450,000	29.9	6.5	67,170	9.38	630,225	41.8	7.2	-26.0	89.3	40.1	66.4
Banana	38,260	5.88	224,950	11.2	2.4	90,530	15.48	1,401,610	70.1	12.0	136.6	163.3	523.1	50.0
<b>Total value</b>	...	...	...	<b>459.6</b>	<b>100.0</b>	...	...	...	<b>583.2</b>	<b>100.0</b>	...	...	...	...

Sources: MPARA (1987b, 1988a-f), World Bank (1986), IMF (1988), BDE (1988).

<sup>a</sup> No data on yields were collected as part of the agricultural census. Yield data shown are from MPARA's annual yield estimates for 1985.

Note: Price data for manioc, maize, potatoes and sweet potatoes based on average prices for the first two quarters and from the main markets. Banana price derived assuming a fixed ratio of cassava prices to banana prices. 1984 Price is .96 times the cassava price less a 50 percent marketing margin.

In the country as a whole, food crops account for 78 percent of the area planted to all crops.<sup>11</sup> Sixty-one percent of the land cropped by modern farms is sown to industrial and export crops, yet production of most export crops is dominated by smallholders. Among the major crops, the share of total area cultivated by modern farms exceeds 10 percent only for cotton (52 percent), sugarcane (19 percent), pepper (18 percent), and groundnuts (16 percent) (table 5).

Agricultural value added grew by an average of 0.6 percent per year between 1970 and 1980, and by an average of 3.1 percent per year between 1981 and 1987. However, agricultural production figures from the 1984/85 agricultural census (MPARA 1988a-f) differ substantially from previously published official production estimates for a number of crops (MPARA, 1987b; table 6). Estimates for two of the most important crops, rice and coffee, differ by only about 10 percent between the two sources, but differences between the two sources exceed 50 percent of the lower estimate for 11 of the remaining 16 crops. Overall the estimated value of production from the census is higher than that of the annual MPARA statistics by 16 percent. In general terms, however, the relative importance of the crops in terms of value of production is clear, and the major food crops (rice, manioc [cassava], and sweet potatoes) account for two-thirds (MPARA annual statistics) to three-fourths (census data) of the total value of production.

### Major Food Crops

Rice is by far the most important crop in Madagascar in terms of area planted (51 percent of total area cultivated) and value of production (39 percent of the total).<sup>12</sup> Moreover, rice is the major staple throughout most of the country. Between 1979 and 1981, 54 percent of calories consumed nationally were derived from rice (table 7). Only in the dry south and southeast agroecological zone, where area planted to rice accounts for less than half of area cultivated (29 percent), is rice not the major staple.

Nationally, 82.4 percent of rice (including seed gardens) is irrigated. Eighty percent of households farm irrigated land, and the average irrigated area cultivated is 0.52 hectare per household. The Lac Alaotra and Maravoay basin areas are major surplus-producing regions for rice. Production of rice has

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<sup>11</sup> Area devoted to food crop production is 1,604,954 hectares and includes rice, other cereals, roots and tubers, grain, legumes, and vegetables (table 2).

<sup>12</sup> Figures calculated from 1984/85 agricultural census data presented in table 6.

**Table 7 – Madagascar: Food Balance Sheet, 1979-1981**

	Production	Imports	Stock Changes	Exports	Processed Trade	Domestic Supply	Per Capita Supply per Day	
							Calories	Protein
							Numbers	Grams
1,000 Metric Tons								
Grand total							2,491	56.6
Cereals							1503	33.5
Wheat					-57	57	48	1.4
Paddy rice	2058				-223	2,281	1356	29.5
Maize	122			1		121	97	2.5
Roots and tubers							429	3.8
Cassava	1641				5	1,636	327	2.2
Potatoes	170					170	25	0.5
Sweet potatoes	379					379	66	0.9
Sugar and honey							114	0.1
Sugar	115		2	12	7	94	105	...
Pulses							41	2.6
Nuts and oilseeds							24	0.8
Vegetables							18	1.1
Fruit							89	1.3

*Table Continued*

*Table Continuation*

Meat and offals					140	10.4
Beef and veal	121		4	117	63	4.9
Eggs					4	0.4
Fish and seafood					10	1.6
Milk					9	0.6
Vegetable oils and fats					61	...
Groundnut oil	6			6	16	...
Palm oil	2	3		5	7	...
Cottonseed oil	3	11		14	36	...
Animal oils and fats					18	...
Other					31	0.4

*Source: FAO (1984).*

stagnated since the mid-1970s because of low producer prices and inadequate supplies of fertilizer. Lack of appropriate seed technology is another constraint on rice production. High-yielding rice varieties developed and grown in southern Asia are generally not suitable for the ecologies of Madagascar's major rice growing regions (characterized by cold temperatures, lack of water control and poor soil in the irrigated highland areas, and acidity and iron toxicity in the soils of the eastern part of the country).

Cassava is the second leading source of calories in Madagascar after rice. The 1979 to 1981 *Food Balance Sheets* (FAO 1984), based on MPARA annual estimates of 1.64 million tons of cassava produced (table 7), shows cassava consumption totaling 327 calories per capita per day, representing 13 percent of national calorie consumption.<sup>13</sup> Cassava is usually grown on upland (nonirrigated) soils and is a dominant crop in the drier parts of the country (43 percent of the area under cassava cultivation is grown in the south and southeast agroecological zone). Prices of cassava per calorie tend to be substantially less than those of rice, a major reason why cassava is becoming increasingly important as a rice substitute in the Malagasy diet. Production of cassava, which has increased faster than the population, grew by 4.2 percent per year between 1972 and 1980 and by 4.0 percent per year between 1980 and 1987. Small amounts of cassava are processed into tapioca and exported.

Maize (97 calories per person per day in the period 1979-1981), sweet potatoes (66 calories per person per day) and potatoes (25 calories per person per day) are also important sources of calories in some regions of the country.<sup>14</sup> Like peas, beans and most of the food crops other than rice, these crops are not traded internationally by Madagascar on a large scale.<sup>15</sup> Vegetable oils are imported, however, and domestic production of vegetable oil, mainly from groundnuts and cotton seed, accounts for less than half of consumption.

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<sup>13</sup> If the 1984/85 census production figure of 3.56 million tons is correct, cassava consumption per capita may be nearly twice the 327 calories per person per day estimated for 1979 to 1981.

<sup>14</sup> Production figures for sweet potatoes are 40 percent higher, and production figures for potatoes 60 percent lower in the agricultural census than in the annual production figures. The FAO food balance sheet may thus overstate the importance of potatoes in the diet and understate the role of sweet potatoes.

<sup>15</sup> Small amounts of maize, averaging 10,800 tons per year (6 percent of production), were exported between 1987 and 1989 (1989 figures estimated) (McDermott unpublished).

groundnuts and cotton seed, accounts for less than half of consumption.

In the years leading up to the balance of payments crises of 1981 and 1982, Madagascar was becoming increasingly dependent on imported food. In the period 1979-1981, imported wheat and rice accounted for 181 calories per person per day, 12.0 percent of calories derived from cereals, and 7.3 percent of total calories consumed. Imports of rice peaked in 1982, however, and were reduced thereafter as part of the stabilization and structural adjustment policies of the government. In the period 1984-1986, imports of rice and wheat accounted for only 108 calories per person per day.<sup>16</sup>

### Export Crops

Coffee is Madagascar's most important export in terms of foreign exchange earnings, accounting for 36.9 percent of export earnings on average between 1981 and 1987. Sixty-two percent of Madagascar's coffee is grown in the east coast zone, and 94.0 percent of area planted to coffee is cultivated by traditional farmers. Area planted to coffee is 20.5 percent of area planted to rice in the east coast zone and 4 percent nationally.

About 98 percent of Madagascar's coffee is robusta, a type of coffee that generally receives a 5 to 15 percent discount relative to the preferred arabica coffees on world markets. Volume of coffee exports has fallen 25 percent from its peak of 67,800 tons per year in the period from 1973 to 1976 to 50,750 tons per year from 1982 to 1987. Export earnings from coffee have fluctuated along with the world price. F.o.b. prices of coffee exports from Madagascar more than tripled between 1975 and 1977 and remained at about US\$3,000 per ton from 1977 to 1980. From 1981 to 1988, they averaged only US\$2,600 per ton in nominal terms.

Future prospects for increased export revenues from coffee are uncertain. Until 1989, Madagascar was part of the International Coffee Agreement and faced an export quota that put an upper limit on the annual quantity of exports to member countries. (Annual exports consistently fell short of the limit, however.) The suspension of the International Coffee Agreement in 1989 removed the limit on the quantity of exports but resulted in a sharp drop in world market prices as coffee producers sold off stocks.

Vanilla, Madagascar's second leading export, is the fruit of a tropical climbing

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<sup>16</sup> 120.8 thousand tons of rice and 42 thousand tons of wheat on average were imported each year from 1985 to 1987 (IMF 1988 and FAO 1984). Estimates are based on conversion methods used in the FAO *Food Balance Sheet*.

orchid native to Mexico. Almost all vanilla (99 percent of area planted) is grown by traditional farmers, and 90 percent of domestic production comes from Antsiranana faritany in the north. Madagascar is the world's leading producer of vanilla and exports about 75 percent of the world total on average. Comoros and Indonesia have export shares of about 10 percent each. Natural vanilla accounts for only about 5 percent of world vanilla consumption, however, because of the widespread use of lower cost synthetic vanilla.

Madagascar's production of vanilla has been highly unstable, in part because of deliberate government policies to reduce stocks in 1968 and 1978 and a hurricane in 1976 that caused severe crop damage. World import markets are also highly concentrated, and the US and France account for about 50 and 25 percent of world imports, respectively.

Cloves, primarily exported in the form of dried clove buds (either whole or ground), were until recently Madagascar's second largest export. Total area planted to cloves according to the 1984/85 census was 45,000 hectares, 30 percent of the area devoted to coffee. About half of total production comes from the area just north of Toamasina, but cloves are grown along almost the entire length of Madagascar's east coast. Cloves are predominantly a smallholder crop. Clove plantings per farmer average about three-fourths of a hectare and 70,000 out of 80,000 farmers have clove holdings of less than 1 hectare (World Bank 1983). The crop requires little labor apart from harvesting, which occurs from October to December. Clove production is highly unstable. Harvests of cloves are cyclical and reach peaks every three to four years. Production in the three major producing countries (Indonesia, Madagascar, and Tanzania) is also susceptible to damage from cyclones and plant diseases.

Dried clove buds have two distinct uses: they are sold either as spice or for blending with tobacco to make *kretek* cigarettes in Indonesia. The volume of world trade in cloves averaged 13,400 tons per year between 1976 and 1980. Indonesia's imports averaged 66 percent of the total and Madagascar's exports represented 61 percent of world trade. In recent years, however, Indonesia's own clove production has increased, greatly reducing demand for imports. World clove prices have thus fallen dramatically, from a high of \$8.39 per kilogram in 1981 to \$3.33 per kilogram in 1987 (World Bank 1984; IMF 1988) and Madagascar's export (f.o.b.) earnings from cloves in 1987 were only one-seventh that of 1982. Clove bud oil (used in the perfume, pharmaceutical, and flavoring industries) is also exported. Export receipts averaged about FMG 1 billion per year from 1973 to 1980, about one-fifth that of clove buds.

## Industrial Crops

Cotton is Madagascar's most important industrial crop and feeds the domestic textile industry. About three-fourths of the cotton is produced in flood-recession systems (*culture de décrue*), in which the crop is planted during the dry season (March to October) on flood plains after the water has receded. In the Mahajanga area, these farms are large (averaging 170 hectares) and most operations are mechanized and use large amounts of fertilizer and insecticides. There are also both irrigated and rainfed smallholder production systems. Yields on the large farms average 2.3 tons per hectare, two to three times the average yields of small farms. This is mainly because the large farms use about five times as much fertilizer and insecticide per hectare as small farms.

In 1983 (the year for which data is available) all seed cotton was collected and ginned by HASYMA, a cotton parastatal. Domestic cotton production was not sufficient to keep the ginneries running at full capacity or to supply manufacturers. From 1977 to 1980, imports of cotton fiber and yarn averaged 3,900 tons per year (about 25 percent of total supply). Imports of bulk cotton in 1985 were 662 tons. In the early 1980s, a shortage of foreign exchange for fiber imports resulted in the imposition of a quota system in which domestic cotton fiber was distributed to the six (partly government-owned) textile factories in proportion to their installed capacity. The value of fabric production is about FMG 30 billion annually, equivalent to 1.4 percent of GDP.

Sugarcane is mainly grown along the east coast of the country in the areas surrounding four large sugar factories. Nineteen percent of sugarcane is grown by large holders (including the sugar companies themselves). About half of the fertilizer consumed in Madagascar is used on sugarcane, although the area planted to sugarcane is only 0.2 percent of the total area cultivated. During the 1970s, the government set official prices for independent growers (outgrowers) and for consumers, though parallel markets existed for domestic sugar. Twenty-seven thousand five hundred tons of sugar per year (31.5 percent of production) was exported from 1983 to 1985 (IMF 1988).

## Livestock

Production of livestock, mainly beef cattle, accounts for about 10 percent of the value of agricultural output. The 1984/85 national agricultural census estimated a livestock population of 8.1 million cattle, 1.2 million sheep and goats, and 736,000 pigs. Livestock production is mainly practiced by smallholders and the average size of a herd of cattle is 10.8 head. The average number of pigs raised per farmer is 2.8.

About two-thirds of Madagascar's cattle graze on open pasture land in Mahajanga and Toliary faritanies (World Bank 1983). Pastures are often

burned at the end of the dry season to encourage new growth of grass. This practice is the major cause of erosion, and although it is illegal, it remains widespread in these regions. In recent years, cattle theft, long almost an accepted part of the culture, has increased significantly.

Madagascar's meat exports increased steadily from 2,100 tons in 1976 to 6,500 tons in 1980 (roughly 4 percent of production in 1980), but averaged only 1,470 tons per year from 1981 to 1986 (World Bank 1983). Exports declined throughout the 1970s as production stagnated, official prices for meat were kept low, and domestic consumption increased. It is estimated that during the 1970s, the parallel market for meat in Antananarivo accounted for up to half of the total supply to the city. Major slaughterhouses are located in Antananarivo and Mahajanga.

### Industry

Madagascar's industrial sector is relatively small and produces only FMG 213.9 million of value added (15.6 percent of GDP) in 1984 (table 3). Statistical data on the industrial sector is weak, however. By 1989, some 196,000 firms had registered with the Banque des Données de l'Etat (BDE) as part of the procedure for acquiring business licenses. Large firms, those employing five or more people, numbered about 800 according to the list compiled by the BDE. Of these, only 355 were included in the 1984 annual industrial census of firms in the formal sector. A few firms with fewer than five employees (e.g., some flour mills) that account for a major share of value added in their subsector are also included in the 1984 industrial census (BDE undated).

The 355 large firms surveyed accounted for 50.3 percent of industrial value added recorded in the national accounts in 1984. Value added produced by small firms in the informal sector (defined here as firms with fewer than five employees, not included in the industrial surveys) may not have been fully recorded in the GDP accounts.<sup>17</sup> Of the firms surveyed, the textile industry alone accounted for 19 percent of employment and 30 percent of value added (table 8). Twenty-eight percent of the sampled firms were involved with food processing; these firms accounted for 34 percent of employment and 19 percent of value added. Other important industrial products include consumer goods such as tobacco, soap, batteries, candles, and kerosene, and intermediate products such as paper, metal sheets, cement, nails, and paint.

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<sup>17</sup> The GDP figures quoted here are preliminary values. A more complete accounting of the informal sector may be made in the detailed national accounts for 1984 to be produced by the BDE.

**Table 8 – Madagascar: Industrial Census, 1984**

Industry	Employees per Firm	Firms	Paid Employees		Value Added	
		Number		Percent	1,000 FMG	Percent
Extractive industries	185	14	2,586	4.28	3,721,459	3.46
Food processing	207	100	20,631	34.14	20,605,215	19.14
Beverages	138	24	3,307	5.47	8,736,874	8.12
Textiles	550	21	11,546	19.10	32,720,310	30.40
Clothing	143	27	3,846	6.36	7,220,389	6.71
Wood	61	30	1,812	3.00	1,351,519	1.26
Paper	317	3	950	1.57	2,875,705	2.67
Printing	38	34	1,264	2.09	2,073,367	1.93
Chemicals	100	24	2,385	3.95	5,786,473	5.38
Non-metallic mineral	144	11	1,577	2.61	1,490,652	1.38
Metal products <sup>a</sup>	88	39	3,413	5.65	4,968,062	4.62
Water and Electricity	4,829	1	4,829	7.99	12,235,470	11.37
Other	85	27	2,291	3.79	3,861,339	3.59
<b>Total</b>	<b>171</b>	<b>355</b>	<b>60,437</b>	<b>100.00</b>	<b>107,646,834</b>	<b>100.00</b>

Source: BDE (undated).

<sup>a</sup> Includes metalworks, transportation materials, machines, equipment and electrical fixtures.

Although Madagascar possesses significant amounts of several important minerals, including chromite, mica, and graphite, that are important as exports, little processing is done domestically. Some petroleum deposits have been found in Morondava and Sakhara but at present world prices, these fields cannot be profitably exploited. Sizable reserves of coal are located in the southwest and the country has huge possibilities for hydroelectric power, as installed capacity represents only 2 percent of the potential (World Bank 1987c).

Madagascar's industrial policy during the 1970s aimed mainly at import substitution and self-sufficiency. The manufacturing sector was closely protected from competing imports of final and some intermediate products through taxes and quotas until the late 1980s. (In January 1988, protectionist import quotas were eliminated and the tariff structure was simplified — first steps toward decreasing the level of protection for domestic manufacturing. Average tariffs were reduced further later in 1988.)

Development of import-substituting industry has not reduced dependence on foreign trade, however. The industrial sector has remained heavily dependent on imported raw materials and intermediate products and interindustry linkages have been weak. Thus real manufacturing output (in 1980 prices) fell from its peak of FMG 131.5 billion in 1979 to only FMG 94.6 billion in 1982, in large part precisely because of tighter restrictions on imported raw materials and spare parts. Despite the successful macroeconomic stabilization, industrial value added in 1987 remained 18.6 percent below the 1979 level.

Since 1986, the government has owned or held stock in the 20 percent of manufacturing enterprises that accounted for over two-thirds of total output (World Bank 1986). Artificially low official prices for the manufactured output have made many firms unprofitable and encouraged diversion of domestic raw materials (eg, groundnuts and cottonseed for the edible oil mills) to the informal sector.

### **Private Services and the Informal Sector**

Basic information on the informal sector is available from a 1978 survey covering 343 of 3,913 enterprises counted in a census of small artisans and service enterprises in Antananarivo. This census did not include transport, construction, or trade — which form a large share of the informal sector. Twenty-eight percent of the enterprises counted produced textiles or clothing. Basketry, woodworking, food processing and sales, leatherworking, mechanical repairs, and metal working were other major subsectors. Total value added for the informal sector firms included in the Antananarivo survey in 1978 (Projet PNUD/BIT 1980) was estimated at FMG 2.449 billion, equal to 0.5 percent of national GDP. Nine thousand people (an average of 2.4 per enterprise) were

employed in the activities included in the survey.

Smaller surveys of the informal sector were also conducted in several major cities by the International Labor Office (ILO, 1985) in 1984 and 1985. The survey in Antananarivo (ILO, 1985a-c, 1986) covered 120 firms in woodworking, metal construction, automotive repair, and other mechanical repair activities. Among several major findings was the discovery that the irregular and declining level of demand for products caused by the stagnation of Madagascar's economy in the early eighties, was responsible for underutilization of productive capacity and low levels of profitability.

### Foreign Trade

Madagascar's exports derive mainly from the agricultural sector. In 1987 the two major exports, coffee and vanilla, together accounted for 57.5 percent of total exports, and cloves and other crops accounted for another 9.9 percent (table 9). Cloves accounted for 22.5 percent of export earnings in 1975, but only 3.2 percent of export earnings in 1987 due both to lower world prices and to a decline in export quantities. Shellfish (mainly prawns) has become increasingly important as a foreign exchange earner and, with the decline in clove exports since the early 1980s, is now the third leading export. Industrial exports are small; cotton cloth exports amounted to 3.8 percent of total exports in 1987. The major traditional exports—coffee, vanilla, and cloves—all face stagnating world demand.

On the import side, raw materials (29.8 percent), equipment (27.6 percent), and energy (mostly petroleum products, 14.5 percent) are the largest categories for 1987. This reflects trade barriers against consumer imports and the dependence of Madagascar's industry on imported raw materials and equipment. In 1980, during the investment boom, raw materials and equipment together accounted for two-thirds of imports. Only 28.1 percent of foreign exchange spent on imports in 1987 went for consumer goods, and nearly half of that was for food. By 1987 rice accounted for only 8 percent of the total value of imports (US\$386.5 million), down from a peak of 19 percent (US\$105 million) in 1982.

France has traditionally been Madagascar's major trading partner and remains so. Between 1978 and 1984, France purchased on average 20.4 percent of Madagascar's exports and supplied 29.2 percent of imports. Other countries with significant shares in Madagascar's total trade during this period include the United States (12.2 and 4.8 percent for exports and imports, respectively), Germany (6.5 percent of total trade), and the United Kingdom (1.8 percent of total trade). According to the direction of trade data published by the IMF, the Soviet Union, Eastern Europe, and North Korea together accounted for only 2.0 percent of Madagascar's annual imports on average and 2.2 percent of the

**Table 9 – Madagascar: Composition of Trade, 1975, 1980, and 1987**

	Exports						Imports						
	1975		1980		1987		1975		1980		1987		
	Mn US	Percent	Mn US	Percent	Mn US	Percent	Mn US	Percent	Mn US	Percent	Mn US	Percent	
<b>Total exports</b>	<b>276.3</b>	<b>100.0</b>	<b>401.2</b>	<b>100.0</b>	<b>392.4</b>	<b>100.0</b>	<b>Total imports</b>	<b>364.2</b>	<b>100.0</b>	<b>596.5</b>	<b>100.0</b>	<b>386.5</b>	<b>100.0</b>
Coffee	65.7	23.8	213.5	53.2	124.1	31.6	Rice	22.8	10.8	14.6	2.4	41.3	8.0
Vanilla	14.0	5.1	18.7	4.7	101.5	25.9	Food (nonrice)	16.5	6.3	23.9	4.0	25.0	4.8
Cloves	62.3	22.5	31.2	7.8	12.7	3.2	Nonfood consumer	55.3	15.2	84.7	14.2	79.3	15.3
Cotton cloth	5.7	2.1	5.9	1.5	15.0	3.8	Energy	73.2	20.1	69.6	11.7	74.9	14.5
Shellfish	11.1	4.0	15.1	3.8	44.3	11.3	Raw materials	124.3	34.1	228.1	38.2	153.9	29.8
Graphite	4.9	1.8	6.8	1.7	9.5	2.4	Equipment	72.1	19.8	175.6	29.4	142.7	27.6
Other crops	35.0	12.7	32.0	8.0	26.2	6.7							
Other	77.7	28.1	78.1	19.5	59.1	15.1							

Sources: 1975, World Bank (1980); 1980, World Bank (1986); 1987, IMF (1988).

country's annual exports. However, these figures may be understated as military trade is not included and much of the trade not allocated in the trade accounts to any country (which in several years is over 10 percent of trade) may be with this group of countries.

### **Government**

During the 1970s, the Malagasy government increased its influence in many sectors of the economy through nationalization of various firms and the creation of parastatals. At its peak in 1980, government expenditure equaled 36.3 percent of GDP; 1987 expenditure was 36 percent lower in real terms, equal to only 23.2 percent of GDP. Real expenditure was lower in 1987 than in 1980 for all major categories except interest payments (table 10). In 1987, capital and personnel expenditure (37.5 and 27.5 percent, respectively) had the largest budget shares. The shares of the budget devoted to health and education in 1987 were 4.4 and 13.1 percent, respectively. Government capital expenditure accounted for 37.5 percent of total expenditure in 1987, down from 43.2 percent in 1980; in real terms government investment was 46 percent less in 1987 than in 1980.

The government is heavily dependent on trade taxes as a source of revenue. Together, import and export taxes accounted for 50.8 percent of tax revenues in 1987. In that year, the average import tax was 38 percent and import tax revenues were 33.5 percent of total tax revenues; the average export tax was 42 percent, raising 17.3 percent of total revenues. Trade taxes accounted for nearly 50 percent of government revenues in 1980 as well, but less than 40 percent in 1975. Consumption taxes and other indirect taxes together accounted for 31.2 percent of tax revenue in 1987, while direct taxes were only 14.5 percent of revenue. Loans from the banking system and from international sources, including foreign aid grants, finance the budget deficit.

**Table 10 – Madagascar: Real Government Expenditure and Revenues, 1975, 1980, and 1987 (1984 FMG)**

	1975		1980		1987	
	Bn FMG	Percent	Bn FMG	Percent	Bn FMG	Percent
<b>Total Expenditure</b>	<b>222.1</b>	<b>100.0</b>	<b>534.5</b>	<b>100.0</b>	<b>334.1</b>	<b>100.0</b>
Personnel	101.7	45.8	136.4	25.5	92.0	27.5
Other goods and services	37.9	17.1	69.9	13.1	29.9	9.0
Interest	10.9	4.9	8.5	1.6	36.8	11.0
Transfers and subsidies	21.2	9.6	27.3	5.1	24.4	7.3
Extrabudgetary	...	...	34.7	6.5	11.3	3.4
Capital expenditure	45.4	20.6	230.2	43.0	125.3	37.5
Other	10.7	4.9	27.5	5.2	14.4	4.3
<b>Total revenue</b>	<b>184.1</b>	<b>100.0</b>	<b>225.7</b>	<b>100.0</b>	<b>200.9</b>	<b>100.0</b>
Direct taxes	32.2	17.5	45.2	20.0	29.1	14.5
Property taxes	...	...	2.1	0.9	2.0	1.0
Consumption taxes	22.8	12.5	59.9	26.5	46.5	23.1
Value-added turnover taxes	35.6	19.2	...	...	...	...
Import taxes and duties	50.0	27.2	92.1	40.8	67.3	33.5
Other indirect taxes	10.2	5.5	1.9	0.8	16.1	8.0
Export taxes and duties	19.2	10.4	17.7	7.8	34.7	17.3
Nontax revenues	14.2	7.7	6.8	3.0	5.1	2.5

**Sources:** 1975, *World Bank (1980)*; 1980, *World Bank (1986)*; 1987, *IMF (1988)*.

### 3. **Macroeconomic Policy in Madagascar**

The immediate cause of Madagascar's balance of payments crisis of the 1980s was the policy of investment to the limit undertaken in the late 1970s and embodied in the 1978-80 Development Plan. The reasons behind this attempt to spur economic growth through massive investment can best be understood in the context of economic performance up until 1978. A historical perspective is also important because the structural constraints and economic policies that had been responsible for nearly two decades of declining per capita income remained as obstacles to economic growth once macroeconomic stabilization had been achieved in the mid-1980s.

This chapter contains a brief summary of Madagascar's economic policies and performance from independence to the stabilization crisis of the early 1980s. The macroeconomic policies that formed the basis of the stabilization and structural adjustment programs and the performance of macroeconomic aggregates in the 1980s will be discussed in detail.

#### **THE COLONIAL LEGACY AND THE ECONOMIC POLICY UNDER TSIRANANA (1960-1972)**

At independence in 1960, the Malagasy economy was dominated by foreign (mostly French) interests. French colonists still owned large estates producing export crops and much of the trading was conducted by non-Malagasy merchants. Foreign capital dominated the small industrial sector.

There was little change in the role of the non-Malagasy in the economy during the 1960s under President Tsiranana. At the end of the decade, firms under French control accounted for 65 percent of sales of all major firms, while the market share of indigenous Malagasy firms (both public and private) was only 5 percent (Hugon 1987). Madagascar continued an import substitution development strategy begun before independence. This policy resulted in a shift in the structure of imports away from consumer goods and toward intermediate and capital goods, but the small size of the internal market limited industrial growth. Meanwhile, the country continued to rely on export crops for foreign exchange.

Significant change, however, was evident in the composition of government expenditure — the shares of social investment, construction, infrastructure, and

administration increased after independence. After a rice crisis in 1965, the government also adopted policies of low producer and consumer rice prices to protect low-income consumers. In general, though, fiscal policy was very conservative, to some extent because of monetary restrictions placed on the country as a member of the franc zone. Government budget deficits averaged only 0.8 percent of GDP and inflation (as measured by the GDP deflator) averaged 3.74 percent in the twelve years from 1960 to 1972 (table 11). Real GDP grew by 2.9 percent per year in this period while population increased at an average rate of 2.2 percent per year so that by 1972 real per capita GDP had increased by 5.9 percent.

### **TRANSITION TOWARD SOCIALISM, THE RATSIRAKA GOVERNMENT, AND INVESTIR A OUTRANCE**

The Ramanantsoa government that held power from 1972 to 1975 initiated economic policies that moved Madagascar toward socialism. The government gradually took greater control over the economy through the nationalization of industries and the formation of parastatal agencies given responsibility for marketing and trading. Real value added in industry increased by an average of only 1.5 percent per year from 1971 to 1975 while the tertiary (services) sector actually declined by 7.5 percent in real terms from 1971 to 1974.<sup>18</sup> By 1975 real income per person was 6.9 percent below its 1971 level.

When the Ratsiraka government came to power in 1975, it continued the socialist policies of the previous administration, further increasing the government's control over the economy. As outlined in the 1975 *Charte de la Révolution Socialiste Malagasy*, the new government sought to achieve the satisfaction of basic needs of the population and a reduction of income disparities by the end of the century while increasing national self-sufficiency. As part of the long-term development strategy, real per capita income was to double during this period. The 1978-80 Development Plan, the first formulated to attain these goals, allocated 26 percent of investment to the social sector (health, education, and housing) and 25 percent each to industry and "transport and communications," while the agricultural sector, which accounted for 40 percent of GDP in 1977, was targeted for only 16 percent of total investments (World Bank 1980).

The Development Plan reflected a view that low rates of investment were a

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<sup>18</sup> Figures are for 1970 quasi-factor prices calculated from data in Pryor (1988).

**Table 11 – Madagascar: Macroeconomic Summary, 1961-1987**

	1961-72	1973-77	1978-80	1981-82	1983-87
Real GDP (bn 1984 FMG)	1,189	1,352	1,417	1,349	1,351
Real GDP/capita (1,000 FMG, 1984 FMG prices)	188.3	177.1	167.2	148.6	143.2
Average GDP growth rate (percent)	2.87	0.16	2.80	4.51	1.4
Annual percentage change in GDP deflator					
Average	3.7	10.8	10.9	25.9	15.7
End of period	5.2	9.1	14.8	28.1	19.9
Trade deficit/GDP Percent					
Average	5.8	2.8	13.2	9.8	6.1
End of period	3.3	1.7	16.9	8.6	6.6
Budget deficit/GDP <sup>a</sup> (percent)					
Average	0.8	4.2	12.8	11.9	4.7
End of period	3.8	8.0	18.4	8.7	4.2
Rice imports (thousand tons)					
Average	-11	86	161	272	132
End of period	13	95	176	351	94
Exchange rate (FMG/dollar)					
Average	252	233	217	311	683
End of period	253	226	211	350	1069
Industrial value added (billion FMG)					
Average	211	251	267	209	220
End of period	237	261	265	202	228

**Sources:** All data 1961-72 from Pryor (1988); 1983-87, from IMF (1988).

<sup>a</sup> Budget deficit on commitment basis.

**Notes:** Industrial value added 1961-72 in factor prices, all other years in market prices.

major reason behind the lack of growth in the economy (real GDP in 1977 was slightly below that of 1974, per capita GDP had fallen by 12.9 percent since 1971). Net private foreign investment, which equaled US\$14 million in 1974 (7 percent of gross fixed capital formation at the official exchange rate), had declined to nearly zero by 1976 and was negative between 1977 and 1979.<sup>19</sup> To finance the substantial investments and imports of capital goods needed to meet the development targets, the 1978-80 Development Plan envisaged a large increase in domestic savings. This proved to be unrealistic, however, and the investment policy was financed instead with foreign borrowing and domestic monetary expansion.<sup>20</sup>

The borrowed funds fueled a spurt of growth in real GDP of over 10 percent from 1978 to 1980 (table 12). Gross capital formation (both public and private) increased from FMG 150 to 257 billion (1984) between 1977 and 1981. Expenditure on social needs increased also, and government spending on education increased by FMG 20 billion (170 percent) between 1975 and 1980. Lacking a substantial increase in government revenues, however, the result was a 240 percent increase in the government budget deficit between 1977 and 1980. From 1978 to 1980, the budget deficit averaged 12.75 percent of GDP. At the same time, the current account deficit ballooned from US\$16 million in 1977 to US\$568 million in 1980, averaging 13.2 percent of GDP from 1978 to 1980.

### **STABILIZATION AND STRUCTURAL ADJUSTMENT, 1981-1988**

Madagascar borrowed heavily from official and commercial sources to finance its balance of payments deficits from 1978 to 1980, but as payments for interest and principal came due on the short-term debt contracted in 1978 and 1979, international reserves were rapidly depleted. Short-term commercial capital became increasingly expensive and payments arrears accumulated. Eventually, the government was forced to resort to borrowing from the International Monetary Fund to meet the balance of payments crisis.

A standby agreement for SDR 64.45 million to be made available over two

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<sup>19</sup> Data from *International Financial Statistics* (IMF undated).

<sup>20</sup> The World Bank (1980), in a report presented to the Malagasy government in June 1979, raised questions concerning the inadequacy of domestic savings to finance the development efforts and recommended increases in foreign borrowing to bridge the gap in funds. The report, however, did raise questions as to the economic feasibility of some of the industrial investment projects.

**Table 12 – Madagascar: GDP Growth, 1970-1987**

	Nominal GDP	Real GDP	Real GDP per Capita	Change in Real GDP	Change in per Capita GDP
	Bn FMG	Bn 1984 FMG	1,000 1984 FMG	Percent	
1970	249.3	1,306.6	192.1		
1971	269.2	1,352.7	194.4	3.5	1.2
1972	279.7	1,348.6	189.1	-0.3	-2.7
1973	304.7	1,333.0	182.6	-1.2	-3.5
1974	372.8	1,361.6	181.8	2.1	-0.4
1975	395.2	1,374.4	180.8	0.9	-0.5
1976	421.1	1,333.5	170.7	-3.0	-5.6
1977	468.1	1,358.4	169.4	1.9	-0.8
1978	486.6	1,324.8	160.8	-2.5	-5.1
1979	595.1	1,455.4	171.8	9.9	6.9
1980	689.8	1,470.2	169.0	1.0	-1.7
1981	789.0	1,358.5	151.6	-7.6	-10.3
1982	996.1	1,339.3	145.6	-1.4	-4.0
1983	1,221.0	1,346.2	143.2	0.5	-1.6
1984	1,369.1	1,369.1	140.7	1.7	-1.7
1985	1,553.4	1,400.2	140.3	2.3	-0.3
1986	1,817.1	1,419.0	134.5	1.3	-4.1
1987	2,209.4	1,438.5	132.1	1.4	-1.8

Sources: 1970 to 1982, Pryor (1988); 1983 to 1987, IMF (1988).

years was signed in June 1980, but failure on the part of the Malagasy government to meet the conditions of the agreement limited the disbursement of the loans (drawings) to only SDR 10.0 million over the following nine months. After further negotiations between the IMF and the Madagascar government, the 1980 standby agreement was canceled and immediately replaced by a new agreement for SDR 76.7 with stricter (more explicit) conditions to run from April 1981 through June 1982.<sup>21</sup> In June 1981 the size of the loan was increased

<sup>21</sup> See Hugon (1986) for details on the negotiations between the IMF and Malagasy government.

to SDR 109.0 million. Subsequent standby agreements were signed in July 1982 (SDR 51 million over one year) and in April 1984 (SDR 33 million over one year).

The early attempts to stabilize the economy focused mainly on efforts to control inflation and the balance of payments deficits through changes in macrofiscal, monetary, and trade policies and through changes in rice policy that are discussed in detail in chapter 5.

### **Fiscal Policy**

In the implementation of their ambitious development goals, the Madagascar government gradually lost the fiscal discipline that had characterized macroeconomic policy since independence. Until 1977, government budget deficits were generally small (averaging 4.16 percent of GDP between 1973 and 1977),<sup>22</sup> inflation relatively low (averaging 10.8 percent from 1975 to 1977 as measured by the GDP deflator) and the external debt very modest (US\$205 million, 11.7 percent of GDP in 1977). However, the government budget deficit expanded rapidly from 1978 to 1980 mainly because of the accelerated investment strategy (figure 3). Investment expenditure by the central government increased five-fold between 1977 and 1980 and the share of investment expenditure rose from 26 to 48 percent of total expenditure. Total expenditure increased by FMG 144.7 billion (65 percent of the increase came from capital expenditure), while revenues increased by only FMG 55.3 billion.

Under the stabilization programs, capital expenditure was rapidly cut back from a peak of FMG 230.3 billion (1984) in 1980 to FMG 100.0 billion (1984) in 1982. Real public investment in 1982 was, however, still 68 percent greater than in 1977. In the ensuing years of stabilization and structural adjustment, real capital expenditure remained almost constant until 1987 when it rose to FMG 125.3 billion (1984). Real current expenditure was also cut by 33 percent between 1980 and 1983, so that total real expenditure was reduced by nearly half. Thus it was possible to reduce the budget deficit from FMG 270.3 billion (1984) in 1981 to FMG 80.0 billion (1984) in 1983 despite a drop in real revenues by 22 percent due mostly to a decline in import tax revenue.

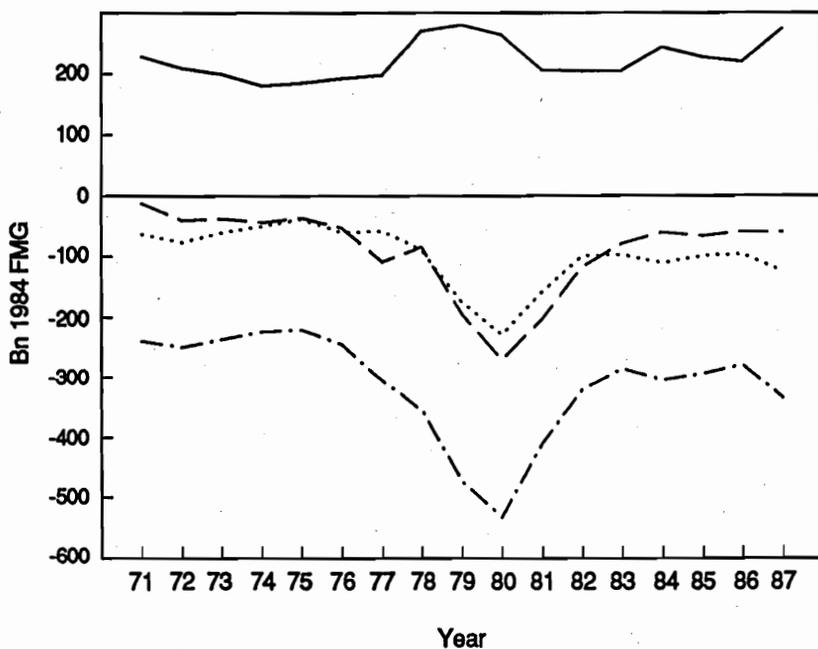
### **Monetary Policy**

The large budget deficits from 1978 to 1980 were financed by a combination of domestic money creation (credits from the central bank to the government

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22 Based on deficits on a commitment basis.

**Figure 3 – Madagascar: Real Government Budget, 1971 - 1987**



- Revenues
- - Budget Deficit
- ..... Capital Expenditure
- . . . Expenditure

**Sources:** Pryor (1988), World Bank (1980, 1986), IMF (1988).

and public enterprises) and foreign borrowing. Foreign loans financed 58 percent of the budget deficit in 1978, but domestic (net) financing (mostly credits from the central bank) increased sharply in 1979 and 1980, rising from FMG 13 billion in 1978 to a peak of FMG 79 billion in 1980 (table 13). As a result, growth in the narrow money supply (M1 equal to currency plus demand deposits) accelerated from 10 percent in 1979 to 22 percent in 1980; broad money supply (M2), equal to narrow money supply (M1) plus time deposits, increased by an annual average of 15.9 percent from 1977 to 1981. As the money supply grew, the inflation rate accelerated from 6.8 percent per year in 1978 to 31.3 percent per year in 1982 (as measured using the GDP deflator; see table 14).

The monetary accounts do not appear to be completely consistent with the government budgetary data presented in table 13, but the general outlines of how the reduction in the budget deficit helped reduce monetary growth are clear.<sup>23</sup> Lower budget deficits reduced the need for net credit to the public sector while continued availability of foreign financing further reduced the inflationary impact of the budget deficit. According to the government budget accounts, credit from domestic sources to finance the deficits fell from FMG 78.8 billion in 1980 (equal to 63 percent of the 1979 money supply) to FMG 36.6 billion in 1982 (equal to 19 percent of the 1981 money supply).<sup>24</sup> Credit to the private sector actually grew faster in the early years of stabilization than under the government investment push, growing by nearly 90 percent between 1981 and 1984.

As a result of the stabilization policies, inflation as measured by the GDP deflator fell to 10.3 percent in 1984, but monetary policy eased somewhat in the next two years. Domestic financing of the government budget deficit was gradually reduced to zero between 1984 and 1987, but credit to the private sector and the money supply continued to increase and by 1987 inflation had risen to 19.9 percent per year.

Real interest rates (calculated as the nominal interest rate less inflation)<sup>25</sup> averaged -3.71 percent from 1976 to 1979. As inflation accelerated in the late 1970s and early 1980s, the real interest rate declined further, despite increases in the nominal interest rate from 5.5 percent in 1980 to 13.0 percent in 1983. The

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23 Differences in the classification of the transactions of public enterprises between the two accounts are a likely source of many discrepancies.

24 Each year from 1982 to 1984 the share of the deficit financed by foreign borrowings was approximately 55 percent.

25 The annual percentage change in the GDP deflator is used as the measure of inflation.

**Table 13 – Madagascar: Financing the Government Budget Deficit, 1971-1987**

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
	Billion FMG																
Total revenue and grants	45.3	43.3	45.6	49.4	52.9	60.5	68.0	99.0	114.3	123.3	119.6	151.6	185.5	243.2	251.5	280.4	420.7
Total expenditure	47.7	51.7	54.2	61.5	63.6	77.5	105.4	130.2	194.3	250.1	237.7	238.6	258.0	304.4	325.6	356.9	513.1
Budget deficit and financing																	
Deficit on a commitment basis <sup>a</sup>	(2.4)	(8.5)	(8.6)	(12.1)	(10.6)	(17.0)	(37.4)	(31.2)	(80.0)	(126.8)	(118.1)	(87.0)	(72.5)	(61.2)	(74.1)	(76.5)	(92.4)
Deficit on a cash basis	(2.4)	(8.5)	(8.6)	(12.1)	(10.6)	(17.0)	(37.4)	(31.2)	(80.0)	(126.8)	(118.1)	(87.0)	(81.6)	(66.2)	(72.4)	(72.2)	(96.8)
Financing <sup>b</sup>	2.6	7.7	10.6	12.6	10.4	15.4	20.1	31.2	79.9	126.7	118.1	87.0	81.6	66.2	72.4	72.2	96.7
Foreign (net)	2.1	1.8	4.0	3.4	5.4	4.1	4.6	18.2	35.3	47.9	57.5	50.4	46.3	36.6	48.1	51.3	100.0
Drawings	2.1	1.8	4.0	3.4	5.4	4.1	4.6	19.2	36.8	50.4	67.0	66.2	67.1	76.2	92.9	101.4	180.5
Amortization (-)	0.0	0.0	0.0	0.0	0.0	0.0	0.0	(1.0)	(1.5)	(2.5)	(9.5)	(15.8)	(20.8)	(39.6)	(44.8)	(50.1)	(80.5)
Domestic (net)	0.4	5.9	6.6	9.1	5.0	11.3	15.5	13.0	44.6	78.8	60.6	36.6	35.3	29.6	24.3	20.9	(3.3)
Discrepancy	0.2	(0.8)	2.1	0.4	(0.2)	(1.6)	(17.4)	0.0	(0.1)	(0.1)	0.0	0.0	0.0	0.0	(0.0)	0.0	(0.1)
	Percentage																
Foreign financing	83.1	23.0	37.6	27.4	52.1	26.6	22.8	58.3	44.2	37.8	48.7	57.9	56.7	55.3	66.4	71.1	103.4

**Sources:** Data for 1971 through 1977 is from World Bank (1980). Data for 1978 through 1982 are from World Bank (1986). Data for 1983 through 1987 are from IMF (1988).

<sup>a</sup> Deficit on a commitment basis is the difference between total revenues and total expenditure.

<sup>b</sup> Financing data for 1971-77 are treasury data and do not match deficit based on budget directorate figures (World Bank 1980).

Table 14 – Madagascar: Monetary Data, 1971-1987

	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
M1 (bn FMG)	46.95	53.33	57.32	67.93	69.35	79.67	99.98	112.80	124.20	151.30	193.82	208.00	192.60	239.90	238.60	289.60	371.80
M1 (percent change)	1.62	13.59	7.48	18.51	2.09	14.88	25.49	12.82	10.11	21.82	28.10	7.32	(7.40)	24.56	(0.54)	21.37	28.38
M2 (bn FMG)	58.55	65.43	68.02	82.18	83.71	97.08	116.43	136.28	140.60	169.63	210.22	228.91	208.05	258.07	292.35	367.28	434.97
M2 (percent change)	6.13	11.75	3.96	20.82	1.86	15.97	19.93	17.05	3.17	20.65	23.93	8.89	(9.11)	24.04	13.28	25.63	18.43
CPI (1984 = 100) <sup>a</sup>	19.54	20.67	21.74	25.93	28.55	30.16	31.50	33.65	38.11	44.60	57.54	75.54	91.04	100.00	109.91	124.82	146.57
CPI Inflation (percent)	5.60	5.80	5.17	19.31	10.07	5.67	4.43	6.82	13.25	17.03	29.03	31.27	20.52	9.84	9.91	13.56	17.42
GDP deflator (1984 = 100)	19.90	20.74	22.86	27.38	28.75	31.58	34.46	36.73	40.89	46.92	58.08	74.38	90.70	100.00	110.94	128.05	153.59
GDP deflator (percentage change)	4.30	4.22	10.21	19.78	5.02	9.82	9.12	6.59	11.32	14.75	23.79	28.06	21.95	10.25	10.94	15.43	19.94
Discount rate end of period (percent)	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	5.50	8.00	12.50	13.00	13.00	11.50	11.50	11.50
Real interest rate (percent)	1.20	1.28	(4.71)	(14.28)	0.48	(4.32)	(3.62)	(1.09)	(5.82)	(9.25)	(15.79)	(15.56)	(8.95)	2.75	0.56	(3.93)	(8.44)

Sources: IMF, *International Financial Statistics (tapes and various monthly issues)*; IMF (1988); and Pryor (1988).

<sup>a</sup> The consumer price index is a weighted average of the traditional and modern CPIs, with weights of 0.75 and 0.25, respectively. The traditional CPI concerns lower income Malagasy households; the modern CPI concerns upper income Malagasy and expatriate households.

real interest rate was lower than -15 percent in both 1981 and 1982, but beginning in 1983 the combination of higher nominal interest rates and lower inflation increased real interest rates to 2.75 percent in 1984. Subsequent increases in inflation, however, again resulted in a negative real interest rate in 1986 and 1987.

### Trade and Exchange Rate Policies

The trade deficit widened sharply in the late 1970s because much investment expenditure went for imported goods and services. Imports increased by nearly 150 percent in nominal (dollar) terms (imports of capital goods increased by 56.8 percent between 1978 and 1980) while export revenues grew by only 25 percent. Much of the foreign borrowing to finance the imports was in the form of short-term loans from commercial banks; from 1978 to 1980 loans from financial institutions and suppliers credits accounted for nearly half of the US\$790 million total borrowings (World Bank undated). Unfortunately, most of the projects financed with these loans were economically unsound or had a longer gestation period than the life of loans themselves. Refinancing of these loans became necessary before the projects had paid off and while interest rates in world capital markets were rising (from 9.3 percent in 1978 to 16.13 percent in 1981) (IMF various years).<sup>26</sup>

External factors such as a decline in the terms of trade (largely due to higher oil prices and lower coffee prices) and higher interest rates worsened the situation, but were not the major cause of the problem. Table 15 and figure 4 present figures on counterfactual levels of exports, imports, and the trade balance under the assumption that the terms of trade in 1978 held for the entire period. All data is converted into constant (1984) dollars to allow a comparison of the counterfactual trade balance with the historical values. Madagascar's terms of trade deteriorated by 30 percent from 1978 to 1981, but even if the prices of exports and oil had remained unchanged from their 1978 levels, the current account deficit would still have averaged US\$145 million (1984) between 1979 and 1981, instead of US\$232 million (1984).<sup>27</sup> Likewise interest payments accounted for only 3.7 percent of total imports of goods and nonfactor services in 1981, although tighter world credit markets may have had a more important effect on Madagascar's ability to obtain new commercial finance in these years.

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<sup>26</sup> The interest rate cited here is the London interbank offer rate on deposits with maturities of one year.

<sup>27</sup> Figures are simple averages of annual totals. Although the terms of trade were higher in 1977, 1978 is used as a base of comparison because the 1977 level was extraordinarily high, more than 20 percent greater than in any other year from 1970 to 1986.

Table 15 – Madagascar: Effects of the Terms of Trade on the Balance of Trade, 1970-1987

	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Export prices, f.o.b (1980 = 100)	29	30	32	42	55	52	73	101	90	101	100	89	90	89	93	94	108	89
Import prices, c.i.f. (1980=100)	23	27	27	35	58	56	57	64	72	85	100	102	96	93	93	91	78	93
Terms of trade (1980 = 100)	125	111	119	120	96	93	129	159	125	120	100	87	94	96	100	104	139	96
Merch. exports (f.o.b.) (mn\$)	145	147	166	200	240	320	289	351	405	414	437	332	327	313	335	270	329	311
Merch. imports (f.o.b.) (mn \$)	(142)	(178)	(168)	(178)	(238)	(332)	(262)	(312)	(404)	(662)	(764)	(546)	(464)	(374)	(353)	(326)	(331)	(315)
Trade balance (mn \$)	3	(31)	(2)	23	2	(12)	27	39	1	(249)	(328)	(214)	(137)	(61)	(19)	(56)	(2)	(4)
Merch. exports (mn 1984\$) <sup>a</sup>	351	343	344	332	333	415	378	433	437	384	364	300	313	308	335	269	273	228
Merch. imports (mn 1984\$) <sup>a</sup>	(344)	(415)	(348)	(296)	(330)	(431)	(343)	(385)	(436)	(615)	(636)	(494)	(444)	(367)	(353)	(325)	(275)	(231)
Trade balance (mn 1984\$) <sup>a</sup>	7	(72)	(4)	37	3	(16)	35	48	1	(230)	(272)	(193)	(131)	(60)	(19)	(56)	(2)	(3)
Merch. exports: 1978 t.o.t. (mn 1984\$) <sup>b</sup>	490	477	495	461	422	592	382	336	437	395	422	360	350	341	348	277	295	337
Merch. imports: 1978 t.o.t. (mn 1984\$) <sup>c</sup>	(480)	(514)	(480)	(396)	(320)	(458)	(356)	(380)	(436)	(605)	(591)	(415)	(374)	(312)	(295)	(278)	(329)	(262)
Trade balance: 1978 t.o.t. (mn 1984\$)	10	(37)	15	65	102	134	25	(44)	1	(210)	(169)	(55)	(25)	29	53	(1)	(34)	75
Tot effect: exports (mn 1984\$)	139	134	151	129	89	177	3	(97)	0	11	59	60	37	33	13	8	22	109
Tot effect: imports (mn 1984\$)	(136)	(99)	(132)	(100)	10	(28)	(14)	5	0	9	44	78	70	56	58	48	(55)	(31)
Tot effect (trade balance) (mn 1984\$)	3	35	19	29	99	150	(10)	(92)	0	20	103	139	106	89	72	55	(33)	78
Dollar world price index <sup>d</sup>	100.0	103.9	116.8	145.8	174.5	186.7	185.1	196.4	224.3	260.9	291.0	267.9	253.1	246.5	242.2	242.7	291.7	330.8

Source: World Bank (1988b).

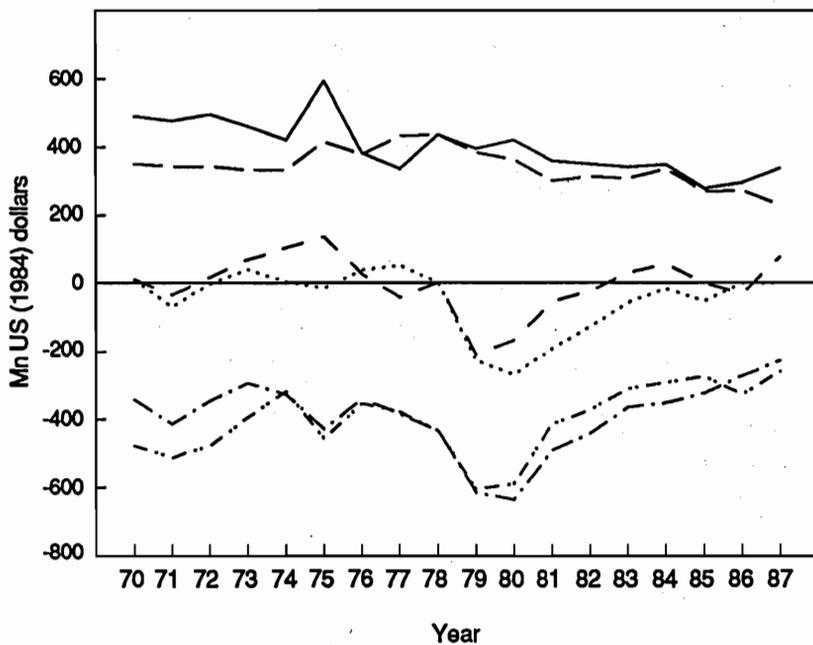
<sup>a</sup> Converted to 1984 dollars using the dollar world price index.

<sup>b</sup> Values of exports at 1978 export prices, expressed in 1984 dollars,  $x'(t) = x(t) \cdot [px(1978) / px(t)] \cdot [\$WPI(1984) / \$WPI(1978)]$ , where  $x(t)$  is exports in year  $t$ ,  $px$  is the price index of exports and  $\$WPI$  is the dollar world price index.

<sup>c</sup> Value of imports at the 1978 import prices, expressed in 1984 dollars,  $m'(t) = m(t) \cdot [pm(1978) / pm(t)] \cdot [\$WPI(1984) / \$WPI(1978)]$ , where  $m(t)$  is imports in year  $t$ ,  $pm$  is the price index of imports and  $\$WPI$  is the dollar world price index.

<sup>d</sup> Constructed as the weighted average of wholesale price indices, expressed in dollars, of Madagascar's major trading partners (table 16).

**Figure 4 – Madagascar: Actual and Counterfactual Real Trade Balances, 1970 - 1987**



- Merchandise exports 1978 terms of trade
- - Merchandise exports
- - - Trade balance 1978 terms of trade
- ..... Trade balance
- . - . Merchandise imports
- . . - Merchandise imports 1978 terms of trade

**Source:** Table 15.

In order to ease the balance of payments deficit, the government relied mainly on commercial policies (reductions in foreign exchange allocations for imports) to reduce imports from US\$494 million (1984) in 1981 to US\$ 353 million in 1984. Rice imports were reduced beginning in 1983, but the biggest adjustment was in terms of imports of investment goods (capital and intermediate inputs), which fell by 42 percent (in real 1984 dollars) between 1980 and 1983 to a level 21.1 percent below imports of investment goods in 1976-77, prior to the *investir à l'outrance* policy. Average export earnings between 1981 and 1983 were 24.1 percent below their average level in the period between 1977 and 1980 largely because of lower world prices for coffee and unstable markets for vanilla and cloves. Despite lower real exports, the current account deficit was reduced by 53 percent between 1980 and 1983.

Exchange rate policy also played a role in achieving macroeconomic stability. Madagascar's exchange rate had been fixed at FMG 50 per French franc since the country left the franc zone in 1973. Beginning in April 1982 the Malagasy franc was allowed to depreciate relative to the French franc and other currencies (table 16). Although the Malagasy franc depreciated by only 33.7 percent relative to the French franc between April 1982 and the fourth quarter of 1984, the French franc itself was depreciating relative to other major world currencies. Thus, the Malagasy franc depreciated by 109 percent relative to the dollar (from 299.7 FMG/\$ in the first quarter of 1982 to 626.0 FMG/\$ in the fourth quarter of 1984; see table 16).

The nominal depreciation of the Malagasy franc reversed the appreciation of the real exchange rate<sup>28</sup> that had resulted from the combination of a fixed nominal exchange rate and high domestic inflation since the late 1970s (figure 5). Between 1977 and 1982, the real exchange rate appreciated by 25.8 percent. In theory this made traded goods less expensive relative to nontradables, increased incentives for imports and decreased incentives for exports. The depreciation of the exchange rate between 1982 and 1984 returned the real exchange rate to 94.2 percent of its 1971 value.

The direct effect of these movements in the real exchange rate on domestic prices and the balance of trade were probably small. Prices of most major agricultural traded goods, including rice and major export crops, were set by the

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<sup>28</sup> The real exchange rate is defined here as the ratio of the price of nontraded goods (P<sub>nt</sub>) to the domestic price of traded goods P (= E•P<sub>w</sub>), where E is the nominal exchange rate (FMG/\$) and P<sub>w</sub> is an index of the world price of traded goods expressed in dollars. An appreciation of the currency thus corresponds to an increase in the real exchange rate.

**Table 16 – Madagascar: Nominal and Real Exchange Rates, 1970-1988**

	Exchange Rate <sup>a, b</sup>		Nominal \$/FMG Index <sup>c</sup>	Effective Exchange Rate Index <sup>d</sup>	Madagas- car CPI <sup>e</sup>	Dollar World Price Index <sup>f</sup>	Real Exchange Rate Index IMF <sup>g</sup>	PPP Exchange Rate <sup>h</sup>	Parallel Exchange Rate
	FMG/\$	FMG/FFr							
1970	276.4	50.0	100.0	100.0	100.0	100.0	100.0	423.0	283.0
1971	275.6	50.0	100.3	99.1	105.3	103.9	101.7	429.1	277.0
1972	252.5	50.0	109.5	100.6	111.0	116.8	104.0	401.9	236.0
1973	222.9	50.0	124.0	103.5	117.8	145.8	100.2	341.9	300.0
1974	240.7	50.0	114.8	100.8	143.8	174.5	94.6	348.7	300.0
1975	214.3	50.0	129.0	106.5	155.6	186.7	107.5	352.5	300.0
1976	238.9	50.0	115.7	103.4	163.4	185.1	102.2	373.5	335.0
1977	245.7	50.0	112.5	100.4	168.5	196.4	96.5	362.8	223.0
1978	225.7	50.0	122.5	99.8	179.5	224.3	98.0	338.6	284.0
1979	212.7	50.0	129.9	101.5	204.8	260.9	102.0	332.0	228.0
1980	211.3	50.0	130.8	101.9	242.0	291.0	108.8	351.8	265.0
1981	271.7	50.0	101.7	94.2	315.9	267.9	119.9	498.8	384.0
1982	349.7	53.1	79.0	83.6	416.2	253.1	130.0	695.7	700.0
1983	430.5	56.4	64.2	74.3	496.8	246.5	129.4	852.6	884.0
1984	576.6	65.9	47.9	61.0	545.8	242.2	108.0	953.3	880.0
1985	662.5	74.1	41.7	54.5	603.3	242.7	103.7	1,051.5	691.7

*Table Continued*

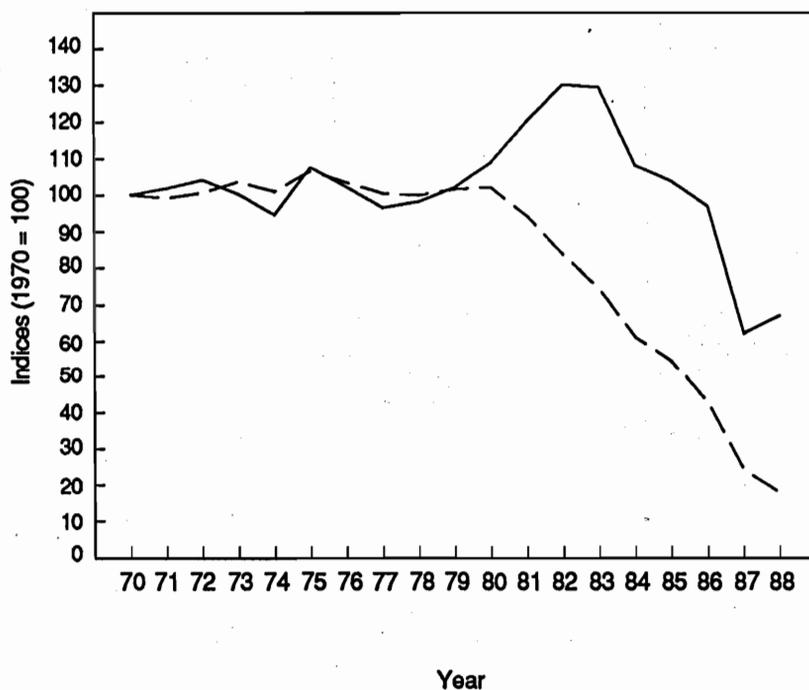
Table Continuation

1986	676.3	98.1	40.9	42.6	690.8	291.7	96.8	1,002.0	...
1987	1,069.2	178.4	25.9	23.9	794.4	330.8	62.1	1,015.9	...
1988	1,407.1	235.9	19.6	17.7	1,005.9	302.4	65.3	1,407.1	...

**Sources:** Calculated using data from IMF, International Financial Statistics, computer tapes and various monthly issues, IMF (1988), Pryor (1988).

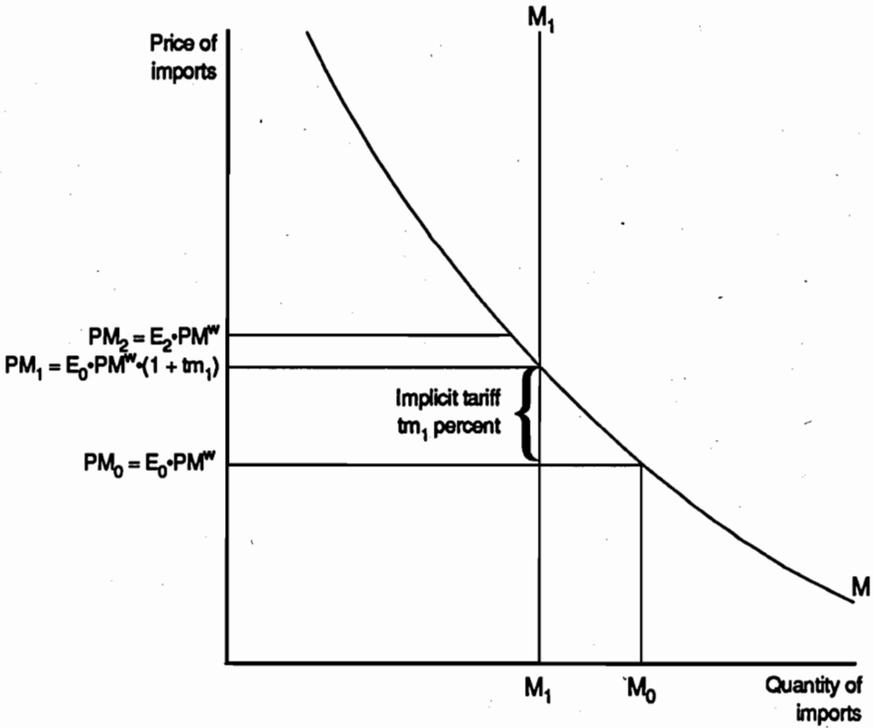
- <sup>a</sup> Nominal exchange rate, annual average (FMG/\$).
- <sup>b</sup> Nominal exchange rate, annual average (FMG/FFr).
- <sup>c</sup> Nominal exchange rate index, annual average (FMG/\$), 1970=100.
- <sup>d</sup> Effective exchange rate index, annual average, 1970=100.  
Index =  $\pi [ER(i,t) / ER(i,1970)]^{w(i)}$ , where  $ER(i,t)$  = the nominal exchange rate of country  $i$  (expressed in units of country  $i$ 's currency per FMG) in year  $t$ . Weights  $w(i)$  are: France - .512; US - .174; Germany - .122; Japan - .100; Italy - .055; and UK - .037. Weights are based on average trade weights for the period 1977-1987.
- <sup>e</sup> Madagascar Consumer Price Index is calculated as a weighted average of traditional and modern household CPIs, with weights of .75 and .25, respectively. CPI data from Pryor and IMF (1988).
- <sup>f</sup> Dollar world price index  $PI\$(i,t)$ .  $PI\$(i,t) = \pi [WPI(i,t)/ER\$(i,t) / [WPI(i,1970)/ER(i,1970)]^{w(i)}$ , where  $ER\$(i,t)$  = the nominal exchange rate of country  $i$  in year  $t$ , expressed in units of country  $i$ 's currency per dollar and  $WPI(i,t)$  = the wholesale price index in country  $i$ .
- <sup>g</sup> Real exchange rate index = Madagascar CPI divided by the ratio of the dollar world price index and the nominal dollar/FMG index.
- <sup>h</sup> Purchasing power parity exchange rate with 1988 base year (PPPER( $t$ )) where  $PPPER(t) = ER(t) \bullet [CPI(t)/CPI(1988)] / [PI\$(t)/PI\$(1988)]$ , where  $ER(t)$  and  $CPI(t)$  are the nominal exchange rate and consumer price indices, respectively.

**Figure 5 – Madagascar: Indices of Nominal and Real Exchange Rates, 1970 - 1988 (foreign currency/FMG)**



Source: Table 16.

**Figure 6 – Madagascar: The Implicit Import Tariff**



*Source: Authors' calculations.*

**Note:**

$PM$  = Domestic price of imports,

$E_0, E_2$  = Exchange rates,

$PM^w$  = World price of imports,

$tm$  = Implicit tariff.

government. Depreciation of the real exchange rate of course had no direct effect on these fixed prices, although the implicit trade taxes on these goods increased. Changes in the real exchange rate may have had a significant impact on imports of industrial inputs and final products that were regulated by quantitative restrictions on trade, as is illustrated by figure 6.

With free trade and an exchange rate of  $E_0$ , import demand for good M is  $M_0$  and the domestic price is  $PM_0 = E_0 \cdot PM^w$ . If imports of good M instead are limited to  $M_1$  (less than  $M_0$ ) by a quota, the domestic price of good M rises to  $PM_1$  (the price that an importer could receive if he sold the goods in the market). The implicit tariff ( $tm_1$ ) is represented by the difference between  $PM_1 (= E_0 \cdot PM^w \cdot (1 + tm_1))$  and  $PM_0$ .<sup>29</sup> If the exchange rate is devalued by a small amount to  $E_2$ , and the import quota is unchanged, there is no change in the domestic price ( $PM_1$ ) or the amount of imports. Devaluation of the exchange rate has no direct effect on the demand for imports unless the new exchange rate,  $E_2$ , raises the domestic price above  $PM_1$  (that is,  $E_2 \cdot PM^w > PM_1$ ). At this exchange rate, domestic demand for the import good is less than the quota, and the quota is no longer binding.<sup>30</sup> In the case of the stabilization program in Madagascar in the early 1980s, import quotas were binding both before and after the exchange rate devaluations for many importable goods. (In fact, import quotas were reduced for many goods.)

### Structural Adjustment Policies

Beginning in about 1984, the focus of macroeconomic policy reform shifted from stabilization to structural adjustment in the form of a series of sectoral reforms designed to remove supply-side constraints in key sectors. These were undertaken with the support of several World Bank loans. In contrast to the rapid results achieved under the stabilization program, however, only slow progress has been made with the structural adjustment of the Malagasy economy.<sup>31</sup>

The industrial sector adjustment credit (ISAC) signed in August 1985 aimed to eliminate most ex-factory price controls, to reduce controls on profit margins,

<sup>29</sup>  $PM_1 - PM_0 = tm_1 \cdot (E_0 \cdot PM^w)$  where  $tm_1$  is the implicit tariff.

<sup>30</sup> The above analysis ignores the effects on income distribution and import demand of the import quotas. A discussion of several scenarios of the distribution of the economic rents in Madagascar follows in chapter 4.

<sup>31</sup> The description of the economic reforms undertaken by Madagascar during the period between 1984 and 1988 draws heavily from Harber (1989).

to eliminate export taxes on manufactured products, and to introduce a new investment code. All export taxes, except those on traditional crops, were eliminated in 1985, but some industrial price and margin controls remained until February 1989, and by 1989 a new investment code had yet to be formulated. Negotiations are continuing on possible modifications of the current investment code. These include a mechanism for repatriating dividends and capital, reduction in the restrictions limiting the activities in which private investors may participate, and a reduction in restrictions on divestiture, exit, or equity transfer by a foreign investor.

In May 1986, the agricultural sector adjustment credit (ASAC) to promote agricultural liberalization was signed. This gave particular support to continued reforms of rice production and marketing policies. Reforms in rice marketing had begun in 1983 when the private rice trade was legalized after nearly a decade of government monopoly in rice marketing. In 1985, official maximum producer prices set by the government were replaced with floor prices for paddy, thereby allowing private traders to pay open market prices to producers. However, many other administrative obstacles to private trade, remained (Berg 1989). Rice policy reforms are discussed in more detail in chapter 5.

Significant reforms in trade policy were finally made in 1987 (five years after the 1982 IMF standby agreement). Supported by a World Bank industry and trade policy adjustment credit (ITPAC) signed in June 1987 and a loan through the IMF's structural adjustment facility (SAF) in August, Madagascar undertook a large devaluation of the Malagasy franc (73.7 percent relative to the dollar) during May and June 1987. Soon afterwards, in January 1988, protectionist quantitative import restrictions were eliminated and a simplified tariff structure was established. By July 1988, the open general license (OGL) system was fully implemented. This made the granting of import licenses for most merchandise automatic and allocated foreign exchange for imports through a market-determined system. Domestic and international marketing of all products except vanilla were also liberalized during 1988.

No detailed data are available on the structure of the new tariff system and the changes in import volumes. If the new import taxes under the new exchange rate are close to the equivalent tariffs (arising from import quotas) at the old exchange rate, the quantity of imports would not be expected to change significantly in the exchange rate and tariff structure. However, the eventual goal of the trade liberalization process is to achieve a more uniform tariff structure (ranging from 10 to 50 percent) with lower average tariff rates by 1992.

In theory, the introduction of the OGL system will bring about a more efficient distribution of foreign exchange as potential users bid for foreign

exchange according to the expected economic returns of its intended use. In addition, economic rents previously captured by those holding import licenses or having access to scarce foreign exchange should now be eliminated and the value of the rents accrue to the central bank selling the foreign exchange. It remains, however, too soon to judge the effects of the policy change.

The World Bank public sector adjustment credit (PSAC), signed in June 1988, provided further support for reforms of public enterprises (PEs or parastatals) begun as part of the initial stabilization efforts. The absolute increase in the number of public enterprises the state sponsored during the investment boom of the late 1970s had combined with ineffective management and pricing policies, to place a large burden on the government budget during the early 1980s.<sup>32</sup> Public enterprises became significant borrowers, accounting for 39.4 percent of official external debt outstanding in 1980. Industrial parastatals recorded an FMG 1.3 billion loss in 1982 according to a sample of 39 PEs. On average, between 1980 and 1986, public enterprises absorbed about 60 percent of total nongovernment short-term credit, yet accounted for only 2.3 percent of GDP and 7.1 percent of formal-sector employment.

A small number of public PEs were affected by emergency measures in 1981 when current subsidies were reduced from FMG 750 million in 1980 to FMG 20 million in 1983. PEs were also affected by the elimination of price and profit controls arising from the ISAC and by increased competitive pressures as a result of trade liberalization. Finally PEs were put under pressure to settle cross-debts and arrears of payment to the government.

The three-year reform plan supported by the 1988 PSAC loan included a moratorium on the creation of new enterprises and a slowing of financial flows to existing public enterprises by the limiting of credit and budgetary transfers. The primary aim of the plan was to reduce the government's role in productive and commercial activity by cutting the 170 enterprises to half that number by mid-1991. To date, however, progress toward this goal has been limited. Although major steps toward the privatization or liquidation of 41 parastatal firms were to have been taken by the end of 1988, by October 1989 "confirmed significant actions" had been undertaken for only 10 enterprises (Harber 1989).

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<sup>32</sup> Statistical information on the public enterprise sector is taken from Swanson and Wolde-Semait (1989).

## The External Costs of Government Policies: The Public Foreign Debt

Madagascar's public foreign debt more than quadrupled from 1977 to 1981 (from 0.46 billion dollars to 2.06 billion dollars) as a result of the investment to the limit policies (figure 7). The external debt, however, continued to grow from 1982 to 1987 in spite of the stabilization and structural adjustment policies. Net foreign borrowing during the first years of stabilization was relatively small, so that the debt rose by only 14.9 percent (US\$0.30 billion) from 1981 to 1984. The large sectoral adjustment loans from 1985 to 1987 helped to add another US\$1.60 billion to the debt, so that total public foreign debt (which includes undisbursed loans) in 1987 reached US\$3.96 billion, equal to 150.7 percent of GDP at the official exchange rate and 7.5 times the level of exports of goods and services. In 1987, 58.7 percent of the disbursed outstanding public foreign debt was owed to bilateral official donors, the largest of which is France (table 17). Debt to the World Bank (17.3 percent) and the IMF (4.3 percent) accounted for 21.7 percent of the total.

Net disbursements have remained positive in part due to numerous debt reschedulings. Official debt first was rescheduled in a meeting of the Paris Club of bilateral donors following the April 1981 IMF standby agreement. Since that time, official debts have been rescheduled four times (1982, 1984, 1985, and 1986). Commercial debts have been rescheduled twice (in 1981 and 1984). Payments of interest and principal have increased, however, reaching a level of 64.3 percent of disbursements in 1987.<sup>33</sup>

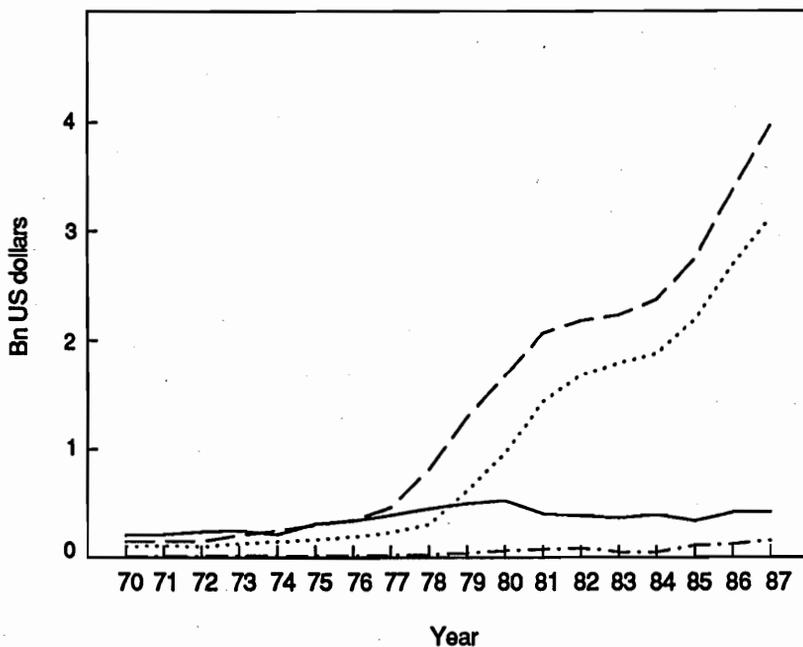
Comparing net foreign inflows with changes in national income is difficult because changes in nominal exchange rates exaggerate changes in the value of GDP measured in foreign currency (or the changes in the value of foreign inflows measured in domestic currency). A purchasing power parity exchange rate (set to equal the 1988 value of the FMG) was used to convert GDP in domestic currency to a dollar value.<sup>34</sup> As shown in figure 8, incremental GDP is not closely correlated with net capital inflows. Large capital inflows in 1979 and 1980 (US\$631 million over the two years) coincided with a US\$365 million increase in GDP in 1979 and a further US\$173 million increase in 1980, but in 1981 and

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33 Madagascar has received some debt relief. The US announced plans to forgive bilateral debt to eligible countries in Africa in July 1989. France signed a debt forgiveness agreement with Madagascar in June 1990 (Christian Science Monitor 1989; Le Monde 1990).

34 A purchasing power parity exchange rate series is calculated as the nominal exchange rate series for which the real exchange rate is kept constant at a given level (in this case, the value of the real exchange rate in 1988). The purchasing power parity exchange rate series is given in table 16.

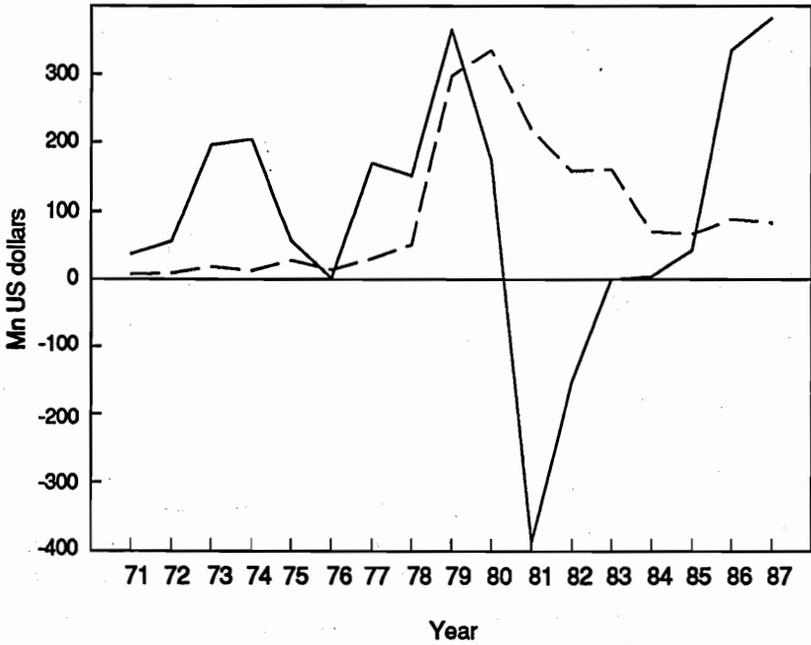
**Figure 7 – Madagascar: Foreign Public Debt, Servicing, and Exports, 1970 - 1987**



- Exports of goods and services
- - - Total debt
- ..... Disbursed debt
- . - . Principal and interest payments

Source: World Bank (undated).

**Figure 8 – Madagascar: Net Foreign Capital Inflows and Incremental GDP, 1971 - 1987**



— Incremental GDP at purchasing power parity  
 - - Net inflows

Sources: World Bank (undated), authors' calculations.

**Table 17** – Madagascar: Foreign Public Debt, by Source, 1975, 1980, and 1987

	1975		1980		1987	
	Mn US\$	Percent	Mn US\$	Percent	Mn US\$	Percent
Total debt <sup>a</sup> outstanding	184.2	100.0	1,255.6	100.0	3,376.9	100.0
World Bank (IBRD/IDA)	77.8	42.2	151.7	12.1	585.6	17.3
International Monetary Fund	17.0	9.2	55.0	4.4	144.0	4.3
Multilateral	2.2	1.2	68.3	5.4	271.6	8.0
Bilateral	77.9	42.3	390.3	31.1	1,981.6	58.7
Suppliers credits/financial Institution	9.3	5.0	346.2	27.6	274.7	8.1
Short-term debt	0.0	0.0	244.1	19.4	119.4	3.5

**Source:** World Bank (Undated).

<sup>a</sup> All categories are for debt outstanding and disbursed.

1982, GDP (measured in dollars) fell sharply despite continued net inflows of foreign capital (albeit at lower levels). Net inflows stabilized at an average of US\$76 million per year from 1984 to 1987 (23 percent of the 1980 level) and positive real GDP growth resumed from 1985 to 1987, with incremental GDP 3.8 and 4.7 times greater than net capital inflows in 1986 and 1987, respectively.

### Summary

By 1987, the structural adjustment policy reforms had yet to produce sustained growth in real incomes. Real GDP per capita continued to fall as real economic growth averaged only 1.44 percent per year from 1983 to 1987, only half the average growth rate from 1961 to 1972 (2.87 percent per year). This suggests that many structural constraints that had limited growth since 1971 still exist despite the reforms. The environment for private investment remains uncertain, given the nationalizations of the 1970s, problems with the investment code and the history of price controls. The staggered introduction of the reforms also shares in the blame for the minimal real growth. Privatization and restructuring of public enterprises had barely begun by 1987 and trade policy reforms did not take place until 1988.

Initial estimates of per capita real GDP for 1988, show a decline by 5.0 percent, due in large part to a poor rice harvest. More disturbing than the lack of real growth, however, is preliminary data from 1988 and 1989 suggesting that some of the achievements of the stabilization and structural adjustment programs (eg, reductions in budget and trade deficits and inflation) are being

slowly eroded by an apparent softening of the government's fiscal discipline and commitment to policy reform (Harber 1989). Whether the very recent data represent the start of adverse trends or are only minor departures from the impressive macrostability attained since the early 1980s, remains to be seen.

## 4.

# Profile of the Poor in Madagascar

Characterizing the poor in terms of their occupations, incomes, expenditure, health, and other household characteristics is an important first step in understanding the linkages between economic policies and poverty. Data from a number of household budget surveys conducted in recent years provide some basic information on the distribution of incomes and the patterns of expenditure. More detailed data will be gathered through the large-scale survey of households by the World Bank's Social Dimensions of Adjustment Unit, scheduled to begin by early 1991.

A survey in 1977/78 of households in the seven largest cities in Madagascar included data broken down by socioeconomic group of the head of household (l'Institut National de la Statistique et de la Recherche Economique, undated). Similar data were collected from surveys of the rural and semiurban households in 1980/81 (BDE 1987a and b). To date, expenditure and income data for semiurban areas (broken down by faritany<sup>35</sup> and by job classification of the head of household) have been published; for rural areas, only the expenditure data (broken down by faritany and seven activities of heads of households) are available. The Ministry of Agricultural Production and Agrarian Reform (MPARA) has also conducted household surveys since 1982/83 of both urban households—again for the seven largest cities and rural and secondary urban households combined. Associates for International Resources and Development (AIRD) published the results of the first year's surveys, but only partial results of later surveys have been released (AIRD 1984). Finally, a number of small surveys provide data on the nutritional status of the population.

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<sup>35</sup> Administratively, Madagascar's government is divided into six faritanies (formerly provinces), which are further subdivided into fivondronampokolona or fivondrananas (formerly sub-prefectures or districts). The 110 fivondrananas are made up of 1252 firaisam-pokolona (firaisanas, formerly cantons), which in turn are subdivided into 11,393 fokontanies (villages). The numbers of administrative units, as of January 1, 1986, are given in BDE 1988, vol. I.

## IDENTIFYING THE POOR

Table 18 presents an estimate of household income distribution in Madagascar in 1980 based on expenditure data from the INSRE household budget surveys (BDE 1987a and b) and Pryor (1988). The estimates in the table are constructed using the actual average incomes and income distribution from the survey of rural areas and small urban centers, and estimates of the income distribution of the seven largest cities. These latter estimates assume that the average real income in the large urban centers was unchanged between 1978 and 1980 and that the Gini coefficient for the large urban centers in 1980 was the same as that in the small urban centers.<sup>36</sup>

Approximate poverty lines for rural and urban households indicate the minimum income required for a rice-based subsistence diet on the basis of food requirements and typical shares of expenditure for rice, total food, and other expenses. Meeting 50 percent of total calorie requirements from rice would require 297 grams of rice per person per day,<sup>37</sup> at a cost of FMG 17.84 per day at the 1980/81 official price of FMG 60 per kilogram. Assuming expenditure on rice to be 40 percent of total expenditure on food and expenditure on food to be 70 percent of total expenditure,<sup>38</sup> the minimum per capita income required is FMG 63.7 per day or FMG 23,253 per year. The minimum annual income required per household in 1980 would be FMG 132,000 for rural households and FMG 150,000 for urban households.<sup>39</sup> The rural poverty line is slightly below the minimum wage for agriculture in 1980 (FMG 132,900 per year) and

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<sup>36</sup> The numbers differ from those of Pryor (1988) in two ways: 1) Pryor's estimates assume the Gini coefficient for the large urban centers was the same in 1962 as in 1980 while the estimates in table 18 assume the Gini coefficient for large urban centers in 1980 was the same as that of small urban centers; 2) in Pryor's estimates rural incomes are scaled down by 15 percent to adjust for a possible overestimate of rural incomes (no adjustment is made for the figures in table 18). Pryor scaled down rural incomes because the data on average real rural incomes (using an average of the GDP deflator and a retail price index as the deflator) show an increase of 14 percent between 1962 and 1980, while Pryor's data on average real production in the primary sector show a decrease of about the same percentage. It is possible, however, that the 1962 primary production data or the budget surveys overstated both production and incomes, and reducing the rural income figure for 1980 is unwarranted.

<sup>37</sup> Assumes a minimum daily calorie requirement of 2,200 calories per person and 7.7 calories per gram of milled rice (FAO 1984).

<sup>38</sup> The percentages given are typical expenditure patterns in low-income households in Madagascar (see table 24).

<sup>39</sup> Assuming an average rural household size of 5.67 people (MPARA 1988a-f) and an average urban household size of 6.47 people (weighted average of average household size across cities cited in the MPARA 1982/83 survey [AIRD 1984]).

**Table 18 – Madagascar: Household Income Distribution, by Type of Area, 1980**

Household Income 1,000 FMG/Year	Rural			Small Urban			7 Largest Cities			Total		
	Number of Households	Cum. % Households <sup>a</sup>	Cum. % Income <sup>a</sup>	Number of Households	Cum. % Households <sup>a</sup>	Cum. % Income <sup>a</sup>	Number of Households	Cum. % Households <sup>b</sup>	Cum. % Income <sup>a</sup>	Number of Households	Cum. % Households <sup>a</sup>	Cum. % Income <sup>a</sup>
0-49	65,375	4.8	0.8	4,197	4.3	0.4	7,523	3.3	0.2	77,095	4.6	0.6
50-99	247,881	23.0	7.1	10,445	15.0	2.7	15,372	10.1	1.4	273,698	20.8	5.4
100-149	298,274	44.9	19.2	10,738	26.0	6.5	18,932	18.4	3.6	327,944	40.2	14.6
150-199	217,917	60.9	31.4	12,885	39.2	13.0	19,641	27.0	6.9	250,443	55.1	24.2
200-249	149,818	71.9	42.2	11,323	50.8	20.5	23,095	37.2	11.9	184,236	66.0	33.4
250-299	104,873	79.6	51.6	8,688	59.7	27.2	20,845	46.4	17.2	134,406	74.0	41.7
300-349	73,547	85.0	59.6	7,419	67.3	34.2	17,913	54.3	22.8	98,879	79.8	49.0
350-399	54,479	89.0	66.1	5,369	72.8	40.0	15,105	60.9	28.2	74,953	84.3	55.2
400-449	39,498	91.9	71.3	5,174	78.1	46.2	13,298	66.8	33.5	57,970	87.7	60.5
450-499	23,154	93.6	75.0	3,416	81.6	51.0	9,968	71.1	38.1	36,538	89.9	64.5
500-599	29,964	95.8	80.1	5,369	87.1	59.2	17,715	78.9	47.1	53,048	93.0	70.8
600-699	19,068	97.2	84.0	2,831	90.0	64.6	10,923	83.7	54.0	32,822	95.0	75.5
700-799	10,896	98.0	86.6	2,343	92.4	69.6	8,689	87.6	60.1	21,928	96.3	79.1
800-899	6,810	98.5	88.4	976	93.4	71.9	5,074	89.8	64.1	12,860	97.0	81.4

*Table Continued*

Table Continuation

Household Income	Rural			Small Urban			7 Largest Cities			Total		
1,000 FMG/Year	Number of Households	Cum. % Households <sup>a</sup>	Cum. % Income <sup>a</sup>	Number of Households	Cum. % Households <sup>a</sup>	Cum. % Income <sup>a</sup>	Number of Households	Cum. % Households <sup>a</sup>	Cum. % Income <sup>a</sup>	Number of Households	Cum. % Households <sup>a</sup>	Cum. % Income <sup>a</sup>
900-999	2,724	98.7	89.3	2,050	95.5	77.5	4,282	91.7	68.0	9,056	97.6	83.4
1,000+	17,706	100.0	100.0	4,393	100.0	100.0	18,926	100.0	100.0	41,025	100.0	100.0
<b>Total</b>	<b>1,361,984<sup>b</sup></b>	...	...	<b>97,616</b>	...	...	<b>227,300</b>	...	...	<b>1,686,900</b>	...	...
	Rural			Small Urban			7 Largest Cities			Total		
Average income	227.1			356.2			462.7			264.4		
Gini coefficient	0.410			0.458			0.456			0.447		

Sources: Adapted from BDE (1987a,b) and Pryor (1988).

<sup>a</sup> Percentages are cumulative.

<sup>b</sup> This figure is the column sum. Total number of rural households in original document is 1,360,983.

Notes: Income distribution for seven largest cities constructed from income distribution in small urban centers (see text). Population figures for rural and small urban centers are taken directly from the surveys; Pryor (1988) uses adjusted figures.

an urban poverty line 15 percent higher than the minimum wage for nonagriculture in 1980 (FMG 130,524 per year).

On the basis of the above poverty lines, 37 per cent of households in rural areas, 26 percent of households in small urban centers, and 18 percent of households in the seven largest cities were poor in 1980 (table 19). Overall, 34 percent of households had incomes below the poverty line in 1980, 90 percent of these in rural areas.

Table 20 presents a ranking of occupations of heads of households in rural and semiurban areas by mean household income in 1980. Median household income was higher than the poverty line for all categories of households, although median household income for the rural jobless (no profession) and for farmers in rural areas were only 4 and 18 percent, respectively, above the poverty line. Four other categories of semiurban household had median incomes below FMG 200,000 in 1980: artisans, those performing small services, farmers, and the inactive. These groups account for 50 percent of the semiurban population and 89 percent of the rural population (agriculture alone is the major economic activity for 87 percent of rural heads of households).

Seven categories of households (defined according to the occupation of the household head) are distinguished in the 1982/83 MPARA survey of Antananarivo (AIRD 1984). Ranked from the lowest to the highest average expenditure, the occupations are: farmer, small services, employees and factory

**Table 19 – Madagascar: Poverty Estimates, 1980**

	House-	Poverty	Households	Poor	Total Poor
	holds	Line	Below Poverty Line	House-	House-
	1,000	FMG/Yr	Percent	1,000	Percent
Seven largest cities	227.3	150,000	18	41.8	7.3
Small urban centers	97.6	150,000	26	25.4	4.4
Rural areas	1,362.0	132,000	37	503.9	88.2
<b>Total</b>	<b>1,686.9</b>	<b>...</b>	<b>34</b>	<b>571.1</b>	<b>100.0</b>

**Sources:** Author's estimates, calculated from Pryor (1988) and BDE (1987a,b).

**Table 20 – Madagascar: Ranking of Occupations of Heads of Household in Rural and Semiurban Areas, by Mean Household Income, 1980**

Small Urban Centers	Household Income Mean	Percent of Households	Median Income	Rural	Household Income Mean	Percent of Households	Median Income
Artisan	192.4	6.5	170.1	No profession	195.4	2.1	137.2
Small services	204.6	6.0	163.4	Farmer	199.6	87.1	155.2
Farmer	238.0	24.9	178.6	Artisan	246.3	3.0	201.9
Inactive	246.5	12.9	167.7	Household help	270.0	1.1	266.3
Factory worker	279.9	20.3	258.5	Other agricultural activities	320.2	...	...
Employee	457.0	16.1	402.4	Teacher/Admin.	532.2	5.0	431.1
Trader/merchant	693.4	7.4	324.3	Trader	698.8	1.2	322.9
Upper-level employee	955.7	5.9	852.3				
Independent employer	1,896.6 <sup>a</sup>	...	...				

**Source:** BDE (1987a,b).

<sup>a</sup> Less than 0.1 percent.

**Table 21 – Madagascar: Rural and Urban Incomes, Ranked by Region, 1980**

	Median Income	Mean Income
	1,000 FMG per Household	
<b>Rural</b>		
Toamasina	130.7	178.3
Mahajanga	132.9	183.3
Fianarantsoa	172.1	218.7
Antananarivo	180.2	256.0
Toliary	185.1	256.1
Antsiranana	218.5	267.6
<b>Small urban centers</b>	...	290.0
Fianarantsoa	...	290.0
Toamasina	...	334.4
Toliary	...	346.6
Mahajanga	...	365.9
Antananarivo	...	405.6
Antsiranana	...	480.9
<b>Averages</b>		
Small urban centers	246.5	356.2
Rural	165.9	226.9
<b>Estimated poverty line</b>		
Small urban centers	...	150.0
Rural	...	132.0

**Sources:** BDE (1987a,b).

workers, inactive, other office workers, artisans and traders, and upper- and middle-level workers (*cadres supérieurs et moyens*). The same methodology used above, with the official 1982 rice price of FMG 140 per kilogram, gives a minimum per capita income in urban areas of FMG 59,200 per year (FMG 383,000 per household). Average annual household expenditure per person is slightly below the poverty line for farmers and only 12 and 25 percent above the poverty line for service-sector workers and employees, and factory workers, respectively.

Median incomes vary widely by region. Data from the 1980 INSRE rural survey (BDE 1987a-f) show that median incomes in rural Toamasina and Mahajanga are significantly below those in the other provinces. This is surprising since Toliary province has some of the areas reputed to be the poorest in the country (table 21). Even across rice-producing zones, average per capita expenditure reported in the 1982/83 MPARA survey of rural (including small

Table 22 – Madagascar: Size Distribution of Land, 1984/85

	All Madagascar		Antananarivo		Fianarantsoa		Toamasina		Mahajanga		Toliary		Antsiranana	
	Number of Farm Households	Hectares	Number of Farm Households	Hectares	Number of Farm Households	Hectares	Number of Farm Households	Hectares	Number of Farm Households	Hectares	Number of Farm Households	Hectares	Number of Farm Households	Hectares
<b>TRADITIONAL</b>														
Landless <sup>a</sup>	6,090	0	274	0	567	0	245	0	836	0	3,687	0	481	0
<0.25	99,537	14,553	25,150	3,483	11,624	1,840	12,564	1,700	7,521	1,255	37,317	5,425	5,361	850
0.25-0.49	193,822	75,009	55,949	21,643	51,371	20,222	27,143	10,558	6,725	2,660	40,382	15,158	12,252	4,768
0.50-0.74	253,910	157,448	71,748	44,195	68,791	42,445	25,018	15,415	25,761	16,193	46,974	29,442	15,618	9,758
0.75-0.99	249,095	216,029	55,184	48,113	63,021	54,953	37,286	32,430	32,648	28,461	41,435	35,171	19,521	16,901
>1.00	656,369	1,213,125	122,412	228,050	155,648	247,305	145,359	281,678	93,442	199,093	66,770	118,230	72,738	138,769
<b>Total</b>	<b>1,458,823</b>	<b>1,676,164</b>	<b>330,717</b>	<b>345,484</b>	<b>351,022</b>	<b>366,765</b>	<b>247,615</b>	<b>341,781</b>	<b>166,933</b>	<b>247,662</b>	<b>236,565</b>	<b>203,426</b>	<b>125,971</b>	<b>171,046</b>
<b>MODERN</b>														
Landless <sup>a</sup>	13	0	4	0	0	0	2	0	2	0	3	0	2	0
<0.25	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.25-0.49	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0.50-0.74	2	2	0	0	0	0	1	1	1	1	0	0	0	0
0.75-0.99	2	2	1	1	0	0	1	1	0	0	0	0	0	0
>100	595	79,539	64	39,488	105	8,925	209	15,045	78	23,804	49	14,910	90	13,367
<b>Total</b>	<b>612</b>	<b>79,543</b>	<b>69</b>	<b>39,489</b>	<b>105</b>	<b>8,925</b>	<b>213</b>	<b>15,047</b>	<b>81</b>	<b>23,805</b>	<b>52</b>	<b>14,910</b>	<b>92</b>	<b>13,367</b>

Table Continued

**ALL SECTORS**

Landless <sup>a</sup>	6,103	0	278	0	567	0	247	0	838	0	3,690	0	483	0
<0.25	99,537	14,553	25,150	3,483	11,624	1,840	12,564	1,700	7,521	1,255	37,317	5,425	5,361	850
<0.25-0.49	193,822	75,009	55,949	21,643	51,371	20,222	27,143	10,558	6,725	2,660	40,382	15,158	12,252	4,768
0.50-0.74	253,912	157,450	71,748	44,195	68,791	42,445	25,019	15,416	25,762	16,194	46,974	29,442	15,618	9,758
0.75-0.99	249,097	216,031	55,185	48,114	63,021	54,953	37,287	32,431	32,648	28,461	41,435	35,171	19,521	16,901
>1.00	656,964	1,292,664	122,476	267,538	155,753	256,230	145,568	296,723	93,520	222,897	66,819	133,140	72,828	152,136
Total	1,459,435	1,755,707	330,786	384,973	351,127	375,690	247,828	356,828	167,014	271,467	236,617	218,336	126,063	184,413

Source: MPARA (1988a-f).

<sup>a</sup> The modern- and traditional-sector "landless" farmers are engaged in raising livestock and poultry and in other animal husbandry but the owner may not cultivate the land.

urban centers) households ranged widely from FMG 54,000 in the east zone to FMG 75,000 in the plateau meridional subzone (AIRD 1984).

The size distribution of land reported in the 1984/85 MPARA agricultural census (1984a-f) provides another indirect measure of rural poverty. Assuming average yields for irrigated rice (2.54 tons of paddy per hectare), a minimum of 0.071 hectares of irrigated rice land per person is needed for self-sufficiency (assumed here to be 1,100 calories of rice per day, equal to 108.5 kilograms per year).<sup>40</sup> On nonirrigated land, rice yields average only 1.62 tons per hectare, so 0.111 hectare per person is needed. For the average farm household of 5.67 persons, 0.403 hectare of irrigated or 0.629 hectare of nonirrigated land must be planted with rice for self-sufficiency. Average farm size in Madagascar is 1.149 hectares and 55 percent of farms are less than 1 hectare (table 22). If farmers devote half their land to rice (the national average), total land required is 0.142 hectares per person (for irrigated rice). Under these assumptions 38 percent of farm households (with 48 percent of the farm population) do not cultivate enough land to be self-sufficient in rice (i.e., have landholdings of less than 0.15 hectares per person).<sup>41</sup> Twenty-five percent of farm households (occupied by 30 percent of the population) have land holdings of less than 0.1 hectare per person. The estimate of the percentage of households not self-sufficient in rice, based on land holdings (38 percent), corresponds quite closely to the percentage of rural households below the rural poverty line in 1980 (37 percent). Because both measures of poverty are based on minimum rice consumption, the similarity of the estimates suggests that the data on the distribution of area cultivated per household is broadly consistent with the 1980 survey data on distribution of rural incomes (tables 20 and 21).

## CHANGES IN INCOME DISTRIBUTION

Table 23 presents measures of income inequality in rural areas and nationwide for 1962 and 1980.<sup>42</sup> The unadjusted figures from the 1962 and 1980 surveys

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<sup>40</sup> A milling ratio of 0.67 kilograms of milled rice per kilogram of paddy and a loss rate of 10 percent are assumed.

<sup>41</sup> The distribution of households according to area cultivated per person is estimated on the basis of MPARA agricultural census data on area cultivated by household size (1988a-f).

<sup>42</sup> Two surveys were conducted in 1962—in the rural areas, (Patrick J. Francois 1967) and for the six largest cities (Ministère des Finances et du Commerce, INSRE 1963).

**Table 23 – Madagascar: Estimates of Gini Coefficients, 1962 and 1980**

	Number of Households	Average Income	Median Income	Gini	Number of Households	Average Income	Median Income	Gini
	Estimate A <sup>a</sup> (Unadjusted Incomes)				Estimate B <sup>b</sup> (Adjusted Incomes)			
<b>1962</b>								
Rural	1,076.2	60.9	...	0.290	1,076.2	59.1	...	0.290
Small urban	36.6	153.6	...	0.487	36.6	238.1	...	0.487
Six cities	98.9	199.3	...	0.500	98.9	308.9	...	0.500
All Madagascar	1,211.7	75.0	...	0.391	1,211.7	84.9	...	0.460
	Estimate C <sup>c</sup> (Unadjusted Incomes)				Estimate D <sup>d</sup> (Adjusted Incomes)			
<b>1980</b>								
Rural	1,362.0	226.9	165.9	0.410	1,542.9	192.9	141.0	0.435
Small urban	97.6	356.2	246.5	0.458	140.5	356.2	246.5	0.487
Seven cities	227.3	462.1	320.2	0.456	227.3	462.7	320.2	...
All Madagascar	1,686.9	266.1	185.0	0.447	1,910.8	237.0	145.0	0.489

*Table Continued*

Table Continuation

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**Sources:** Estimates A, B, and D from Pryor (1988); Estimate C is authors' estimate.

- <sup>a</sup> Constructed from survey data on incomes in rural areas and the six largest cities, with adjustments for population. Used 1980 Gini coefficient for small urban centers and ratio of incomes in large and small urban centers in 1980 to construct small urban centers income distribution.
- <sup>b</sup> Same as estimate A but with agricultural incomes reduced by 3 percent and urban incomes increased by 55 percent in each category.
- <sup>c</sup> Constructed from 1980 survey data on rural and households in small urban areas and from 1978 survey of households in the seven largest cities.
- <sup>d</sup> Same as estimate C but with adjustments for the number of rural households, and with agricultural incomes reduced by 15 percent in each income category.

show that average rural income per household increased by 13.8 percent in real terms (using the GDP deflator in Pryor, 1988) while real average urban incomes fell by 29.2 percent.<sup>43</sup> The evidence suggests that rural income distribution became more unequal over time as the Gini coefficient increased from .290 to .410 from 1962 to 1980. Estimating the change in distribution of incomes in urban areas is not possible because income distribution data is available only for large cities in 1962 and only for smaller urban centers in 1980. There is, however, little difference between the Gini coefficients for the two years.

In order to construct the overall distribution of income in 1962, Pryor (1988) assumes that the Gini coefficient for small towns was unchanged between 1962 and 1980. Average incomes in small towns for 1982 were calculated using the ratio of small town incomes to incomes in large cities in 1980. Under these assumptions, the overall Gini coefficient for 1962 is 0.391 (estimate A in table 23), which is lower than either of the Gini coefficients estimated for 1980, indicating an increase in inequality between the two years. In his adjusted estimate for 1962 (estimate B), Pryor (1988) scaled all rural incomes down by 3 percent and increased all urban incomes by 55 percent and arrived at a Gini coefficient for 1962 only slightly below the adjusted 1980 Gini coefficient.

Thus, the unadjusted figures show a serious deterioration in income distribution from 1962 to 1980, due essentially to increased inequality in rural income distribution while average rural incomes grew only slightly. Adjusting urban and rural average incomes to be more consistent with national income aggregates results in estimates showing little change in inequality at a national level, but increased inequality in rural areas and declines in urban per capita incomes of more than 50 percent. Given the uncertainty in the data and the number of assumptions required to construct the overall income distributions, the estimates in the table can be regarded only as suggestive.<sup>44</sup>

## DIETS/EXPENDITURE OF THE POOR

Expenditure on rice accounts for a major share of total expenditure among all income groups, including the poor. Data from household surveys in An-

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<sup>43</sup> As noted above, the figures showing a sharp rise in rural incomes are questionable, since per capita agricultural production fell during this period.

<sup>44</sup> Moreover, the measures of the Gini coefficients are flawed by the lack of data on income distribution of households with incomes of more than FMG 1 million.

tananarivo indicate that between November 1982 and April 1985, rice accounted for between 39.6 and 47.7 percent of total expenditure for the poorest 20 percent of the population (AIRD 1985).<sup>45</sup> Expenditure on rice by the middle class accounted for between 26 and 34 percent of total expenditure. Per capita consumption of rice (in kilograms) by the poor was between 26 and 38 percent lower than that of the middle class during the period between 1982 and 1985 (AIRD 1985). Using a double logarithmic formulation with a squared quadratic term, AIRD (1984) calculated an expenditure elasticity of demand for rice (evaluated at the mean) of .412 and a price elasticity of -0.333. Average expenditure by occupation of the head of household also shed some light on the food consumption patterns of the poor. As shown in table 24, absolute expenditure on all major categories of foods increase with income, indicating that the income elasticities are positive. (Professions are distributed from left to right in increasing order of income.) Shares of total expenditure on meat and fish rise with income (implying an income elasticity of demand greater than 1 for these commodities). Household groups with lower average expenditure tend to consume a higher proportion of cassava to bread than higher income households.

Expenditure fell in real terms in most cities between 1978 and 1982 (exceptions were Toamasina and Fianarantsoa) and the share of total expenditure on food increased in all cities except Toamasina, where it remained unchanged. Likewise, the share of food expenditure on rice increased or remained the same in all cities.

According to the 1983 MPARA survey of rural households (including these in small urban centers) conducted in nine major rice-producing agroecological zones, average per capita rice consumption by agroecological zone ranged from 126 to 204 kilograms per year (AIRD 1984). Cassava consumption was higher and bread consumption lower in rural areas compared with urban areas. AIRD (1984) also estimated a double logarithmic equation with a squared quadratic term for rural rice consumption and found an expenditure elasticity of .380 (evaluated at the mean) and a price elasticity of -0.822.

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<sup>45</sup> Two income groups are compared — the poorest 20 percent are defined as the poor, and the individuals in the 20 to 70 percent range of the distribution of income are defined as the middle class.

**Table 24 – Madagascar: Annual Expenditure in Antananarivo, by Employment of Household, 1982/83 (FMG 1,000 per household)**

	Agricultural		Small Service		Employee/Worker		Inactive		Other Workers		Artisan/Commerce		Middle/Upper Level Workers		Average	
	FMG	Percent	FMG	Percent	FMG	Percent	FMG	Percent	FMG	Percent	FMG	Percent	FMG	Percent	FMG	Percent
Food	239	76.0	254	71.0	342	71.0	318	62.0	423	68.0	465	67.0	740	58.0	419	65.0
Rice	83	...	106	...	123	...	118	...	141	...	145	...	145	...	129	...
Rice, home consumption	51	...	9	...	10	...	8	...	6	...	9	...	26	...	14	...
Cassava	9	...	10	...	14	...	8	...	12	...	11	...	19	...	12	...
Bread	7	...	7	...	15	...	9	...	16	...	18	...	39	...	17	...
Maize	1	...	2	...	2	...	1	...	2	...	1	...	4	...	2	...
Meat/fish	48	...	61	...	99	...	104	...	147	...	171	...	302	...	144	...
Fruit/vegetable	37	...	44	...	60	...	60	...	77	...	88	...	152	...	78	...
Beverages	3	...	3	...	5	...	3	...	7	...	5	...	28	...	8	...
Meals out	0	...	12	...	15	...	7	...	15	...	17	...	24	...	14	...
Fuel	44	14.0	50	14.0	67	14.0	83	16.0	87	14.0	96	14.0	169	13.0	89	14.0
Transport	7	2.0	11	3.0	27	6.0	54	11.0	43	7.0	43	6.0	209	16.0	57	9.0
Housing	12	4.0	30	8.0	22	5.0	38	7.0	44	7.0	67	10.0	89	7.0	47	7.0
Clothing	14	4.0	15	4.0	22	5.0	18	4.0	28	4.0	26	4.0	71	6.0	29	5.0
Total	316	100.0	360	100.0	480	101.0	511	100.0	625	100.0	697	101.0	1,278	100.0	641	100.0
Size of household	5.36	...	5.48	...	6.46	...	5.30	...	6.78	...	6.78	...	6.21	...	6.24	...
Total per head	58.96	...	65.69	...	74.30	...	96.42	...	93.28	...	102.80	...	205.80	...	102.72	...
Percentage of sample	8.75	...	12.13	...	10.37	...	8.75	...	27.64	...	19.14	...	13.22	...	100.00	...

Source: AIRD (1984).

## OVERVIEW OF NUTRITION AND HEALTH<sup>46</sup>

Little comprehensive data on nutrition and health in Madagascar exists apart from a number of isolated surveys and one nationwide survey.<sup>47</sup> The survey results vary widely both across location and over time (table 25).

Long-term malnutrition appears to be widespread among children under five. The national sample of children 3 years old and under showed 33.1 percent and 37.6 percent of children in urban and rural areas with evidence of long-term malnutrition (stunting), and no survey found less than 29.6 percent. Acute malnutrition, reflected in low weight-for-height, is less common. The national sample of children 3 years old and under found 11.9 and 13.0 percent of the children in urban and rural areas, respectively, suffered from acute malnutrition, and in no other survey was the level reported more than 7 percent. It is possible, however, that acute malnutrition may have been a more serious problem for children in the various samples at some time before the survey period. Weight-for-age measures of malnutrition, like the height-for-age measures, were also reported to be very high—over 30 percent in the national sample of children three years old and under.

Clinic data on malnutrition in Madagascar is available but interpretation of the results is difficult because of the manner in which the data are collected. The Ministry of Health collects data on the number of cases of malnutrition detected during medical visits to teaching clinics (*formations sanitaires dirigées par des médecins*). The data is of limited use because (1) there are no fixed criteria for diagnosing malnutrition, (2) malnutrition is not detected in a systematic fashion, (3) it is not known if the sample visiting the formations sanitaires is representative, (4) the number of the malnourished varies widely from month to month, and (5) the population visiting the centers is unknown. Thus it is impossible to calculate rates of incidence or of prevalence.

The Catholic Relief Services collects data on weight-for-age of all children visiting their nutritional supplement centers every month. This amounts to some 50,000 children in about 70 centers. Although the data are often used as an indication of trends in the nutritional status of children, inferences drawn from the data are questionable because (1) it is likely that those who visit the centers are from the poorest households and already have malnourished children, (2)

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<sup>46</sup> This section is based on the summary of surveys of the nutritional status of children under five reported in PNSAN (1989). A list of the surveys covered is found in appendix 1.

<sup>47</sup> Andrianasolo et al. (1986) surveyed a nationwide sample of children under three years old.

**Table 25 – Madagascar: Malnutrition among Children**

	Height/Age "Stunting"	Weight/Height "Wasting"	Weight/Age
	Percent of Children in Sample		
National sample survey <sup>a</sup>			
1983 urban	33.1	11.9	33.3
1983 rural	37.6	13.0	36.9
Other surveys <sup>b</sup>			
Minimum reported	29.6 <sup>c</sup> (Lac Alaotra 1985)	0.8 <sup>d</sup> (Antsirabe 1984)	26.8 (Mahajanga 1986)
Maximum reported	77.0 (Antsirabe 1985)	7.0 (Vohipeno 1988)	49.4 (Antsirabe 1985)

**Source:** PNSAN (1989).

<sup>a</sup> National sample of children 3 years old or less, Andrianasolo, R., et al. (1986).

<sup>b</sup> Maximum and minimum values of all surveys reported in PNSAN (1989). Survey sites and dates in parentheses.

<sup>c</sup> Criteria of less than or equal to 90 percent.

<sup>d</sup> Criteria of less than or equal to 80 percent.

**Note:** Malnutrition defined as percent of children with value of indicated index below two standard deviations of international standard.

the number of participants depends on the rations allocated to each center, (3) the method of recruitment varies across centers, (4) both the children and the mother benefit from supplemental foods given, (5) data is often incomplete data for periods during which staff are on vacation. Data from an individual center may give some indication of the nutritional state around that center over time, but there is much variation between centers even within cities.

Estimates of infant mortality in Madagascar vary widely.<sup>48</sup> For 1966, infant mortality is variously estimated at 53 deaths per 1,000 by the official registration system, 102.1 per 1,000 by the demographic sample survey, and 166 per 1,000 according to adjustments to the demographic table based on the age structure of the population. The 1975 census calculated infant mortality as 67.6 per 1,000, but using census data on the fertility and age structure, a French demographer

<sup>48</sup> The following discussion of infant mortality data is based on Pryor (1988).

**Table 26 – Madagascar: Major Causes of Mortality**

Affections	Percentage of Deaths
Infectious intestinal diseases	12.2
Undefined bronchitis	7.5
Malaria	5.1
Measles	4.9
Bronchopneumonia	3.9
Gastroenteritis and colitis	3.3
Bronchitis and bronchiolitis	3.0
Other respiratory diseases	2.4
Chronic bronchitis	2.3
Senility	1.9
Whooping cough	1.9
Asthma	1.6

**Sources:** *Department of Health and Medical Service, 1982 Annual Report, cited in World Bank (1987a).*

estimated a much higher figure of 160 per 1,000. The World Bank *Population and Health Sector Review* (1987a) estimates infant mortality of at least 109 per 1,000 in 1980 on the basis of data from the household budget survey of 1980 and 126 per 1,000 in 1982/3 on the basis of data from the sociodemographic survey of 1984. Pryor (1988) concludes from data on population and age structure and fertility rates, that infant mortality rates in 1985 were approximately the same as in 1975: 160 per 1,000, a level similar to estimates based on age structure for 1966. Data from the World Tables (World Bank 1988b) show a steep decline in infant mortality rates, however, to only 67 per 1,000 in 1983.

Various types of bronchitis, infectious intestinal diseases, malaria, and measles are the leading causes of mortality as reported by the Department of Health and Medical Services for 1982 (table 26). Deaths from malaria increased alarmingly in recent years because of an increase in incidence in the highland

areas<sup>49</sup> and because of a shortage of drugs for treatment. An estimated 100,000 people died of malaria in 1988 (The Economist, 1988).

## OVERVIEW OF HEALTH SECTOR<sup>50</sup>

Since 1975 the Government has undertaken a public health policy of providing rural village-based healthcare facilities to offset the rural-urban imbalance and to allow for universal access to primary healthcare. The emphasis has been on preventive rather than curative medicine. This strategy entailed a doubling of the number of facilities as well as of the number of health personnel between 1978 and 1985.<sup>51</sup> This expansion was made possible by a near tripling of the health budget in nominal terms (although it fell by 25 percent in real terms) between 1977 and 1985 (World Bank 1989a).

The result of this strategy is that an estimated 65 percent of the population has physical access to basic healthcare (World Bank 1989a). Despite regional differences that favor Antananarivo, the ratios of health facility per inhabitant, doctor per inhabitant, and inhabitants per hospital bed are quite favorable relative to other sub-Saharan African countries.

However, universal healthcare access was more an objective than a reality, and public health policy fell short due to inappropriate expenditure patterns. Despite relatively extensive healthcare facilities, the health status of the population has not changed much. The primary cause of this poor performance is a failure to increase operating expenditure in proportion to personnel and investment expenditure. In effect, the health system ceased to be effective because needed equipment, materials, and medicines were not available. In fact, in many public hospitals, patients must bring their own supplies, medicines, bandages, and even food. This poor situation is complicated by a tendency to import expensive brand-name drugs instead of cheaper generic ones, and a general lack of foreign exchange with which to import drugs (World Bank 1989a). As a result

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<sup>49</sup> Malaria had been largely eliminated in the highlands region in the 1950s and 1960s through control of mosquitos and widespread chemical prophylaxis. Since that time, however, the population has lost any acquired resistance to the disease and malaria has spread rapidly after being reintroduced to the region.

<sup>50</sup> This section draws heavily on the discussion in World Bank 1989a.

<sup>51</sup> Statistics are available only for 1977 and 1985, making it difficult to assess the effects of the stabilization and structural adjustment policies on health personnel and the number of facilities.

of the failure of the health system to deliver adequate service, infant and maternal mortality rates and deaths from malaria have increased from their 1980 levels.<sup>52</sup>

The malaria epidemic in 1988 showed the weakness of the health sector. A lack of drugs, improper vector control and epidemiological surveillance led to a major epidemic. National production of antimalarial tablets was well short of demand and the price of chloroquine in rural areas was over three times the price in Antananarivo. The result was that poor rural families were unable to obtain drugs (World Bank 1989a).

The vaccination campaign, despite donor support, has suffered from lack of vaccines, transportation, and refrigeration. Only 40 percent of healthcare facilities are able to participate in the program.

The Malagasy health sector failed to deliver adequate healthcare because of expenditure biases (away from operating costs), lack of resources to make the coverage universal,<sup>53</sup> and a general economic crisis requiring uniform cut-backs in all sectors.

## EDUCATION

Education has been a high priority for the Malagasy government, especially since the mid-1970s when the educational system was expanded and primary school attendance for children between 6 and 14 years of age was made compulsory. The gross enrollment ratio for primary school (calculated as the number of students enrolled divided by the total number of children of primary school age) is very high in Madagascar, equal to 90 percent in 1970 and exceeding 100 percent in 1978 and 1983.<sup>54</sup> Enrollment rates have declined between 1982/83 and 1987/88 by 17 percent for primary education and by 9 percent for secondary education (World Bank 1989a).

In 1985, the Ministry of Education absorbed 30 percent of government

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52 The increase in infant mortality rates is attributed both to a change in the method of data collection that previously underreported deaths and to a significant deterioration in mortality rates (see World Bank 1989a).

53 The argument presented by UNICEF (1989) that the price increases for medicines brought on by devaluations required by the structural adjustment program had affected the poor's ability to obtain medicine, is invalidated by the fact that the poor had almost no access to these drugs and services even before the economic reforms. The services that they obtained, with the exception of antimalarial treatment, were mostly preventive measures, such as vaccination, subsidized by either the government or donors or both.

54 According to Pryor (1988), the gross enrollment ratio exceeds 100 percent in the latter years because some older children may be attending primary school and some children in preprimary classes may be included.

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recurrent expenditure, as compared with only 21 percent for the Ministry of Defense and 11 percent for the Ministry of Health. The distribution of educational resources is highly skewed toward upper levels of education — 43 percent of the education budget was allocated for primary education (FMG 14,900 per student), 21 percent for secondary education (FMG 35,800 per student), 5 percent for technical and professional training (FMG 281,500 per student), and 26 percent for university education (FMG 330,000 per student). Salaries account for 96 percent of the education budget while only 1 percent of the budget is devoted to educational materials, leaving most schools inadequately supplied.

Quality of education is often low and repetition rates are high. The average length of time to complete the five years of primary school is more than 11 years, more than 70 percent of university students repeat their first year, and only 15 to 20 percent of university students successfully graduate (World Bank 1989a). No recent estimates of literacy are available. Only 39 percent of people over 14 years old in 1966 were literate (defined as the ability to write).<sup>55</sup>

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<sup>55</sup> Ministère des Finances et du Commerce and Institut National de la Statistique et de la Recherche Economique, *Enquête Démographique* (1966), quoted in Pryor (1988).

## 5. Rice Policy and its Impact on the Poor

Stabilization and structural adjustment policies affect household welfare through changes in household incomes and expenditure. By altering prices of production goods, affecting supplies of inputs to production, and influencing demand for labor and therefore real wages, government policies have an impact on household incomes. Changes in consumer prices through the removal of subsidies, as well as through changes in market supply and demand, cause shifts in household expenditure. Household welfare may also be influenced through reductions in the consumption of government services as government programs are reduced.

As discussed in Chapter 3, Madagascar's structural adjustment and stabilization efforts have involved a wide range of macroeconomic and sectoral policies. Each of the policies has had some impact on household welfare. However, because of the importance of rice consumption for all income groups in the country and of rice production in generating rural incomes, changes in rice policy had a larger and more direct effect on the welfare of households than other policies adopted.

In the early 1980s, the need to reform rice policy was obvious. Madagascar's rice sector was characterized by stagnating production, large consumer subsidies, an inefficient public marketing system, and growing rice imports. Problems in the rice sector adversely affected the macroeconomy as well—growing consumer subsidies enlarged the fiscal deficit and increasing rice imports exacerbated the balance of payment problems.

This chapter focuses solely on rice policy, describing in some detail the policies on production, marketing, and consumption of rice. It also includes an analysis of the financial cost of the consumer rice subsidies and the distribution of the benefits. Changes in real producer prices are discussed but the analysis of changes in producer incomes is postponed until chapter 6 for discussion in context with the effects of price changes in other crops and the combined effect of macroeconomic, trade, and other policies.

## RICE PRODUCTION

Rice production grew rapidly in the early 1960s, increasing by an average of 5.3 percent per year from 1960 to 1968.<sup>56</sup> Most of the 52 percent increase in production during this time was due to a 31 percent increase in yields from 1.57 to 2.05 tons per hectare. This substantial yield increase was largely due to increased use of chemical fertilizer, which grew from about 1,000 tons in 1956 to about 13,000 tons in 1973 (AIRD 1984).<sup>57</sup>

Yields remained at about two tons per hectare through 1971, but ranged from 1.6 to 1.8 tons per hectare throughout most of the rest of the 1970s and into the early 1980s (table 27). The 13 percent increase in production from 1970 to 1980 was due solely to a 29 percent increase in area harvested (averaging 2.2 percent per year). Several factors were responsible for the decline in yields and the slow growth in production. Shortages of foreign exchange, transport problems, and an inefficient distribution system (managed by parastatals) contributed to a decline in fertilizer use on rice from 11,000 tons of NPK in 1973 to 340 tons in 1980.<sup>58</sup> Moreover, much of the increase in area planted was on nonirrigated land with lower rice yields, and maintenance of existing irrigation systems was inadequate. Improved seed multiplication and distribution also was very limited.

Declining real rice prices played an important role in stagnating production as well. Official rice prices paid to producers fell by 33 percent in real terms from 1976 to 1982. AIRD (1984) estimated own-price elasticities of rice production of 0.2 in the short run and 0.4 to 0.9 in the long run, results implying that had real rice prices been kept at the 1976 level, production would have been at least 17.6 percent higher in 1982 (approximately 230,000 tons of milled rice, equal to

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56 The following discussion of rice production trends in the 1960s and 1970s is based on AIRD (1984).

57 Data on fertilizer use in Madagascar vary widely by the source of data. For example, data presented in Berthelemy (1988) are not consistent with the AIRD figures. The latter series is presented in table 29.

58 Other types of fertilizer also were used on paddy. Berthelemy (1988) shows 5,902 tons of fertilizer of all types used on paddy in 1980.

**Table 27 – Madagascar: Rice Production, Total Supply, and Prices, 1970-1987**

	Area <sup>a</sup>	Yield <sup>b</sup>	Production <sup>ac</sup>	Exports <sup>de</sup>	Imports <sup>d</sup>	Change in Stocks <sup>d</sup>	Total Supply <sup>d</sup>	Production per Capita <sup>d</sup>	Availability per Capita <sup>de</sup>	Imports/Availability	Real Consumer Prices <sup>g</sup>	Real Producer Price <sup>h</sup>
	1,000 Ha	Tons/Ha	1,000 Tons				Kgs		Percent	Index		
1970	935	1.99	1,865	68	20	0	1,002	155.7	148.6	2.0	146.1	80.2
1971	943	1.99	1,873	36	61	0	1,079	152.8	156.4	5.7	138.3	80.2
1972	1,008	1.67	1,687	26	49	0	972	134.4	137.7	5.0	131.2	76.0
1973	1,055	1.64	1,730	6	96	0	1,064	134.5	147.0	9.0	138.1	71.6
1974	1,134	1.63	1,844	7	129	5	1,155	139.9	155.7	11.2	184.6	97.8
1975	1,078	1.83	1,972	5	64	0	1,174	146.0	154.4	5.5	178.9	108.5
1976	1,064	1.92	2,043	4	72	5	1,213	147.4	155.5	5.9	170.4	120.5
1977	1,175	1.76	2,067	2	95	9	1,252	145.4	156.5	7.6	141.8	116.9
1978	1,133	1.70	1,922	1	153	7	1,236	131.6	150.4	12.4	131.2	109.7
1979	1,158	1.77	2,045	1	156	0	1,313	136.4	155.6	11.9	115.0	104.4
1980	1,178	1.79	2,109	1	177	2	1,361	136.9	156.9	13.0	100.0	100.0
1981	1,186	1.70	2,012	0	193	8	1,319	127.0	148.0	14.6	96.7	83.7
1982	1,188	1.66	1,970	0	351	66	1,402	120.9	152.9	25.0	121.7	81.1
1983	1,189	1.81	2,147	0	179	120	1,333	128.2	141.5	13.4	175.6	81.6

Table Continued

Table Continuation

1984	1,163	1.82	2,112	0	111	30	1,390	122.7	143.4	8.0	231.6	82.5
1985	1,180	1.84	2,177	0	106	0	1,361	123.0	136.7	7.8	291.4	85.2
1986	1,085	2.06	2,230	...	162 <sup>l</sup>	28	1,417	122.4	138.2	11.4 <sup>f</sup>	344.4	159.4
1987	1,098	2.09	2,300	...	94 <sup>j</sup>	37	1,388	122.8	131.7	6.8 <sup>f</sup>	212.9	120.4

Sources: Shuttleworth (1989), IMF (1988), MPARA (1989), Hirsch (1986), AIRD (1984), table 28.

<sup>a</sup> 1970-1985, Shuttleworth; 1986/87, IMF and MPARA.

<sup>b</sup> Tons/hectare of paddy.

<sup>c</sup> In thousands of tons of paddy.

<sup>d</sup> Rice equivalent, equal to 0.67 kilograms of milled rice per kilogram of paddy times loss rate of 16 percent. (Loss rate from Hirsch 1986).

<sup>e</sup> 1970-1985, Hirsch (1986); 1986/87, IMF(1988).

<sup>f</sup> Consumer price, calendar year basis, deflated by traditional basket CPI; 1970-1982 data are official consumer prices; 1983-1987 data are free market consumer prices.

<sup>g</sup> AIRD (1984), table 28.

<sup>h</sup> Producer price deflated by traditional CPI; 1970-1982 data are official producer prices for the crop year (for example the crop year  $t/t+1$  is shown as  $t+1$ ); 1983-1987 data are free market producer prices, annual average.

<sup>i</sup> 1970-1974, AIRD (1984), table 28.

<sup>j</sup> Net imports.

about two-thirds of the record level of imports in that year).<sup>59</sup> In hindsight it seems that the supply elasticities were overstated. From 1982 to 1987, real producer prices increased 48 percent, but per capita production increased by less than 2 percent, from 120.9 kilograms to 122.8 kilograms.<sup>60</sup>

Prices in the parallel market are likely to have followed a similar trend, as indicated by the small spreads between parallel and official prices at both the beginning and the end of the periods (table 28). There was almost no difference between average consumer prices reported from survey data in urban areas and the official consumer price in 1977 (suggesting only a small difference in producer prices between the parallel and official markets). In 1983, after private trade in rice was legalized, private market prices were only 13 percent higher than the official prices. If the spread between producer prices in the parallel and official markets was only 13 percent in 1982, then parallel market prices fell by about 20 percent from the mid-1970s to 1982.

Relative prices of paddy to fertilizer changed little during this period because the official price of fertilizer was controlled (table 29). Fertilizer was often unavailable to rice farmers at the official price, however, so the ratio of fertilizer to paddy prices may not reflect actual price incentives for most producers. The AIRD (1984) rice supply regressions (from which the above estimates of supply elasticities are taken) were estimated with fertilizer use on paddy as one of the explanatory variables. Thus the supply elasticities reflect a change in production in response to a change in price, holding fertilizer use constant. Changes in production in response to price changes are implicitly due to changes in other inputs, the most important of which is likely to be labor input for land preparation, weeding and other operations.

Producer prices in Madagascar during the 1970s and early 1980s were low in comparison with world prices as well (figure 9). Between 1976 and 1982, producer prices were on average 31 percent below border prices (calculated as the c.i.f. import price of rice adjusted for marketing and transport costs). Details

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<sup>59</sup> Real producer prices in 1976 were 44 percent higher than real producer prices in 1982,  $(116.9/81.1 - 1)$ . Using a long-run supply elasticity of 0.4, production would have been 17.6  $(= 63 \cdot 0.4)$  percent higher in 1982.

<sup>60</sup> Gross production increased by 17 percent from 1982 to 1987, implying an overall price elasticity of 0.35. This estimate, however, neglects changes in other factors influencing rice production, such as rural population growth.

Table 28 – Madagascar: Official and Private Markets for Rice, 1975-1988

Marketed Production <sup>a</sup>	Official Procurement <sup>b</sup>	Official Producer Prices <sup>cd</sup>		Private Producer Prices (Calendar Year) <sup>e</sup>	Consumer Prices		Ratio of Consumer to Producer Prices		Ratio of Private Consumer Prices to Official Consumption	
		(Crop Year)	(Calendar Year)		Official (Calendar Year) <sup>f</sup>	Private (Calendar Year) <sup>g</sup>	Official Market	Private Market		
1975	20-25	12	45.0	45.0	...	65.0		1.44	...	...
1976	20-25	12	52.5	50.0	...	65.0		1.30	...	...
1977	20-25	12	52.5	52.5	...	55.8	55.5/59.0 <sup>h</sup>	1.06	...	...
1978	20-25	10	52.5	52.5	...	55.0		1.05	...	...
1979	20-25	11	57.0	55.5	...	55.0		0.99	...	...
1980	20-25	11	64.5	62.0	...	56.5		0.91	...	...
1981	20	6	70.5	68.5	...	71.3		1.04	...	...
1982	23	5	90.0	83.5	...	118.3	143.5/205 <sup>h</sup>	1.42	...	...
1983	22	4/6	97.5	95.0	108.0	142.0	250.8	1.49	2.32	1.77
1984	...	7	112.5	107.5	120.0	190.0	295.2	1.77	2.46	1.55
1985	...	5	124.5	120.5	137.0	225.4	410.5	1.87	3.00	1.82
1986	...	...	150.0	141.5	293.0	251.2	555.6	1.78	1.90	2.21
1987	...	...	180.0	177.5	255.0	297.4	394.9	1.68	1.55	1.33
1988			225.0	...	...	...	...	...	...	...

Table Continued

*Table Continuation*

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**Sources:** AIRD (1984), Berthelemy (1988), Hirsch (1986), IMF (1988), Berg (1989), ODI (Forthcoming).

<sup>a</sup> *Percentage of production marketed (lower bound estimates); AIRD (1984, 12,13).*

<sup>b</sup> *Official procurement as a percentage of total production, 1975-83, AIRD; 1983-1985, Berthelemy (includes private procurement).*

<sup>c,d</sup> *Official producer prices: floor price, paddy ordinaire, 1975-1984, Hirsch; 1985-86, IMF; 1987, ODI. Crop year prices are higher than calendar year prices in most years since the official price has generally been raised at the start of the rice procurement season (April). Crop year is May/April. Data are for rice equivalent.*

<sup>e</sup> *Private producer prices: Berg. Data are for rice equivalent.*

<sup>f</sup> *Official consumer prices: 1975-1982, riz de consommation courante ceiling price, Hirsch; 1983, Berg; 1984-1987 for official distribution ordinary price, IMF.*

<sup>g</sup> *Parallel market consumer prices: 1983-87, IMF, free market ordinary rice. (For the 1983 calendar year, prices shown are for August to December only.) 1977 and 1982 figures from AIRD. Two prices are presented in each year: the unweighted average of four cities (Antananarivo, Toamasina, Mahajanga, Antsiranana) and the unweighted average of three cities (Antsirabe, Fianarantsoa, Toliary).*

<sup>h</sup> *Figures from 1977 and early 1982 are from the parallel market.*

**Table 29 – Madagascar: Fertilizer Imports, Consumption on Rice, and Prices, 1976-1987**

Year	Fertilizer Imports <sup>a</sup>	Fertilizer Consumed in Paddy Production <sup>b</sup>	NPK Price (11-22-16) <sup>c</sup>	Official Producer Price of Paddy <sup>d</sup>	Ratio of Paddy to Fertilizer Prices <sup>e</sup>	Private Paddy Price	Ratio of Private Paddy to Fertilizer Prices
	1,000 MT	1,000 MT	FMG/Kg	FMG/Kg		FMG/Kg	
1976	21.273	2.000	62	35.0	0.484	...	...
1977	19.053	2.997	62	35.0	0.565	...	...
1978	28.994	2.771	62	35.0	0.565	...	...
1979	22.375	2.886	62	38.0	0.565	...	...
1980	26.604	5.902	62	43.0	0.613	...	...
1981	14.558	4.974	62	47.0	0.694	...	...
1982	35.789	4.889	100	60.0	0.470	...	...
1983	20.004	13.193	140	65.0	0.429	72.0	0.514
1984	33.310	7.719	180	75.0	0.361	80.0	0.444
1985	24.321	...	180	83.0	0.417	91.3	0.507
1986	...	...	210	100.0	0.395	195.3	0.930
1987	...	...	280	120.0	0.357	170.0	0.607

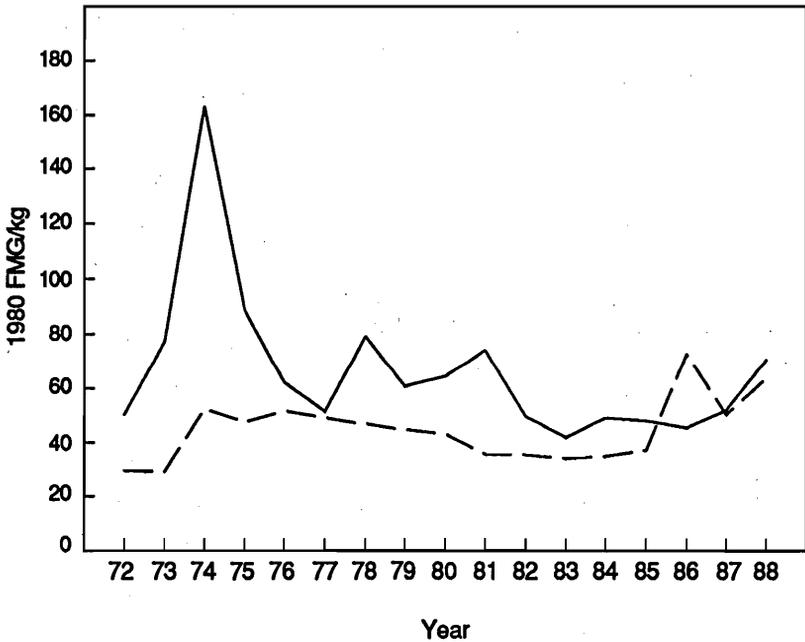
Sources: AIRD (1984), Berthelemy (1988), ODI (Forthcoming), IMF (1988), Berg (1989).

<sup>a</sup> INSRE data (Berthelemy).

<sup>b</sup> Data from FAO Fertilizer Project (Berthelemy).

<sup>c</sup> MPARA data (ODI).

**Figure 9 – Madagascar: Real Paddy Producer Prices, 1972 - 1988**



- Border price (Import parity producer price, first quarter)
- - - Producer price  
 1972 - 1982 = official price (crop year)  
 1983 - 1988 = free market price (calendar year)

*Sources: Table 37, authors' calculations.*

of these calculations are found in chapter 6. If producer prices were increased to border price levels throughout the period, output would have been higher by an average of 18 percent (about 240,000 tons of milled rice) by 1982, 40 percent greater than average annual imports over the period.<sup>61</sup>

Producer prices of paddy on the official market for rice were increased by 28 percent in nominal terms for the 1982/83 production year in an effort to improve incentives for production and increase government procurement of rice. More important, in May 1983, the government monopoly on rice marketing was ended and private trade in rice (which had been banned since the mid-1970s) was legalized. Various restrictions on traders, especially at the local level, continued to impede free marketing of rice, however. Berg (1989) reports numerous examples of local government restrictions on the private rice trade. For example, up until 1985, many local governments regarded the paddy price paid in the official market as a ceiling price for private traders as well.

Producer prices of paddy on the official market changed little in real terms from 1982 to 1985 and private market prices for paddy were only 12 to 14 percent higher than official floor prices (table 28). Producer prices in the private market finally rose substantially in 1986, increasing by 114 percent in nominal terms and 87 percent in real terms. In this year, rice producer prices exceeded import parity border prices for the first time in two decades (figure 9). Rice prices fell somewhat in 1987, but real producer prices were still 41 percent higher than in 1985. Because border prices of rice rose as a result of the exchange rate devaluation in 1987, producer prices were once again slightly below import parity in 1987 and 1988.<sup>62</sup> Farmers responded to the higher real prices with a 5.7 percent increase in production from 1985 to 1987 after a 10.5 percent increase in production from 1982 to 1985.

## RICE MARKETING AND CONSUMPTION

Beginning in the mid-1970s and lasting until the marketing reforms of 1983, various parastatal agencies sanctioned by the government enjoyed a monopoly

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<sup>61</sup> An average increase of 45 percent would be required to bring producer prices up to border price levels. The calculation assumes a long-run elasticity of supply of rice of 0.4.

<sup>62</sup> The producer price for 1988 shown in figure 9 is the average of monthly market prices from Antananarivo, Fianarantsoa, and Toamasina faritanies with no adjustment for transport costs to farmgate. If these transport costs are large (as they are for many farmers), the farmgate price in 1988 may have been significantly less than import parity border prices. Transport costs and market prices vary considerably by region as well, so the actual producer prices for 1983 to 1988 in a given region may have been somewhat higher or lower than those shown in figure 9.

on rice marketing as private trade in rice was officially banned. The Malagasy government, which set both the purchase price of paddy and the sales price of rice, attempted to improve the welfare of rice consumers by keeping official prices for consumers low. From 1975 to 1982 the consumer price of rice fell by 55 percent in real terms and were on average 39 percent below border prices (figure 10).

Official procurement accounted for 10 to 12 percent of domestic production from 1975 to 1980; the remainder of the 20 to 25 percent of marketed rice was sold in parallel markets. Domestic procurement proved insufficient to meet the quantities demanded at the subsidized prices in the official distribution network, however, and a growing gap between domestic procurement and quantities required for official distribution was met through increased government imports sold at subsidized prices. Between 1975 and 1980 the share of imports in total rice availability increased from 5.5 to 13.0 percent.

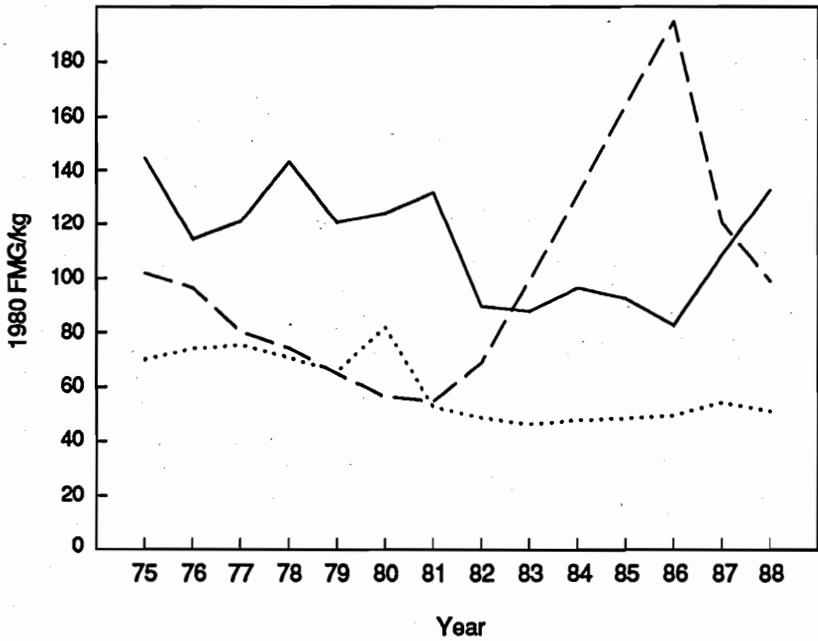
The marketing situation reached a crisis in the early 1980s. Government procurement of rice fell to only 6 percent of domestic production in 1981, in part due to a 16 percent drop in producer prices in real terms.<sup>63</sup> However, demand for rice through the official distribution system continued to increase as real rice prices for consumers fell. As a result the government imported 351,000 tons of rice in 1982 (equal to 24 percent of total rice availability) in order to meet the excess demand for rice.

In mid-1982 the official distribution price of rice to consumers was raised by 87 percent to FMG 140 per kilogram of milled rice (figure 11), narrowing the gap between the cost of imports to the government and the price at which rice was sold. In addition to the marketing reforms and increases in producer prices described above, limits on imports of rice by the government were also

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<sup>63</sup> Berthelemy (1988) presents regression results suggesting that shortages of consumer goods also contributed to the decline in farmers' rice sales to parastatals. The regressions do not include the price of rice in the parallel market as a variable, however, so the regression results are likely to be biased.

**Figure 10 – Real Consumer and Producer Prices of Rice, 1975 - 1988**

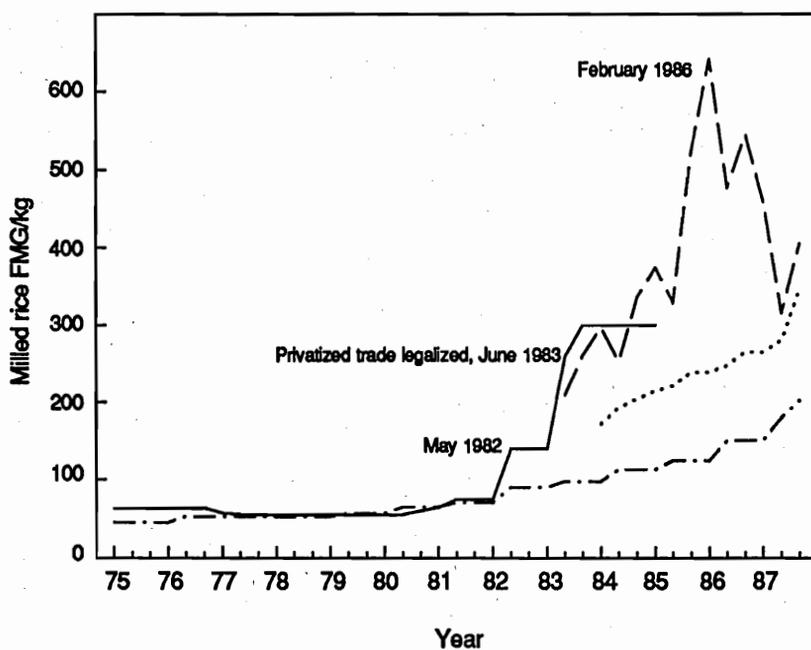


- Consumer price (import parity)
- - - Consumer price
- ..... Official producer price

**Sources:** Table 28, authors' calculations.

**Note:** All data are for the calendar year, deflated by traditional CPI.

**Figure 11 – Madagascar: Evolution of Nominal Rice Prices, 1975 - 1988**



- Ceiling price
- - Free market price
- ..... Official distribution price
- . - . Official producer price or floor price

**Sources:**

*Ceiling price: Hirsch (1986),*

*Free market and official distribution: IMF (1988),*

*Official producer price/floor price: ODI (forthcoming).*

**Note:** A milling rate of 2/3 is assumed.

negotiated with the IMF in order to reduce the balance of payments deficit.

Consumer rice prices in the official market were increased by 31 percent between 1982 and 1985. In the parallel market (now a legal private market) prices were on average 71 percent higher from 1983 to 1985. Moreover, consumers who were forced to switch from the official distribution network to open market purchases faced an even larger price increase.

A major reason for the increase in prices was the decline in the per capita availability of rice which fell from 152.9 kilograms in 1982 to 136.7 kilograms in 1985 as imports were sharply curtailed (table 27). The increase in consumer prices was exacerbated in late 1985 when, because of a lack of coordination between ministries, the government distribution system used up its quota of rice imports and was left without stocks of rice to sell on the market (figure 11).<sup>64</sup>

The sharp rise in consumer rice prices led the Malagasy government to insist on some form of rice buffer stock mechanism in its negotiations with the World Bank. The stock tampon, which went into place in late 1986, was not, however, a traditional buffer stock. Rather it consisted of pre-arranged import contracts along with lines of credit available so that additional imports could be arranged at short notice in an emergency.

## WELFARE EFFECTS OF THE RICE SUBSIDY

Estimates of the financial (as opposed to economic) cost of government subsidies on rice from 1974 to 1985 are given in table 30. The subsidy on domestic rice is calculated as the difference between the domestic sales price and the sum of the procurement price, milling costs, and marketing costs from farmgate to consumer. Similarly, the subsidy on imported rice is calculated as the difference between the sales price and the sum of the import price (c.i.f.) plus marketing costs to the consumer. Estimates of marketing costs are based on data from

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<sup>64</sup> The Ministry of Transportation, Food, and Tourism, responsible for arranging rice imports and distributing rice to consumers, continue to plan for (and supply) the previous year's ration of 400 grams per person per day through government distribution channels. The ration amount, however, was incompatible with the import quota negotiated by the Ministry of Finance and the entire import quota was used up by August. Domestic procurement policy further worsened the situation by stipulating a constant sales price of rice for the parastatals that procured rice domestically. Without an incentive to hold stocks, these parastatals disposed of their purchases soon after the harvest, so that there were no government-held stocks of domestically produced rice either (for further details, see Shuttleworth 1989).

AIRD (1984) for 1984 and extrapolated using the consumer price index (CPI).

Consumer subsidies on domestic rice increased markedly in 1977 when the sales price of rice was lowered from FMG 65 to FMG 55 per kilogram while the procurement price remained unchanged (figure 10, where consumer subsidy is shown as total subsidy). The implicit subsidy on domestic rice for consumers ranged from 40 to 54 percent of the sales price between 1977 and 1981. Subsidies on imported rice were even larger, varying from 50 to 112 percent in the same period.<sup>65</sup>

The large increase in the consumer price in 1982, a central part of the stabilization program, eliminated the marketing subsidy on domestically procured rice, and in combination with lower world rice prices reduced the subsidy on imported rice as well. On average, there was essentially no consumer subsidy on rice in 1984 or 1985. During its peak year of 1981, the consumer subsidy on rice reached FMG 18.5 billion, equivalent to 15 percent of government revenue. Total government budget expenditure for transfers and subsidies (which include other subsidies as well) were only FMG 12.3 billion in 1981, but this figure may not include losses of parastatals responsible for rice marketing.

The subsidy on rice was essentially a transfer from the government budget to consumers. The majority of consumers outside of the capital city, however, bought their rice on the private market. AIRD (1984) estimated that the average market price in 1983 was FMG 220 per kilogram, compared with the official distribution price of 140 FMG/kg. Consumers outside the distribution network gained no direct benefit from the subsidy and indeed faced private market prices somewhat higher than those that would have existed under a policy with the same amount of imports but with no subsidy. (Compared with a situation where the same amount of rice imports was sold in the open market, the rice subsidy was an implicit income transfer that increased the demand for rice by favored consumers. As a result total demand for rice was increased and the market-clearing price was higher.)

The 1982/83 MPARA survey indicated that the major beneficiaries of the rice subsidy were people living in the cities of Antananarivo, Toamasina, Mahajanga, and Fianarantsoa, where average per capita consumption of public distribution rice ranged from 131 to 159 kilograms (AIRD 1984). Per capita consumption of official distribution rice in the cities of Antsirabe, Fianarantsoa

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<sup>65</sup> Some of the imported rice was high quality (deluxe) rice and could be sold at a higher price than ordinary rice. Thus, the subsidy on sales of imported rice shown in table 30 may be overstated, especially for the years 1983 to 1985.

Table 30 – Madagascar: Rice Subsidies, 1974-1985

	Quantity Procured	Domestic Subsidy <sup>a</sup>	Domestic Subsidy	Imports <sup>b</sup>	Import Subsidy <sup>c</sup>	Import Subsidy	Total Subsidy <sup>d</sup>	Total Consumer Subsidy
	1,000 MT	Percent	Mn FMG	1,000 MT	Percent	Mn FMG	Percent	Mn FMG
1974	131.4	-10.0	-852	129.00	143.8	12,059	67.5	11,208
1975	137.0	3.8	336	64.00	52.3	2,176	18.8	2,512
1976	135.4	17.0	1,492	72.00	15.6	728	16.9	2,221
1977	137.1	39.6	2,982	95.00	50.0	2,612	44.6	5,593
1978	104.2	42.6	2,439	153.00	101.3	8,522	76.9	10,961
1979	131.5	57.0	4,125	156.00	76.4	6,556	65.9	10,681
1980	132.3	65.3	5,182	177.00	96.0	10,200	83.4	15,381
1981	68.3	54.1	2,771	193.00	111.5	16,137	98.8	18,908
1982	60.4	6.5	548	351.00	5.8	2,840	6.8	3,388
1983	74.4	18.2	1,920	179.00	17.3	4,394	22.3	6,313
1984	78.9	0.5	70	111.00	4.8	1,004	2.0	1,074
1985	61.9	-6.6	-920	106.00	5.5	1,323	0.9	403

Table Continued

*Table Continuation*

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**Sources:** AIRD (1984), Berthelemy (1988).

- <sup>a</sup> *Percentage consumer subsidy on sales price calculated as unit subsidy divided by sales price, where the unit subsidy equals (minus) the sales price less estimated marketing costs less the producer price.*
- <sup>b</sup> *Table 27.*
- <sup>c</sup> *Percentage subsidy on imports calculated as the unit import subsidy divided by the sales price of imports, where the unit subsidy is the sales price of imports less estimated marketing costs less the c.i.f. import price.*
- <sup>d</sup> *Percentage total subsidy calculated as the total subsidy divided by the value of sales at domestic sales prices. Total subsidy is the sum of total import subsidy and total domestic subsidy.*

and Toliary was less than half that of the capital city, Antananarivo. Rural households benefitted least from the distribution network. According to the 1982/83 MPARA survey of rural households in major rice-growing regions, average per capita consumption of official distribution rice was only 4 kilograms. In fact, the high average per capita consumption of official distribution rice in urban areas reported in the MPARA surveys in 1982/83 (121 kilograms per capita), accounts for essentially all the rice in the official distribution system, implying that average per capita consumption of official distribution rice by rural households was almost zero (table 31).

Although poor urban households benefitted from the subsidies through the official distribution system, higher income households were the greatest beneficiaries. As shown in table 32, in 1982/83 the poorest 25 percent of households in Antananarivo (in terms of per capita expenditure) purchased 105 kilograms of rice per person (90 percent of the rice they consumed) through the official distribution system. Purchases by the richest 25 percent of households, though, were even higher (150 kilograms of rice per person, equal to 75 percent of their rice consumption).

Table 31 also presents estimates of the evolution of per capita consumption of rice in urban and rural areas from 1980 to 1986/87. Data on rice consumption in major urban centers in 1980 are not available. Rice consumption per capita in secondary urban centers in 1980 was equal to per capita consumption of rice in major urban centers in 1982/83 while nationwide per capita consumption fell from 157 to 141 kilograms. Without further data, however, it is impossible to draw definite conclusions on the changes in regional rice consumption in the two years.

Per capita supplies of rice continued to fall after 1983. The MPARA surveys (AIRD 1984) indicate that urban consumption per capita fell by 15 percent between 1982/83 and 1986/87, as a sharp drop in consumption of official distribution rice (from 121 to 51 kilograms per capita) was not totally compensated for by increased purchases from the open market. Rural consumption per capita fell less dramatically, by only 5 percent, and MPARA survey results indicate that in some major rice-producing regions, rural per capita consumption rose slightly.

In terms of per capita rice consumption, low income households in Antananarivo suffered more than higher income households, as might be expected. Consumption of official distribution rice fell by about half between 1982/83 and 1986/87 for households in all expenditure quartiles, but the poorest households were unable to compensate fully for the loss with open market purchases of rice. Per capita consumption of rice for the poorest 25 percent of households fell by

**Table 31 – Madagascar: Rice Consumption, 1980, 1982/83, and 1986/87**

	Urban <sup>a</sup>	Rural		Rural Total <sup>c</sup>	Average <sup>d</sup>
		Rice Zone <sup>b</sup>	Nonrice Zone <sup>b</sup>		
Kilograms per Capita					
<b>1980</b>					
Officially distributed	...	...	...	...	35
Own produced	...	...	...	...	107
<b>Total<sup>e</sup></b>	<b>151<sup>f</sup></b>	...	...	<b>158</b>	<b>157</b>
<b>1982/83</b>					
Officially distributed	121	4	...	0	21
Own produced	15	136	...	118	100
<b>Total<sup>e</sup></b>	<b>151</b>	<b>153</b>	...	<b>140</b>	<b>141</b>
<b>1986/87</b>					
Officially distributed	51	0	0	...	...
Own produced	10	125	120	...	...
<b>Total<sup>e</sup></b>	<b>128</b>	<b>159</b>	<b>140</b>	<b>133</b>	<b>132</b>

**Sources:** BDE (1988b), World Bank (1989a), AIRD (1984).

<sup>a</sup> Urban figures for 1980 are for secondary urban centers, BDE (1987b). 1982/83 and 1986/87 are for large cities; data are from 1982/83 MPARA surveys (AIRD 1984) and World Bank (1989a).

<sup>b</sup> For 1982/83, rice zone includes all rural regions surveyed in the 1982/83 MPARA surveys; for 1986/87, rural rice zone includes all regions except the southwest coast and the central west coast, which are defined as the rural non-rice zone. Figures shown are unweighted averages of averages of subregions.

<sup>c</sup> Rural total calculated as residual given national total, urban total and rural-urban population distribution.

<sup>d</sup> Average figures derived from tables 27 and 30. In the calculations consumption is assumed to equal availability.

<sup>e</sup> Totals include sources not shown in table.

<sup>f</sup> Data for secondary urban centers.

**Table 32 – Madagascar: Rice Consumption in Antananarivo, by Income Group, 1982/83 and 1986/87**

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile	Average
Kilograms per Person					
<b>1982/83</b>					
Consumption by source					
Official distribution	105	135	144	150	132
Market	3	6	10	26	10
Own production	8	12	20	25	16
<b>Total</b>	<b>116</b>	<b>153</b>	<b>174</b>	<b>201</b>	<b>157</b>
<b>1986/87</b>					
Consumption by source					
Official distribution	49	68	67	82	64
Market	30	45	54	82	51
Own production	1	9	14	22	11
<b>Total</b>	<b>80</b>	<b>122</b>	<b>136</b>	<b>186</b>	<b>126</b>
<b>Percent Change in Consumption 1982/83 to 1986/87</b>					
Official distribution	-53	-50	-53	-45	-52
<b>Total</b>	<b>-31</b>	<b>-20</b>	<b>-22</b>	<b>-7</b>	<b>-20</b>

**Source:** World Bank (1989a).

31 percent while per capita consumption of rice for the richest 25 percent fell by only 7 percent (table 32). Thus the data show that the rice subsidy did benefit poor urban households (and the loss of the subsidy significantly reduced their welfare), but a large share of the subsidized rice went to higher income urban households.

## **6. Macroeconomic and Sectoral Policy Effects on the Poor**

While the effects of changes in rice policies on various household groups are generally straightforward, at least conceptually, the effects of the range of macroeconomic and sectoral policies adopted by Madagascar is exceedingly complex. Tracing the full impact of these policies to the household level would require a complete macro- to microeconomic modeling framework. This chapter has a more limited goal: to highlight the major linkages between the macroeconomy and the economic welfare of poor households and to discuss in broad terms the major effects of stabilization and structural adjustment policies in Madagascar. The analysis focuses on the exchange rate and trade policies (affecting households through producer and consumer prices and levels of employment) and the pattern of government expenditure.

Exchange rate policies most directly affect the poor by influencing output prices of (mostly agricultural) goods produced by the poor and the consumer prices of goods purchased by the poor. But sectoral and commodity-specific trade policies also influence prices and may prevent changes in exchange rates from leading to corresponding changes in domestic prices of traded goods. Thus a simple framework of traded and nontraded goods that omits trade policy is inadequate to explain the effects of structural adjustment policies. A third, less direct channel by which structural adjustment affects the poor is through changes in industrial output and hence the demand for labor in urban areas. Finally, government expenditure helps determine aggregate demand and thereby influences prices and output. The pattern of expenditure, particularly expenditure on health, education, subsidies, and personnel, can have a significant effect on the welfare of the poor.

### **EFFECTS OF STRUCTURAL ADJUSTMENT ON AGRICULTURAL PRODUCER PRICES**

Until the marketing reforms of the mid-1980s, Madagascar's domestic agricultural price and trade policies served to break the direct link between world prices and domestic producer prices for major export commodities and rice. Domestic producers of coffee, cloves, and vanilla were taxed through the setting of domestic producer prices below export parity levels. Part of the

difference between border and producer prices was due to explicit export taxes and levies for the stabilization funds; the remainder represented income for various parastatals given responsibility for marketing.

As shown by Krueger, Schiff, and Valdes (1988), the direct effect of agricultural trade and price policies on producer price incentives (equal to the nominal rate of protection) is measured by the difference between actual producer prices and border prices (adjusted for transport and marketing costs) expressed as a percentage of the border price:

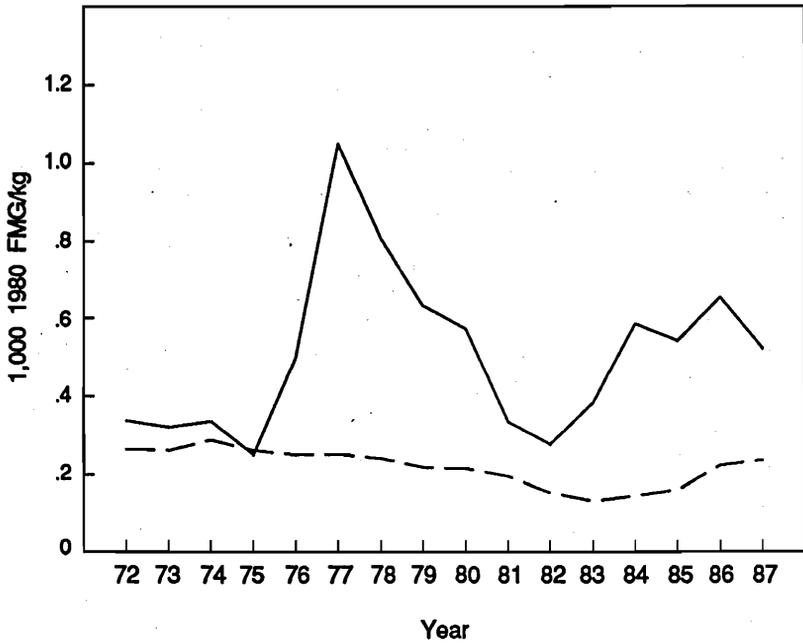
$$[(P_i/P_{na}) - (P_i'/P_{na})] / (P_i'/P_{na}) = (P_i - P_i')/P_i'$$

where  $P_i$  is the producer price of good  $i$ ,  $P_i'$  is the border price of good  $i$  (at the official exchange rate), and  $P_{na}$  is the price index of nonagricultural goods.

Coffee producers were heavily taxed throughout the period from 1972 to 1987 (the direct effect averaged -50 percent), but there were important variations in both real producer prices and the size of the direct effects (table 33). In the early 1970s, world prices were relatively low and the level of taxation on coffee producers was small. Domestic producer prices were on average only 36 percent below export parity prices from 1972 to 1975. When world coffee prices rose sharply in 1976 and 1977, domestic producer prices were not increased significantly (figure 12), so that the direct effect fell to -76 percent (ie, producers received only 24 percent of the border price). The minimal changes in coffee producer prices in the early 1980s may be attributed in part to the government's attempt to maintain revenues from coffee export taxes in the face of the subsequent fall in the world price of coffee. Given high domestic inflation, real producer prices fell by 45 percent between 1978 and 1983. The depreciation of the Malagasy franc did not directly affect producer prices for coffee, but the exchange rate devaluations made it possible to raise domestic producer prices of coffee without reducing government export tax revenues. Real coffee prices did not increase substantially until 1986, however, and still remained slightly below the levels of the 1970s in 1987.

Rates of taxation (negative protection) for vanilla and cloves were even larger, averaging 71 percent, for each commodity (tables 34 and 35). Exchange rate devaluations and movements in world prices changed the level of export parity prices measured in domestic currency, but domestic prices of vanilla and cloves fell in real terms in the 1980s.

Thus, producers of the major export crops gained little from the depreciation of the real exchange rate until 1986 when coffee producer prices were increased. Up until that point, the depreciation of the real exchange rate from 1982 to 1986 translated into increases in export tax revenues rather than increases in producer

**Figure 12 – Madagascar: Real Coffee Prices, 1972 - 1987**

—— Border price  
- - - Producer price

Source: Table 33.

Table 33 – Madagascar: Policy Effects on Coffee Producer Prices, 1972-1987

	PI World <sup>a</sup>	PI <sup>b</sup>	PI* <sup>c</sup>	PI <sup>d</sup>	PI/Pna <sup>e</sup>	PI'/Pna <sup>f</sup>	PI*/Pna* <sup>g</sup>	Direct Effect <sup>h</sup>	Total Effect <sup>i</sup>
	\$/MT		FMG/Kg			Indices		Percent	
1972	820	171	307	135	265	336	749	-21.2	-64.6
1973	914	166	275	135	261	320	655	-18.7	-60.2
1974	991	192	307	165	288	335	596	-14.2	-51.8
1975	974	159	284	165	261	251	539	4.0	-51.7
1976	1,625	336	529	170	251	496	923	-49.4	-72.8
1977	3,281	752	1,092	180	252	1,051	1,767	-76.1	-85.8
1978	2,939	606	924	180	240	806	1,413	-70.3	-83.0
1979	2,838	538	941	185	217	632	1,212	-65.6	-82.0
1980	3,073	572	1,036	215	215	572	1,126	-62.4	-80.9
1981	1,950	428	759	250	195	334	642	-41.6	-69.7
1982	1,731	471	839	260	153	277	551	-44.9	-72.3
1983	2,243	806	1,304	280	132	381	690	-65.3	-80.8
1984	2,623	1,337	1,903	330	144	584	930	-75.32	-84.5
1985	2,303	1,332	2,140	395	160	541	1,012	-70.3	-84.2
1986	2,922	1,754	2,717	600	223	653	1,213	-65.8	-81.6
1987	1,892	1,768	2,404	800	236	521	772	-54.8	-69.5

Table Continued

Table Continuation

1972-75	925	172	293	150	268	310.6	635	-12.5	-57.1
1976-80	2,751	561	904	186	235	711.3	1,288	-64.7	-80.9
1981-85	2,170	875	1,389	303	157	423.3	765	-59.5	-78.3
1986-87	2,407	1,761	2,561	700	229	586.7	992	-60.3	-75.5
1972-87	2,070	712	1,110	278	218	505.5	924	-49.5	-73.5

Sources: World Bank (1980,1984) and IMF (1988).

- <sup>a</sup> World coffee price is derived as the quotient of the FMG value (FOB Toamisina) of coffee exports and export volume at annual average exchange rates.
- <sup>b</sup>  $P_i$ , the border price of coffee at official exchange rates, is equal to FOB Toamisina less marketing and transportation costs from farmgate to port.
- <sup>c</sup>  $P_i^*$  is the border price of coffee at equilibrium exchange rates.
- <sup>d</sup>  $P_i$  is the domestic producer price of coffee.
- <sup>e</sup>  $P_i/P_{na}$  is the domestic coffee producer price deflated by the price index of nonagricultural output at the official exchange rate.
- <sup>f</sup>  $P_i^*/P_{na}$  is  $P_i^*$  discounted by the price index of nonagricultural output at the official exchange rate.
- <sup>g</sup>  $P_i^*/P_{na}^*$  is  $P_i^*$  discounted by the nonagriculture output price index valued at an equilibrium exchange rate and with free trade.
- <sup>h</sup> The direct effect is the nominal protection rate and measures the difference between the border price and the domestic producer price.
- <sup>i</sup> The total effect is the sum of the direct effect and the indirect effect, the latter being the effect of the exchange rate and overall trade policy. The total effect measures the percentage difference between  $P_i^*/P_{na}^*$  and  $P_i/P_{na}$ .

Table 34 – Madagascar: Policy Effects on Vanilla Producer Prices, 1972-1987

	Pi World <sup>a</sup>	Pj <sup>b</sup>	Pj* <sup>c</sup>	Pi <sup>d</sup>	Pi/Pna <sup>e</sup>	Pi'/Pna <sup>f</sup>	Pi*/Pna* <sup>g</sup>	Direct Effect <sup>h</sup>	Total Effect <sup>i</sup>
	\$/MT		FMG/Kg			Indices		Percent	
1972	12.77	2,509	4,628	1,012	1,985	4,923	11,273	-59.7	-82.4
1973	13.81	2,320	3,962	1,012	1,954	4,479	9,452	-56.4	-79.3
1974	13.74	2,381	3,966	1,104	1,924	4,151	7,710	-53.6	-75.0
1975	16.13	2,454	4,536	1,150	1,816	3,876	8,598	-53.1	-78.9
1976	17.99	3,246	5,388	1,150	1,699	4,796	9,401	-64.6	-81.9
1977	20.80	4,024	6,177	1,288	1,800	5,623	9,997	-68.0	-82.0
1978	26.26	4,768	7,614	1,518	2,021	6,350	11,642	-68.2	-82.6
1979	33.50	5,806	10,562	2,300	2,700	6,816	13,603	-60.4	-80.2
1980	45.54	8,062	14,950	2,760	2,760	8,062	16,236	-65.8	-83.0
1981	44.73	10,118	17,707	3,220	2,509	7,885	14,981	-68.2	-83.3
1982	53.31	15,962	27,288	3,220	1,892	9,379	17,934	-79.9	-89.5
1983	56.73	21,219	33,810	4,600	2,174	10,030	17,895	-78.3	-87.9
1984	63.40	33,039	46,723	4,600	2,008	14,425	22,829	-86.1	-91.2
1985	69.30	42,020	66,349	4,600	1,868	17,061	31,382	-89.1	-94.1
1986	61.72	37,291	57,625	5,060	1,882	13,873	25,718	-86.4	-92.7
1987	69.06	68,719	91,936	5,520	1,626	20,242	29,508	-92.0	-94.5

Table Continued

Table Continuation

1972-75	14.12	2,416	4,273	1,070	1,920	4,357	9,258	-55.7	-78.9
1976-80	28.82	5,181	8,939	1,803	2,196	4,325	8,790	-56.9	-78.8
1981-85	57.49	24,471	38,376	4,048	2,090	11,756	21,004	-80.3	-89.2
1986-87	65.39	53,005	74,781	5,290	1,754	17,057	27,613	-89.2	-93.6
1972-87	38.67	16,496	25,201	2,757	2,039	8,873	16,135	-70.6	-84.9

Sources: World Bank (1980,1984) and IMF (1988).

- <sup>a</sup> World vanilla price is derived as the quotient of the FMG value (f.o.b. Toamisina) of vanilla exports and export volume at annual average exchange rates.
- <sup>b</sup>  $P_j'$ , the border price of vanilla at official exchange rates, is equal to f.o.b. Toamisina less marketing and transportation costs from farmgate to port.
- <sup>c</sup>  $P_j^*$  is the border price of vanilla at equilibrium exchange rates.
- <sup>d</sup>  $P_i$  is the domestic producer price of vanilla.
- <sup>e</sup>  $P_i/P_{na}$  is the domestic vanilla producer price deflated by the price index of nonagricultural output at the official exchange rate.
- <sup>f</sup>  $P_j'/P_{na}$  is  $P_j'$  discounted by the price index of nonagricultural output at the official exchange rate.
- <sup>g</sup>  $P_j^*/P_{na}^*$  is  $P_j^*$  discounted by the nonagriculture output price index valued at an equilibrium exchange rate and with free trade.
- <sup>h</sup> The direct effect is the nominal protection rate and measures the difference between the border price and the domestic producer price.
- <sup>i</sup> The total effect is the sum of the direct effect and the indirect effect, the latter being the effect of the exchange rate and overall trade policy. The total effect measures the percentage difference between  $P_j^*/P_{na}^*$  and  $P_i/P_{na}$ .

Table 35 – Madagascar: Policy Effects on Clove Producer Prices, 1972-1987

	PI World <sup>a</sup>	PI <sup>b</sup>	PI* <sup>c</sup>	PI <sup>d</sup>	PI/Pna <sup>e</sup>	PI*/Pna <sup>f</sup>	PI*/Pna* <sup>g</sup>	Direct Effect <sup>h</sup>	Total Effect <sup>i</sup>
	\$/Kg		FMG/Kg			Indices		Percent	
1972	2.72	618	1,070	275	539	1,212	2,606	-55.5	-79.3
1973	2.92	576	923	280	541	1,112	2,202	-51.4	-75.5
1974	3.28	700	1,079	280	488	1,220	2,097	-60.0	-76.7
1975	3.64	682	1,151	320	505	1,076	2,181	-53.1	-76.8
1976	4.09	876	1,363	320	473	1,294	2,378	-63.5	-80.1
1977	5.58	1,264	1,842	320	447	1,767	2,981	-74.7	-85.0
1978	5.16	1,052	1,611	340	453	1,401	2,463	-67.7	-81.6
1979	5.22	982	1,723	340	399	1,152	2,219	-65.4	-82.0
1980	7.15	1,358	2,438	385	385	1,358	2,648	-71.6	-85.5
1981	8.39	2,082	3,507	395	308	1,623	2,967	-81.0	-89.6
1982	7.50	2,363	3,957	430	253	1,388	2,601	-81.8	-90.3
1983	8.26	3,245	5,079	435	206	1,534	2,688	-86.6	-92.4
1984	5.81	3,005	4,259	435	190	1,312	2,081	-85.5	-90.9
1985	3.06	1,650	2,725	435	177	670	1,289	-73.6	-86.3
1986	3.19	1,722	2,773	435	162	641	1,237	-74.7	-86.9
1987	3.33	3,062	4,182	525	155	902	1,343	-82.9	-88.5

Table Continued

Table Continuation

1972-75	3.14	644	1,056	289	518	1,155	2,272	-55.0	-77.1
1976-80	5.44	1,106	1,795	341	431	1,394	2,538	-68.6	-82.8
1981-85	6.61	2,469	3,905	426	227	1,305	2,325	-81.7	-89.9
1986-87	3.26	2,392	3,477	480	158	771	1,290	-78.8	-87.7
1972-87	4.96	1,577	2,480	372	355	1,229	2,249	-70.6	-84.2

Sources: World Bank (1980,1984) and IMF (1988).

- <sup>a</sup> World clove price is derived as the quotient of the FMG value (FOB Toamisina) of clove exports and export volume at annual average exchange rates.
- <sup>b</sup>  $P_i'$ , the border price of clove at official exchange rates, is equal to FOB Toamisina less marketing and transportation costs from farmgate to port.
- <sup>c</sup>  $P_i^*$  is the border price of clove at equilibrium exchange rates.
- <sup>d</sup>  $P_i$  is the domestic producer price of clove.
- <sup>e</sup>  $P_i/P_{na}$  is the domestic clove producer price deflated by the price index of nonagricultural output at the official exchange rate.
- <sup>f</sup>  $P_i'/P_{na}$  is  $P_i'$  discounted by the price index of nonagricultural output at the official exchange rate.
- <sup>g</sup>  $P_i^*/P_{na}^*$  is  $P_i^*$  discounted by the nonagricultural output price index valued at an equilibrium exchange rate and with free trade.
- <sup>h</sup> The direct effect is the nominal protection rate and measures the difference between the border price and the domestic producer price.
- <sup>i</sup> The total effect is the sum of the direct effect and the indirect effect, the latter being the effect of the exchange rate and overall trade policy. The total effect measures the percentage difference between  $P_i^*/P_{na}^*$  and  $P_i/P_{na}$ .

prices. The liberalization of export crop marketing in 1988 may forge a direct link between domestic producer prices and exchange rate determined border prices if export tax rates are not increased in step with changes in border prices.

Besides reflecting the direct effects of agricultural trade and pricing policies, prices of agricultural traded commodities are also affected by movements in the real exchange rate caused by commercial policies of other sectors and other macroeconomic policies. Import taxes and quotas on industrial and consumer goods raise domestic prices of importable goods, thereby encouraging a shift in demand away from importables to nontraded goods, and a shift in productive resources from nontraded goods to importables. The result is an increase in the price of nontraded goods relative to the price of exportables (and importable goods for which there are no tariffs or quantitative restrictions). Thus the imposition of import taxes and quotas, by leading to an increase in the price of nontraded goods, causes an appreciation of the real exchange rate (the ratio of the price of nontraded goods to the price of traded goods increases).

Many agricultural goods are tradable and, in general, the combination of protective trade policies for industrial goods and the accompanying appreciation of the real exchange rate result in an increase in the price of nonagricultural goods relative to the price of agricultural goods. Lower relative prices for agricultural goods reduce incentives for agricultural production and lower real farmer incomes. In this way, overall commercial policy and other policies affecting the real exchange rate and the price of nonagricultural goods have important effects on agriculture.

Again, following Krueger, Schiff, and Valdes (1988), the total effects of policy on agricultural price incentives can be defined as the combination of the direct effects of agricultural trade and price policies and the indirect effects of economywide commercial and macroeconomic policies affecting the real exchange rate. Defining  $P_i^*$  as the border price of good  $i$  evaluated at the equilibrium real exchange rate<sup>66</sup> and  $P_{na}^*$  as the price index of nonagricultural goods in the absence of trade taxes and trade barriers, evaluated at the equilibrium exchange rate, the total (direct plus indirect) effect equals:

$$[(P_i/P_{na}) - (P_i^*/P_{na}^*)] / (P_i^*/P_{na}^*)$$

Calculating the real exchange rate distortion resulting from commercial

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<sup>66</sup> The equilibrium real exchange rate is the real exchange rate that would prevail in the absence of trade restrictions on imports and exports assuming no change in long-term sustainable foreign capital flows.

policies requires estimates of the effects of commercial policies on the nominal prices of importables and exportables. In Madagascar, both import taxes and import quotas have been used to limit the quantity of imports and raise their domestic price. The effect of commercial policy (both import tariffs and import quotas) on the domestic price of importables is measured by the implicit tariff, calculated as:

$$1 + tm = P_m / P_m'$$

where  $P_m$  is an index of the domestic prices of importables,  $P_m'$  is an index of the border prices of importables and  $tm$  is the implicit tariff. Average import taxes and implicit import tariffs in Madagascar for 1972 to 1987 are given in table 36. The implicit import tariff series is constructed using an educated guess at the implicit tariff in 1984 and price data of the domestic price of imported goods in Madagascar.<sup>67</sup> From 1977 to 1984, the average implicit tariff changed little, suggesting that the combination of import quotas and import taxes provided approximately the same level of protection to importables on average. The rise in the implicit tariff in 1985 and 1986 suggests that import quotas were tightened relative to domestic demand for importables (the average import tax was little changed). Given that the indices of domestic prices and world prices of importables are based on a small number of commodities and that the indices do not contain the same commodities or weights, the results can be taken only as a rough indicator of the change in the implicit tariff.

By use of the estimate of the implicit tariff and average export tax the

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<sup>67</sup> No detailed studies estimating the level of the implicit tariff are available. The above estimate approximates a World Bank estimate for 1984. Given the estimate of the implicit tariff for 1984, the implicit tariff in year  $t$  ( $tm(t)$ ), was calculated using the following formula:

$$1 + tm(t) = [P_m(t)/P_m'(t)] / [P_m(1984)/P_m'(1984)] \cdot [1 + tm(1984)],$$

where  $P_m(t)$  is the price index of the domestic price of importables and  $P_m'(t)$  is the price index of the border price of importables.

Table 36 – Madagascar: Equilibrium Exchange Rates, 1972-1987

	Average Import Tariff <sup>a</sup>	Implicit Import Tariff <sup>b</sup> (tm)	Average Export Tax <sup>c</sup> (tx)	Trade Deficit <sup>d</sup> (B)	Current Account Imbalance <sup>e</sup> (Q1)	Exchange Rate <sup>f</sup> (E)	Real Equi- librium Exchange Rate <sup>g</sup> E*	Ratio of Equi- librium Exchange to Nominal Ex- change Rate
1972	0.24	2.410	0.06	9,891	71,860	252	418	1.657
1973	0.25	2.105	0.06	404	59,687	223	342	1.533
1974	0.18	1.128	0.05	8,753	69,678	241	356	1.479
1975	0.18	1.944	0.09	13,412	100,056	214	343	1.602
1976	0.22	1.609	0.06	2,399	82,243	239	358	1.498
1977	0.23	1.319	0.19	2,290	87,017	246	349	1.421
1978	0.24	1.346	0.34	22,586	103,824	226	334	1.480
1979	0.23	1.271	0.34	85,774	168,596	213	355	1.667
1980	0.22	1.259	0.28	108,119	198,391	211	363	1.716
1981	0.21	1.136	0.29	74,258	152,348	272	441	1.624
1982	0.21	1.335	0.35	75,853	180,878	350	562	1.608
1983	0.30	1.209	0.39	61,103	165,948	430	652	1.516
1984	0.28	1.000	0.40	41,690	169,460	577	792	1.374
1985	0.37	1.545	0.42	75,345	249,115	662	1,014	1.530
1986	0.36	1.729	0.38	43,793	270,148	676	1,006	1.487
1987	0.38	0.750	0.42	77,108	231,817	1,069	1,405	1.314

Table Continued.

Table Continuation

Sources: IMF (1988), World Bank (1980, 1986), Pryor (1988).

- <sup>a</sup> Average import tariff: import tax revenues divided by value of merchandise imports (c.i.f.).
- <sup>b</sup> Implicit import tariff: value in 1984 assumed to equal 1.00 (see text). 1987 value assumes that real effective exchange rate for imports in 1987 is the same value as in 1986.
- <sup>c</sup> Average export tax: includes Fonds National Unique de Perequation (FNUP) taxes after 1976.
- <sup>d</sup> Trade deficit: merchandise imports (c.i.f.) less merchandise exports (f.o.b.);  $m-x$ .
- <sup>e</sup> Current account imbalance due to trade taxes and quotas =  $[tm/(1+tm)] \bullet m \bullet nd - [tx/(1-tx)] \bullet (x) \bullet ex$ ; where  $tm$  = implicit  $tm$  in col. "Implicit Import Tariff",  $nd$  is the price elasticity of import demand, and  $ex$  is the elasticity of export supply.
- <sup>f</sup> Nominal exchange rate ( $E$ ).
- <sup>g</sup> Equilibrium exchange rate ( $E^*$ ) =  $E \bullet [(B + Q1)/(m \bullet nd + (x) \bullet ex + 1)]$ .

Table 37 – Madagascar: Policy Effects on Paddy Producer Prices, 1972-1987

	World Price <sup>a</sup>	Pi <sup>b</sup>	Pi*	Pi <sup>c</sup>	Pi/Pna	Pi/Pna	Pi*/Pna*	Direct Effect	Total Effect
	\$/MT	FMG/Kg			Indices			Percent	
1972	136.3	25.6	40.7	15.0	29.4	50.2	99.2	-41.3	-70.3
1973	240.3	40.0	59.1	15.0	29.0	77.1	141.0	-62.5	-79.5
1974	527.8	93.5	134.2	30.0	52.3	162.9	261.0	-67.9	-80.0
1975	354.5	56.1	86.7	30.0	47.4	88.6	164.4	-46.5	-71.2
1976	237.5	41.9	60.9	35.0	51.7	62.0	106.2	-16.5	-51.3
1977	240.8	43.9	60.6	35.0	48.9	61.4	98.2	-20.3	-50.2
1978	354.8	59.4	85.2	35.0	46.6	79.2	130.3	-41.1	-64.2
1979	327.6	51.7	82.9	38.0	44.6	60.7	106.8	-26.6	-58.2
1980	411.1	64.3	106.0	43.0	43.0	64.3	115.1	-33.2	-62.6
1981	477.0	95.1	149.4	47.0	36.6	74.1	126.4	-50.6	-71.0
1982	326.5	84.2	130.7	60.0	35.3	49.5	85.9	-28.7	-58.9
1983	276.5	88.4	129.5	72.0	34.0	41.8	68.5	-18.5	-50.3
1984	263.5	112.0	150.1	80.0	34.9	48.9	73.4	-28.6	-52.4
1985	237.6	117.8	173.7	91.3	37.1	47.8	82.2	-22.5	-54.9
1986	242.5	121.8	175.3	195.3	72.7	45.3	78.2	60.4	-7.1
1987	255.9	175.7	226.6	170.0	50.1	51.8	72.7	-3.3	-31.2

Table Continued

Table Continuation

1972-75	314.7	53.8	80.2	22.5	39.5	94.7	166.4	-54.6	-75.2
1976-80	314.4	52.3	79.1	37.2	47.0	65.5	111.3	-27.5	-57.3
1981-85	316.2	99.5	146.7	70.1	35.6	52.4	87.3	-29.8	-57.5
1986-87	234.1	148.8	201.0	182.7	61.4	48.5	75.5	28.5	-19.1
1972-87	305.0	79.5	115.7	62.0	43.3	66.6	113.1	-28.0	-57.1

Sources: AIRD (1984), BDE (1988).

Note: See table 33 for methodology and definitions.

<sup>a</sup> CIF Toamasina equal to FOB Bangkok 5% Broken, first quarter average, less 20 percent quality discount, plus shipping.

<sup>b</sup> Border price at farmgate equal to CIF Toamasina rice price, converted to FMG using annual average exchange rate and adjusted for milling, marketing and transport costs to farmgate.

<sup>c</sup> Second trimester official producer prices for 1970-82. Average calendar year private market prices 1983-87.

appreciation of the real exchange rate resulting from trade policies may be calculated as the change in the real exchange rate required to reduce the trade deficit to zero if all trade taxes and quotas are eliminated. Elasticities of demand for imports and exports are assumed to equal 2.0 and 0.5, respectively.<sup>68</sup> The calculations suggest that trade and macroeconomic policies resulted in an average appreciation of the real exchange rate of 62 percent from 1978 to 1982 and 48 percent in the 1983 to 1986 period (table 36).<sup>69</sup> Including the indirect effect of overall trade policy increases the spread between domestic and border prices for the major export commodities. The total effect (direct plus indirect effects) for coffee averaged 79 percent over the 1976 to 1987 period (table 33). (In other words, coffee producers received only 21 percent of the free trade border price for their output.) Total effects for vanilla and cloves each averaged 87 percent over the 1976 to 1987 period (tables 34 and 35).

Domestic producer prices for paddy also were set without reference to border prices and were kept substantially below import parity levels (table 37; see also figure 9). Direct and total effects averaged -38 and -64 percent, respectively, between 1975 and 1982. The government was able to maintain this discrepancy between world and official domestic prices by controlling the quantity of rice imports and regulating domestic marketing. Depreciation of the real exchange rate did not cause the increase in real domestic rice prices, but without increases in consumer prices, the higher cost of imported rice would have required larger subsidies. And without an increase in official producer prices, the government would have been forced to rely on imports for a larger share of its rice supply. Real paddy producer prices rose slightly in the first few years after rice marketing was liberalized, but the 1985 price was still 14 percent less than the 1980 price in real terms. Only in 1986, when the domestic paddy price doubled in nominal terms, did the real paddy producer price exceed the levels of the 1970s.

Given the minimal effect of depreciation of the real exchange rate on the

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<sup>68</sup> The relatively low elasticity of supply of exports (the Krueger, Schiff, and Valdes 1988 study assumed a value of 1.0 for countries for which no empirical estimates were available) models a relatively small response in the value of exports (measured in foreign currency) to a change in the domestic price of exportables. The assumed small response in export earnings reflects 1) the inelastic supply of coffee and other major exports and 2) the inelastic world import demand for cloves, vanilla, and other products that implies a significant decline in world prices if Madagascar's exports of these products is increased.

<sup>69</sup> Because of the methodology used in table 36, the change in the nominal equilibrium exchange rate is the same as the change in the real rates. (Dorosh and Valdes 1990).

major tradable agricultural commodities, it is not surprising that production of these commodities has not increased substantially in the 80s. Between 1982 and 1987, coffee production increased by only 1 percent; vanilla production increased by 13 percent despite a decline in real producer prices. Clove production stagnated; average output from 1983 to 1987 was approximately equal to the 1982 level. The supply response was somewhat more favorable for rice: rice production increased by 10.5 percent between 1982 and 1985 while real rice prices increased by 5.1 percent.

Besides the minimal improvement in price incentives before 1986, other factors have contributed to the lack of supply response. Coffee, cloves, and vanilla are perennials requiring several years (3-4 for coffee) between planting and the first harvest, so no increase in production from increased area planted is possible in the first few years. Additional yield would depend mostly on increased use of fertilizer and pesticides, inputs which remain in short supply. Moreover, the world export market is limited, especially for cloves and vanilla, so that large increases in domestic production could result in significant declines in prices. For rice, other technical constraints limit the supply response in the short run. Improvements in water control and increases in irrigated area most often require large investments. Shortages of fertilizer affect rice cultivation as well, but more important is the farmer's lack of improved fertilizer-responsive varieties.

Producers of other export commodities (such as shellfish) may have benefitted more from the devaluations. The extent to which low-income producers may have benefitted is unknown. New export industries may spring up as a result of the change in export incentives, but in the short run it appears that poor households who cultivate export crops did not reap significant short-term benefits from the devaluations of the exchange rate.

## PRODUCER INCOMES

Data on the evolution of market prices for commodities can be combined with data on annual yields to provide a rough indicator of the real agricultural incomes over time. Data on average land holdings, crop distributions and yields from the 1984/85 agricultural census for Antananarivo faritany (representing farms on the high plateau), Toamasina faritany (representing farms along the east coast of Madagascar) and Toliary faritany (representing farms in the south-west) are used as a baseline (tables 38, 39, and 40).

In Antananarivo faritany, average farm size was only 1.045 hectares, of which 0.606 hectares was planted to irrigated rice. Average yields from the annual MPARA (1987b) crop production estimates, and estimates of farm gate prices

Table 38 – Madagascar: Cropping Patterns of Traditional Farmers in Antananarivo Faritany, 1984/85

	Area Cultivated	Principal Crop <sup>a</sup>				Secondary Crop <sup>a</sup>				Average Area per Farm	
		Number of Parcels	Pure <sup>b</sup>	As-associated <sup>c</sup>	Mixed <sup>d</sup>	Total	Number of Parcels	As-associated <sup>c</sup>	Mixed <sup>d</sup>		Total
Hectares											
Rice <sup>e</sup>	223,765	...	...	...	...	...	...	...	...	...	0.677
Seed gardens	12,686	...	...	...	...	...	...	...	...	...	0.038
Irrigated	200,370	...	...	...	...	...	...	...	...	...	0.606
Nonirrigated	10,789	...	...	...	...	...	...	...	...	...	0.033
Cereals	44,444		16,107	15,364	421	31,892		248	12,304	12,552	...
Maize	23,925	147,066	9,318	7,715	378	17,411	30,419	241	6,273	6,514	0.072
Other	20,519	...	6,789	7,649	43	14,481	...	7	6,031	6,038	0.062
Roots and tubers	80,159		48,485	21,642	839	70,966		169	9,024	9,193	...
Cassava	46,048	256,052	27,879	14,608	648	43,135	23,481	67	2,846	2,913	0.139
Sweet potatoes	18,461	176,288	11,525	3,168	103	14,796	38,465	27	3,638	3,665	0.056
Potatoes	8,552	82,681	4,698	2,277	49	7,024	17,444	56	1,472	1,528	0.026
Other	7,098	...	4,383	1,589	39	6,011	...	19	1,068	1,087	0.021
Legumes	25,024	...	4,082	2,928	130	7,140	...	96	17,788	17,884	0.076
Industrial crops	8,433	...	3,793	1,664	180	5,637	...	7	2,789	2,796	...
Groundnuts	5,515	31,118	2,146	1,416	1	3,563	15,511	6	1,946	1,952	0.017
Tobacco	1,848	8,065	1,475	114	161	1,750	693	1	97	98	0.006
Other	1,070	...	172	134	18	324	...	0	746	746	0.003

Table Continued

Table Continuation

Vegetables	4,121	...	1,318	452	38	1,808	...	32	2,281	2,313	0.012
Tree crops and sugarcane	1,695	...	764	143	156	1,063	...	191	441	632	...
Coffee	486	4,061	159	58	37	254	1,708	52	180	232	0.001
Sugarcane	1,206	14,970	642	84	80	806	4,505	139	261	400	0.004
Other	3	...	-37	1	39	3	...	0	0	0	0.000
Fruits and other	4,945	...	1,164	186	659	2,009	...	191	1,541	1,732	0.015
Total nonrice	167,617	...	75,713	42,379	2,423	120,515	...	934	46,168	47,102	0.507
<b>Total area cultivated</b>	<b>391,382</b>	...	...	...	...	...	...	...	...	...	<b>1.045</b>
<b>Number of farms</b>	<b>330,717</b>	...	...	...	...	...	...	...	...	...	...

Sources: MPARA (1988a-f).

<sup>a</sup> Principal and secondary crop refers to the relative importance of a crop in an association or mixed cropping system.

<sup>b</sup> Monoculture.

<sup>c</sup> Associations of annual crops with other annual crops, or tree crops with other tree crops.

<sup>d</sup> Mixed plots with both annual crops and tree crops.

<sup>e</sup> Area planted to rice is almost all monoculture; no data are given in the agricultural census.

**Table 39 – Madagascar: Cropping Patterns of Traditional Farmers in Toamasina Faritany, 1984/85**

	Area Cultivated	Principal Crop <sup>a</sup>				Secondary Crop <sup>a</sup>				Average Area per Farm	
		Number of Parcels	Pure <sup>b</sup>	As-sociated <sup>c</sup>	Mixed <sup>d</sup>	Total	Number of Parcels	As-sociated <sup>c</sup>	Mixed <sup>d</sup>		Total
Hectares											
Rice <sup>e</sup>	216,244	...	...	...	...	...	...	...	...	0.873	
Seed gardens	2,094	...	...	...	...	...	...	...	...	0.008	
Irrigated	125,527	...	...	...	...	...	...	...	...	0.507	
Nonirrigated	88,713	...	...	...	...	...	...	...	...	0.358	
Cereals	38,382		2,587	439	9	3,035	...	75	35,272	35,347	0.155
Maize	21,799	15,390	247	40	...	287	31,617	17	21,495	21,512	0.088
Other	16,583	...	2,340	399	9	2,748	...	58	13,777	13,835	0.067
Roots and tubers	37,644	...	21,021	3,173	1,573	25,767	...	3,542	8,335	11,877	0.152
Cassava	29,043	102,522	16,932	3,007	1,382	21,321	20,579	2,058	5,664	7,722	0.117
Sweet potatoes	4,241	21,472	1,741	152	156	2,049	9,482	172	2,020	2,192	0.017
Potatoes	0	0	0	0	0	0	0	0	0	0	0.000
Other	12,842	...	5,830	318	347	6,495	...	1,656	4,691	6,347	0.052
Legumes	4,001	...	1,302	355	166	1,823	...	0	2,178	2,178	0.016
Industrial crops	3,988		3,574	349	28	3,951		0	37	37	0.016
Groundnuts	3,517	8,154	3,311	169	0	3,480	474	0	37	37	0.014
Tobacco	512	4,057	304	180	28	512	0	0	0	0	0.002
Other	-41	...	-41	0	0	-41	...	...	...	0	0.000

*Table Continued*

Table Continuation

Vegetables	822	...	299	43	16	358	...	43	421	464	0.003
Tree crops and sugarcane	103,791	...	27,322	46,788	8,198	82,308	...	19,595	1,888	21,483	0.419
Coffee	53,056	123,564	11,174	30,747	1,201	43,122	28,238	9,608	326	9,934	0.214
Cloves	38,158	79,718	12,370	14,904	5,388	32,662	16,726	4,850	646	5,496	0.154
Vanilla	1,852	2,626	39	577	108	724	2,255	1,108	20	1,128	0.007
Pepper	537	95	12	0	0	12	1,572	525	0	525	0.002
Sugarcane	8,258	42,714	3,627	520	1,476	5,623	12,071	1,824	811	2,635	0.033
Other	1,930	...	100	40	25	165	...	1,680	85	1,765	0.008
Fruits and other	42,117	...	4,693	1,954	1,374	8,021	...	30,419	3,403	33,822	0.170
Total nonrice	230,471	...	60,798	53,101	11,364	125,263	...	53,674	51,534	105,208	0.931
<b>Total area cultivated</b>	<b>446,715</b>	...	...	...	...	...	...	...	...	...	<b>1.380</b>
<b>Number of farms</b>	<b>247,615</b>	...	...	...	...	...	...	...	...	...	...

Sources: MPARA (1988a-f).

<sup>a</sup> Principal and secondary crop refers to the relative importance of a crop in an association or mixed cropping system.

<sup>b</sup> Monoculture.

<sup>c</sup> Associations of annual crops with other annual crops, or tree crops with other tree crops.

<sup>d</sup> Mixed plots with both annual crops and tree crops.

<sup>e</sup> Area planted to rice is almost all monoculture; no data are given in agricultural census.

Table 40 – Madagascar: Cropping Patterns of Traditional Farmers in Toliary Faritany, 1984/85

	Area Cultivated	Principal Crop <sup>a</sup>					Secondary Crop <sup>a</sup>				Average Area per Farm
		Number of Parcels	Pure <sup>b</sup>	As-sociated <sup>c</sup>	Mixed <sup>d</sup>	Total	Number of Parcels	As-sociated <sup>c</sup>	Mixed <sup>d</sup>	Total	
Hectares											
Rice <sup>e</sup>	83,922	...	...	...	...	...	...	...	...	...	0.355
Seed gardens	4,796	...	...	...	...	...	...	...	...	...	0.020
Irrigated	76,833	...	...	...	...	...	...	...	...	...	0.325
Nonirrigated	2,563	...	...	...	...	...	...	...	...	...	0.011
Cereals	27,716		6,584	7,977	85	14,646		82	12,988	13,070	0.117
Maize	10,667	37,118	1,717	4,898	0	6,615	12,514	0	4,052	4,052	0.045
Other	17,049	...	4,867	3,079	85	8,031	...	82	8,936	9,018	0.072
Roots and tubers	89,868		44,479	28,391	1,322	74,192		527	15,149	15,676	0.380
Cassava	65,210	171,309	37,076	24,822	1,061	62,959	7,781	390	1,861	2,251	0.276
Sweet potatoes	23,920	65,717	7,218	3,569	156	10,943	36,753	123	12,854	12,977	0.101
Potatoes	86	0	0	0	0	0	194	0	86	86	0.000
Other	652	...	185	0	105	290	...	14	348	362	0.003
Legumes	16,954	...	4,870	3,113	35	8,018	...	0	8,936	8,936	0.072
Industrial crops	14,123		9,992	1,882	62	11,936		3	2,184	2,187	0.060
Groundnuts	5,562	7,683	2,893	459	23	3,375	7,528	3	2,184	2,187	0.024
Cotton	7,230	8,203	5,764	1,407	39	7,230	0	0	0	0	0.031
Tobacco	1,000	2,708	984	16	0	1,000	0	0	0	0	0.004
Other	351	...	351	0	0	351	...	0	0	0	0.001

Table Continued

Table Continuation

Vegetables	2,425	...	294	0	0	204	...	13	2,208	2,221	0.010
Tree crops and sugarcane	6,578		3,413	310	817	4,540		961	1,077	2,038	0.029
Coffee	741	3,751	617	104	0	721	188	20	0	20	0.003
Cloves	20	188	0	20	0	20	0	0	0	0	0.000
Sugarcane	5,692	27,903	2,674	186	817	3,677	8,585	941	1,074	2,015	0.024
Other	125	...	122	0	0	122	...	0	3	3	0.001
Fruits and other	5,312	...	1,223	3	1,566	2,792	...	107	2,413	2,520	0.022
Total nonrice	162,976	...	70,765	41,676	3,887	116,328	961	1,809	45,916	44,610	0.689
<b>Total area cultivated</b>	<b>246,898</b>	...	...	...	...	...	...	...	...	...	<b>0.860</b>
<b>Number of farms</b>	<b>236,565</b>	...	...	...	...	...	...	...	...	...	...

Sources: MPARA (1988a-f).

- <sup>a</sup> Principal and secondary crop refers to the relative importance of a crop in an association or mixed cropping system.
- <sup>b</sup> Monoculture.
- <sup>c</sup> Associations of annual crops with other annual crops, or tree crops with other tree crops.
- <sup>d</sup> Mixed plots with both annual crops and tree crops.
- <sup>e</sup> Area planted to rice is almost all monoculture; no data are given in agricultural census.

showed average gross value of farm output of the major crops to be FMG 240,000 at market prices. Of this output, 65 percent derived from rice, 14 percent from cassava and 12 percent from sweet potatoes. Average farm size in Toamasina faritany was 1.380 hectares, of which 0.873 was devoted to rice (0.515 to irrigated rice and 0.358 to nonirrigated rice) and 0.214 and 0.154 hectares were planted to coffee and cloves, respectively. Gross income from major crops equalled FMG 265,000 in 1985, 65 percent from rice, 12 percent from cassava, 11 percent from coffee, and 4 percent from cloves. In the drier climate of Toliary faritany, the average farm size was only 0.86 hectare, and rice accounted for less than half of the area planted (0.355 hectare, of which 92 percent was irrigated). In this ecology, 6 percent more area was planted to cassava and sweet potatoes than was planted to rice.

Tables 41, 42, and 43 give data on the gross value of production for major crops for the three regions from 1975 to 1988. No data are available on the actual amounts marketed for each crop, so it was not possible to construct an index of the real cash incomes of farmers. As an alternative, values of production of the individual crops are deflated using the nonfood CPI which proxies the basket of goods purchased by farmers.

Changes in the real price of rice dominate movements in the real gross revenues of small farmers in Antananarivo. Falling real producer prices for rice caused a 50 percent drop in the value of rice production between 1977 and 1982 and total value of production of the major crops fell by 31 percent. Higher rice prices after the liberalization of rice marketing are the major factor underlying an increase in gross farm revenues of 45 percent between 1982 and 1985 and a further increase of 56 percent in 1986. The large drop in revenues in 1988 is mainly due to a drop in the real price of paddy (average paddy yields on irrigated land also fell by 2.5 percent).

Table 41 also presents a production index calculated with 1984 prices as weights. The index measures the real quantity of production for the typical small farm, assuming area planted to each of the crops remains the same. Thus changes in the index reflect only changes in yields, not any changes in area planted. Between the periods 1975-1977 and 1978-1982, the index fell by 18 percent, then rose by 12 percent in 1983 with the initial liberalization of rice marketing. Since that time, yields have stagnated and remain more than 10 percent below the level between 1975 and 1977.

The decline in gross incomes for farmers in Toamasina in the late 1970s and early 1980s was similar to that in Antananarivo (table 42). Gross incomes fell in real terms by 38 percent between 1976 and 1982, but then surpassed the 1977 levels in both 1986 (a year of abnormally high rice prices) and in 1987. Output

of small farmers, as measured by production index 1, did not decline during the early eighties as much as in Antananarivo, but still remained below its peak in 1979. Small farmers' production, as measured by the production index increased by 7 percent between 1982 and 1987, but remained more than 10 percent below its peak in 1979.

For many small farmers in the east coast region who purchase rice with the proceeds of their sales of coffee and cloves, the purchasing power of these sales in terms of rice is a better indication of their welfare than gross income. As indicated by the export crop/rice index in table 42, these farmers have seen a sharp drop in their purchasing power. Clove prices and revenues dropped dramatically in 1978 and have not recovered and coffee revenues fell by 51 percent in real terms between 1975 and 1983, causing the export crop/rice index to fall from 125.7 in 1976 to 68.1 in 1980. After coffee and clove revenues rose by 44 percent in real terms in 1981 and rice prices fell in real terms, the export crop/rice index rose again to 115.3. But rising real rice prices and falling real coffee prices reduced the index by 52 percent between 1981 and 1985, and during 1986 when real rice prices rose sharply, the purchasing power of coffee and cloves output in terms of rice was only 24 percent of its 1981 level, in spite of higher coffee prices. Lower rice prices in 1987 and 1988 only partially restored the purchasing power of coffee and cloves output, leaving it still 42 percent less in 1988 than in 1981.

In Toliary faritany (table 43), revenues from cassava and sweet potatoes together exceed revenues from rice. Patterns of gross revenues over time thus differ sharply from those in Antananarivo or Toamasina. In the latter two regions gross revenues increased in real terms in the period between 1983 and 1988 after a decline between 1978 and 1982. In Toliary average revenues declined in the periods 1978-1982 and 1983-1988 mainly because of a steady decline in cassava revenues. As in Antananarivo, the production index reached its nadir in 1982, (the Toamasina production index was at its lowest in 1983); since that time, yields have increased 16 percent.

The indices discussed above are admittedly only rough indicators of household income. Nonagricultural income and the value of minor crops are not included. Moreover, much of the agricultural output is consumed on the farm and the CPI index used to deflate nominal income may not accurately reflect the farm household's consumption pattern or market prices in rural areas. In addition, because the index assumes that the area planted to each crop remains unchanged from the 1984/85 level, the gross incomes may be underestimated in other years. (Farmers responding to price incentives may have switched their allocations to more profitable crops as price varied.) Neverthe-

**Table 41 – Madagascar: Real Farmer Gross Incomes in Antananarivo, 1975-1988**

	Irrigated Rice	Upland Rice	Maize	Cassava	Sweet Potatoes	Potatoes	Total	Revenue Index 1 <sup>a</sup>	Revenue Index 2 <sup>b</sup>	Production Index <sup>c</sup>
	1,000 1984 FMGs						Indices			
1975	59.9	1.5	1.9	5.6	2.3	3.0	74.3	100.0	100.0	100.0
1976	68.6	1.7	2.1	5.6	3.8	3.0	84.9	114.3	116.3	104.3
1977	66.4	1.7	2.7	7.6	4.5	4.6	87.5	117.9	123.0	107.3
1978	43.9	2.4	2.2	6.5	6.3	4.5	65.7	88.5	90.9	81.5
1979	45.1	2.4	2.2	11.3	8.3	3.6	72.9	98.1	100.3	91.0
1980	41.6	1.4	2.7	10.2	10.6	4.9	71.4	96.2	97.7	84.3
1981	35.1	1.1	2.9	12.6	10.7	5.4	67.9	91.4	91.2	84.7
1982	32.9	1.0	3.0	9.4	9.3	4.9	60.4	81.4	81.8	82.5
1983	46.4	1.5	3.6	10.1	10.8	5.3	77.7	104.6	109.4	91.6
1984	48.7	1.7	3.1	9.8	7.1	4.5	75.0	101.0	104.1	90.7
1985	54.7	1.7	3.8	12.4	10.2	4.7	87.6	117.9	118.3	90.7
1986	95.0	3.0	6.5	15.9	11.5	4.8	136.7	184.0	175.9	91.5
1987	54.0	1.7	3.5	11.8	7.4	3.1	81.6	109.8	115.3	94.3
1988	38.4	1.2	2.7	7.8	5.9	3.6	59.6	80.3	84.3	92.4

*Table Continued*

Table Continuation

Average 1975-77	65.0	1.6	2.3	6.3	3.5	3.6	82.2	110.7	113.1	103.8
Average 1978-82	39.7	1.7	2.6	10.0	9.0	4.6	67.7	91.1	92.4	84.8
Average 1983-88	56.2	1.8	3.9	11.3	8.8	4.3	86.3	116.3	117.9	91.9
Average 1975-88	52.2	1.7	3.1	9.8	7.8	4.3	78.8	106.1	107.8	91.9
	Hectares									
Average area per farm	0.606	0.033	0.072	0.139	0.056	0.026				

Sources: MPARA (1989, 1987b, 1986, 1978), tables 38, 39, 40.

<sup>a</sup> Revenue Index 1 is nominal revenue deflated by the (traditional) consumer price index for nonfood items.

<sup>b</sup> Revenue Index 2 is nominal revenue deflated by the (traditional) consumer price index.

<sup>c</sup> Production Index is based on 1984 prices.

Notes: Nominal revenues for crop *i* are calculated as  $NR_i = A_i \cdot Y_i \cdot (1-L_i) \cdot P_i \cdot (1-m_i)$ ; where  $A_i$  is area cultivated in hectares,  $Y_i$  is yield (kg/ha),  $L_i$  is percentage losses,  $P_i$  is market price and  $m_i$  is percentage marketing margin. Marketing margins are 30 percent for rice and maize and 50 percent for cassava, sweet potatoes, and potatoes. A 10 percent loss rate is assumed for each crop.

Prices: Rice is spliced series of official producer prices, 1975-82, and open market (MPARA) with 30 percent marketing margin for 1983-88. Maize, sweet potatoes, and potato prices are averages of market prices in first two quarters. Cassava prices are based on averages of market prices of dried cassava for the first two quarters of 1983-88; dried cassava prices for 1975-82 estimated from fresh cassava market prices using average ratio of fresh to dry cassava prices of 1983-88 (1.61). Average fresh root price estimated as market price of dried cassava divided by 3 (to adjust for water content and drying costs).

Table 42 – Madagascar: Real Farmer Gross Incomes in Toamasina, 1975-1988

	Irrigated Rice	Upland Rice	Maize	Cassava	Sweet potatoes	Coffee	Cloves	Total	Revenue Index 1 <sup>a</sup>	Revenue Index 2 <sup>b</sup>	Export Crop/Rice Index	Production Index <sup>c</sup>
	1,000 1984 FMGs								Indices			
1975	42.6	16.7	4.4	13.6	4.5	17.8	6.9	106.4	100.0	100.0	100.0	100.0
1976	48.8	16.4	4.1	10.9	5.6	16.1	17.7	119.6	112.5	114.5	125.7	107.7
1977	47.2	18.5	3.4	13.3	5.2	12.2	13.9	113.5	106.8	111.4	102.3	103.1
1978	40.6	17.6	2.7	13.1	2.5	12.6	11.1	100.2	94.2	96.8	97.5	90.5
1979	52.3	18.8	4.4	18.1	2.7	12.1	3.6	111.9	105.2	107.5	67.3	110.3
1980	48.5	16.1	5.4	17.4	3.1	11.9	3.3	105.8	99.5	101.0	68.1	103.8
1981	32.4	13.0	3.3	13.7	2.3	15.2	6.8	86.7	81.6	81.4	115.3	93.5
1982	29.9	11.6	3.3	10.3	1.7	12.4	4.7	73.8	69.4	69.7	92.9	93.0
1983	29.2	11.9	3.6	9.2	2.0	8.8	1.6	66.2	62.3	65.1	65.0	93.3
1984	34.2	14.1	4.7	8.9	2.0	9.9	4.4	78.2	73.5	75.8	76.8	97.4
1985	50.8	20.6	5.4	11.8	2.3	10.6	4.3	105.6	99.3	99.6	55.1	97.8
1986	124.8	50.5	7.9	18.8	2.8	15.8	2.4	223.0	209.7	200.5	27.7	96.4
1987	69.9	28.3	4.9	10.1	1.9	17.2	2.2	134.5	126.4	132.8	53.6	99.7
1988	46.1	18.7	4.0	7.7	1.6	15.6	0.9	94.6	88.9	93.4	67.3	98.0

Table Continued

Table Continuation

Average 1975-77	46.2	17.2	4.0	12.6	5.1	15.3	12.8	113.2	106.4	108.6	109.3	103.6
Average 1978-82	40.7	15.4	3.8	14.5	2.5	12.8	5.9	95.7	90.0	91.3	88.2	98.2
Average 1983-88	59.2	24.0	5.1	11.1	2.1	13.0	2.6	117.0	110.0	111.2	57.6	97.1
Average 1975-88	49.8	19.5	4.4	12.6	2.9	13.4	6.0	108.6	102.1	103.5	79.6	98.9
	Hectares											
Average area per farm	0.507	0.358	0.088	0.117	0.017	0.214	0.154					

**Sources:** MPARA (1989, 1987b, 1986, and 1978).

<sup>a</sup> Revenue Index 1 is nominal revenue deflated by the (traditional) consumer price index for nonfood items.

<sup>b</sup> Revenue Index 2 is nominal revenue deflated by the (traditional) consumer price index.

<sup>c</sup> Production Index is based on 1984 prices.

**Notes:** Nominal revenues for crop *i* are calculated as  $NR_i = A_i \cdot Y_i \cdot (1-L_i) \cdot P_i \cdot (1-m_i)$ ; where  $A_i$  is area cultivated in hectares,  $Y_i$  is yield (kg/ha),  $L_i$  is percentage losses,  $P_i$  is market price and  $m_i$  is percentage marketing margin. Marketing margins are 30 percent for rice and maize and 50 percent for cassava, sweet potatoes, and potatoes. A 10 percent loss rate is assumed for each crop.

**Prices:** Rice is spliced series of official producer prices, 1975-82, and open market (MPARA) with 30 percent marketing margin for 1983-88.

**Maize, sweet potatoes, and potato prices** are averages of market prices in first two quarters. **Cassava prices** are based on averages of market prices of dried cassava for the first two quarters of 1983-88; dried cassava prices for 1975-82 estimated from fresh cassava market prices using average ratio of fresh to dry cassava prices of 1983-88 (1.61). Average **fresh root price** estimated as market price of dried cassava divided by 3 (to adjust for water content and drying costs).

**Table 43 – Madagascar: Real Farmer Gross Incomes in Toliary, 1975-1988**

	Irrigated Rice	Upland Rice	Maize	Cassava	Sweet Potatoes	Total	Revenue Index 1 <sup>a</sup>	Revenue Index 2 <sup>b</sup>	Production Index <sup>c</sup>
	1,000 1984 FMGs						Indices		
1975	24.3	0.5	0.8	47.8	5.9	79.2	100.0	100.0	100.0
1976	27.8	0.5	1.3	21.9	8.1	59.5	75.1	76.4	96.9
1977	26.9	0.5	0.8	30.9	8.1	67.3	84.9	88.6	89.2
1978	19.1	0.3	1.0	21.7	9.3	51.4	64.9	66.7	78.5
1979	20.2	0.3	1.1	52.0	10.2	73.8	93.2	95.3	106.0
1980	15.9	0.3	1.4	32.4	12.5	62.5	78.9	80.1	89.0
1981	15.1	0.3	1.8	26.4	12.0	55.7	70.3	70.2	76.9
1982	14.3	0.3	1.8	16.2	9.8	42.4	53.6	53.8	75.5
1983	20.3	0.5	1.9	17.6	11.3	51.8	65.4	68.4	74.9
1984	15.8	0.3	1.5	22.7	9.4	49.9	62.9	64.9	79.9
1985	19.8	0.4	1.4	11.8	10.2	43.6	55.1	55.3	80.8
1986	28.1	0.6	2.8	17.1	14.8	63.4	80.1	76.6	80.4
1987	25.3	0.5	1.4	10.7	18.5	56.5	71.3	74.9	87.9
1988	14.4	0.3	1.2	9.7	10.4	36.0	45.4	47.7	87.0

*Table Continued*

Table Continuation

Average 1975-77	26.3	0.5	1.0	33.5	7.4	68.7	86.7	88.4	95.3
Average 1978-82	16.9	0.3	1.4	27.7	10.8	57.2	72.2	73.2	85.2
Average 1983-88	20.6	0.5	1.7	14.9	12.5	50.2	63.4	64.6	81.8
Average 1975-88	20.5	0.4	1.5	23.5	10.8	56.6	71.5	72.8	85.9

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Hectares

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Average area per farm	0.325	0.011	0.045	0.276	0.101	...	...	...	...
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**Sources:** MPARA (1989, 1987b, 1986, 1978).

<sup>a</sup> Revenue Index 1 is nominal revenue deflated by the (traditional) consumer price index for nonfood items.

<sup>b</sup> Revenue Index 2 is nominal revenue deflated by the (traditional) consumer price index.

<sup>c</sup> Production Index is based on 1984 prices.

**Notes:** Nominal revenues for crop *i* are calculated as  $NR_i = A_i \cdot Y_i \cdot (1-L_i) \cdot P_i \cdot (1-m_i)$ ; where  $A_i$  is area cultivated in hectares,  $Y_i$  is yield (kg/ha),  $L_i$  is percentage losses,  $P_i$  is market price and  $m_i$  is percentage marketing margin. Marketing margins are 30 percent for rice and maize and 50 percent for cassava, sweet potatoes, and potatoes. A 10 percent loss rate is assumed for each crop.

**Prices:** Rice is spliced series of official producer prices, 1975-82, and open market (MPARA) with 30 percent marketing margin for 1983-88. Maize, sweet potatoes, and potato prices are averages of market prices in first two quarters. Cassava prices are based on averages of market prices of dried cassava for the first two quarters of 1983-88; dried cassava prices for 1975-82 estimated from fresh cassava market prices using average ratio of fresh to dry cassava prices of 1983-88 (1.61). Average fresh root price estimated as market price of dried cassava divided by 3 (to adjust for water content and drying costs).

less, the indices of gross value of production strongly suggest that farm households suffered losses in real incomes during the spending boom years of 1978 to 1981 and that up to 1985, structural adjustment policies had yet to raise incomes back to the mid-1970s levels. Only with the sharp increase in producer rice prices in 1986, did farmers experience a large increase in the real value of farm output. However, because rice is a major consumption commodity and many poor households are net purchasers of rice, it is likely that the real welfare of poor farm households did not increase in 1986 and may actually have fallen slightly.

### CONSUMER PRICES

As discussed above, exchange rate devaluations did not directly influence rice prices in Madagascar in the 1980s. Domestic price increases were due mainly to rice pricing policy, in particular the decisions to reduce rice imports and cut the per unit rice subsidy for consumers. As a result of these policies, open-market prices for rice increased by 75 percent in real terms between 1982 and 1987.

Prices of nontraded food commodities fell in real terms following the implementation of the stabilization program, after having increased substantially in 1981 and 1982. A weighted average of the prices of potatoes and cassava<sup>70</sup> in Antananarivo increased by only 8.6 percent between 1982 and 1986, after having increased by 84 percent from 1980 to 1982 (table 44). Similarly, the price of meat fell in real terms by 27 percent between 1982 and 1987. Thus the price ratio of traded (rice) to nontraded (cassava, potatoes, meat) foods increased, although not because of exchange rate changes.

Domestic prices of imported consumer goods and intermediate inputs rose by 33.5 percent in real terms between 1982 and 1986. However, the relative contributions of the real depreciation of the FMG and tightening of import quotas to higher domestic prices can only be approximated. From 1982 to 1986, the real exchange rate depreciated by 34.3 percent, a rate almost identical in magnitude to that of the domestic price rise. However, the average import tax rose from 21 to 36 percent during this period and crude estimates of the implicit tariff (table 34) show an increase from 121 percent in 1982 to 173 percent in 1986. Thus there is evidence that quantitative restrictions and import taxes may also have contributed to the rise in domestic prices. Whether as a result of price

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<sup>70</sup> Weights used were based on the 1980 value of production for the two crops. Data on the prices of sweet potatoes and maize, two other major nontraded staples, were not available.

changes or of quantitative restrictions, imports of consumer goods (excluding rice) declined by 21 percent in real terms between 1982 and 1986 while imports of rice fell by 67 percent in real terms.

Table 45 presents data on the changes in household expenditure patterns in the city of Antananarivo from 1982/83 to 1986/87 resulting from the above price changes, income changes and other factors. Total real expenditure fell for households in all four quartiles, declining by 18 percent for the poorest 25 percent of households and by 28 percent for the richest 25 percent of households. Households in all four expenditure quartiles devoted higher shares of total expenditure to rice as their total spending fell. Per capita consumption of rice fell in all income quartiles, though (table 32). It can be calculated from table 45 that the poorest households increased both the share and the level of real expenditure on other staple foods (cassava, bread, and maize) to compensate for the decline in rice consumption. For all four groups, expenditure shares of meat and fish fell; for the poorest 25 percent, this expenditure share fell from 13 to 10 percent.

Nonfood items make up a relatively larger share of the household expenditure for the lowest income groups (26 percent for the first quartile compared with 41 percent for the fourth quartile in 1982/83), so an increase in the ratio of food to nonfood prices would be expected have a more adverse effect on the poor. The ratio of food to nonfood prices in Antananarivo, as reflected by the components of the consumer price index, changed little over time, though (table 44). Consistent with the small change in relative prices, the share of expenditure devoted to nonfood items dropped only 1 to 3 percent in each quartile between 1982/83 and 1986/87. How the poor were affected by these price changes depends on their consumption basket and also on changes in their nominal incomes. Income changes for the rural poor depend largely on changes in agricultural production discussed above. For the urban poor, employment and wage rate figures give some indication of changes in real income.

**Table 44 – Madagascar: Agricultural Production and Price Indices, 1973-1987 (1980 = 100)**

	Real Ex-ports Producer Price <sup>a</sup>	Real Rice Producer Price <sup>b</sup>	Export Production <sup>c</sup>	Rice Production <sup>d</sup>	Real Rice Consumer Price <sup>e</sup>	NT Food Consumer Price <sup>f</sup>	Meat Con- sumer Price <sup>g</sup>	Domestic Import Price <sup>h</sup>	Ratio of Food Prices to Nonfood Prices <sup>i</sup>
1973	128.3	71.6	77.8	90.7	138.1	...	...	100.8	90.3
1974	125.9	97.8	108.9	95.5	184.6	...	...	96.3	106.1
1975	116.4	108.5	88.0	93.5	178.9	...	...	109.7	102.6
1976	111.2	120.5	98.3	96.9	170.4	111.1	95.7	105.7	99.6
1977	115.5	116.9	84.0	102.1	141.8	98.4	95.1	106.9	95.6
1978	110.2	109.7	102.3	90.7	131.2	107.6	101.7	105.8	98.0
1979	104.2	104.4	85.1	97.0	115.0	89.2	94.8	100.7	98.9
1980	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0	100.0
1981	87.9	83.7	104.4	95.4	96.7	123.0	110.0	95.3	102.9
1982	68.8	81.1	102.5	93.4	121.7	184.1	123.6	94.0	101.8
1983	62.8	122.3	87.3	101.8	175.6	169.8	99.6	88.4	95.2
1984	64.6	123.7	120.0	101.0	231.6	159.5	92.5	93.9	97.5
1985	67.2	127.8	110.1	103.2	291.4	172.5	87.0	124.2	102.1
1986	84.4	238.7	94.4	105.7	344.4	200.0	90.0	120.3	110.5
1987	95.8	180.6	101.5	108.9	212.9	...	...	...	94.6

*Table Continued*

*Table Continuation*

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**Sources:** World Bank (1980,1984,1986), IMF (1988), BDE (1988).

<sup>a</sup> Weighted average of the prices of coffee, cloves and vanilla, using 1980 values of production as weights.

<sup>b</sup> 1973-1982 official producer prices; 1983-1987 free market prices (table 27).

<sup>c</sup> Production index of coffee, cloves, and vanilla, using 1980 values of production as weights.

<sup>d</sup> Table 27.

<sup>e</sup> 1973-1982 official consumer prices; 1983-1987 free market consumer prices (table 27).

<sup>f</sup> Nontraded food consumer price index. Weighted average of cassava and potato prices in using 1980 values of production as weights.

<sup>g</sup> Index of the consumer price of meat in Antananarivo.

<sup>h</sup> Index of market prices of importable goods (gasoline, cement, tires, rolled sheet metal, galvanized steel and cooking pans).

<sup>i</sup> Ratio of the indices of the prices of food and the prices of nonfood items from the traditional basket CPI.

**Note:** All price indices have been deflated by the traditional family CPI.

**Table 45 – Madagascar: Nominal Expenditure in Antananarivo, by Income Group, 1982/83 and 1986/87**

	First Quartile	Second Quartile	Third Quartile	Fourth Quartile	Average
<b>1982/83</b>					
<b>Total expenditure (1,000 FMG/person)</b>	<b>39</b>	<b>71</b>	<b>108</b>	<b>229</b>	<b>103</b>
Share of expenditure (percent)					
Rice	41	32	23	14	23
Cassava	4	5	5	5	5
Meat, fish	13	20	24	25	23
Total food	74	72	68	59	67
Nonfood	26	28	32	41	33
<b>1986/87</b>					
<b>Total expenditure (1,000 FMG/person)</b>	<b>32</b>	<b>61</b>	<b>90</b>	<b>165</b>	<b>84</b>
Share of expenditure (percent)					
Rice	47	41	32	24	34
Cassava, bread, maize	8	7	6	6	7
Meat, fish	10	13	18	20	15
Total Food	75	74	69	62	67
Nonfood	25	26	31	38	33
<b>% Change in Expenditure</b>					
<b>Total expenditure (percent change)</b>	<b>-18</b>	<b>-14</b>	<b>-17</b>	<b>-28</b>	<b>-18</b>
Share of expenditure (percent)					
Rice	6	9	9	11	11
Cassava, bread, maize	3	2	1	1	2
Meat, fish	-4	-7	-7	-5	-8
Total Food	1	2	1	3	0
Nonfood	-1	-2	-1	-3	0

**Source:** World Bank (1989a).

## EFFECTS OF STRUCTURAL ADJUSTMENT ON URBAN EMPLOYMENT AND INCOMES

Madagascar's industry is heavily dependent on imported capital and intermediate goods for key inputs into production. Reductions in the volume of these imports played a major role in reducing industrial output and value added in the 80s.<sup>71</sup> Industrial output and value added fell by more than 20 percent each between 1980 and 1982 and have increased only slightly since that time (figure 13). During the same period, imports of capital and intermediate goods have fallen by about 40 percent. (The data suggest that the import intensity of output was substantially higher in the mid-1980s than in the mid-1970s, suggesting a shift in output towards more import-intensive activities with lower domestic value added.)

Reductions in imports and industrial production are not necessarily a result of the exchange rate devaluations. Although overall measures of the implicit tariffs vary little from 1982 to 1986, quantitative restrictions on imports may have varied across subsectors. The effects of 1987 trade liberalization and devaluation are likely to have differed across industries, even firms. Two polar cases are theoretically possible.

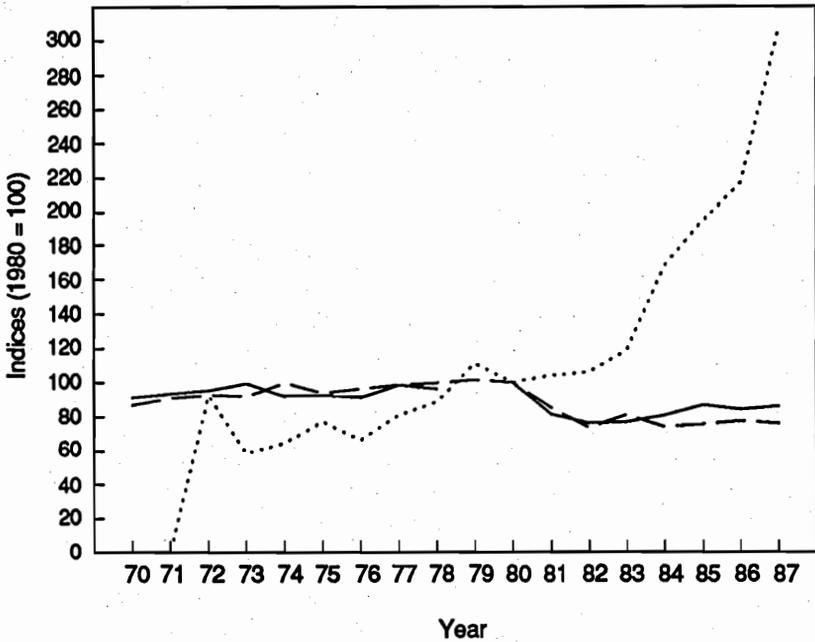
For firms that had resorted to bribes to obtain import licenses under the old system of quotas and restricted import licenses in place until 1987, it is possible that the devaluation merely resulted in a transfer of the economic rents to official government accounts (through payment of explicit import tariffs and higher official price of foreign exchange). Alternatively, companies that had previously obtained imports at the official exchange rate lost the implicit rents after the devaluation, which may have resulted in significant financial losses. In the first case, the 1987 policy changes would simply change the direction of payments without changing the financial situation of the firm. Only in the latter case, would the firm's profitability suffer as a result of the policy change.

Reduced industrial output in the formal sector has had a relatively small effect on employment, at least as recorded in the official data. Employment in the private sector increased by 7.5 percent between 1980 and 1984 (figure 14) while industrial output fell by 26 percent (figure 13). Employment stagnated between 1984 and 1987, however, increasing by only 1.2 percent.

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<sup>71</sup> Krugman and Taylor (1978) show that a devaluation can lead to increased domestic prices and/or reduced domestic output when there is little opportunity for substitution between domestically produced and foreign-produced goods. Madagascar's formal industrial sector exhibits these characteristics.

**Figure 13— Madagascar: Industrial Sector, Indices of Input Use and Output, 1970 - 1987**

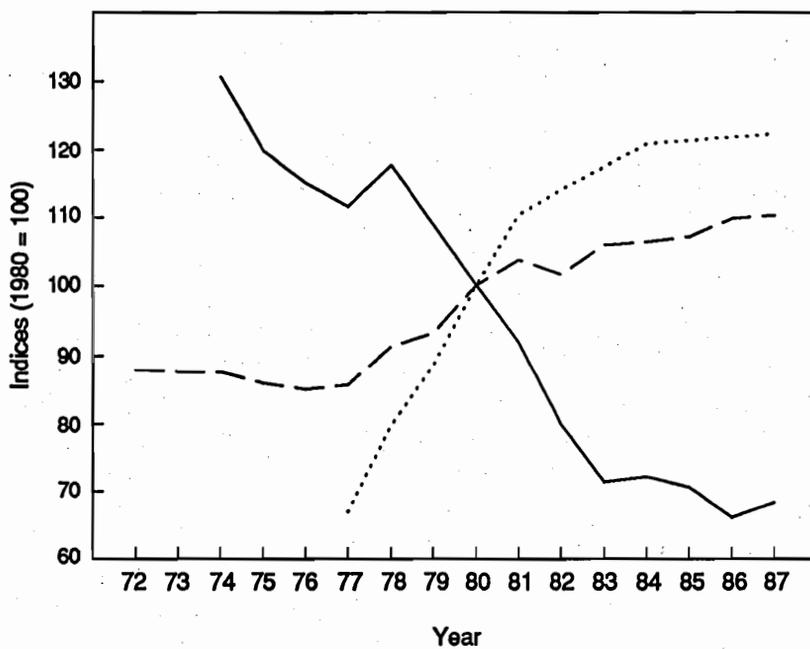


- Industrial value added
- - - Industrial product
- ..... Imports of capital and intermediate goods

**Sources:** Pryor (1988), IMF (1988), World Bank (1980, 1986), USAID (1988).

**Note:** 1980 prices (FMG).

**Figure 14 – Madagascar: Indices of Minimum Wages and Private and Public Employment, 1972 - 1987**



- Minimum wage
- - Private sector wage employment
- ..... Government employment

Sources: Pryor (1988), IMF (1988).

Although employment levels remained higher than their 1980 levels, real wage rates, as reflected in the official minimum wage deflated by the (traditional basket) consumer price index, fell by 31.7 percent between 1980 and 1987 (table 46). Over the same period, the market price of rice increased by 113 percent in real terms, so that the purchasing power of the minimum wage fell from 6.42 kgs of rice per day to 2.06 kgs of rice per day. Although the stabilization and structural adjustment policies may have accentuated the fall in real wage rates, the decline in the real minimum wage is part of a longer term trend that began before the stabilization and structural adjustment process began. The minimum wage also declined by 27 percent in real terms between 1975 and 1981. However, during this period, real rice prices fell by 55 percent. Thus in spite of declining real wages, the rice purchasing power of the minimum wage increased by 69 percent.<sup>72</sup>

Effects on the informal sector of the exchange rate and trade policy changes are even harder to quantify. Formal-sector employment grew at a slower rate than the labor force, so that the numbers of people seeking employment in the informal sector increased during a period when overall economic activity declined. The most important factor determining creation of employment opportunities in the informal sector may have been aggregate demand in the economy, which most likely has fallen (according to the national accounts statistics). As noted earlier, inadequate demand for products and services was found to be a major constraint on profitability of the informal sector in Antananarivo in 1984 (ILO 1985a). Changes in prices or import quantities probably also affected the informal sector, but the effect is likely to have been of second order.

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<sup>72</sup> Rice prices used in the construction of the CPI are lower than reported market prices for 1983 and following years. If an adjustment for higher rice prices were made, the CPI used to deflate the minimum wage and nominal rice prices would be higher and real minimum wages would be even lower than those reported.

**Table 46 – Madagascar: Indices of Food and Nonfood Prices, 1970-1987**

	Minimum Wage <sup>a</sup> (non-agricultural)	Consumer Price for Rice <sup>b</sup>	Real wage Index <sup>c</sup>	Real Rice Index <sup>c</sup>	Rice Purchase of Minimum Wage (SMIG)
	FMG/Mo.	FMG/Kg	1980=100		Kgs/Day
1970	...	34.0	...	146.1	...
1971	...	34.0	...	138.3	...
1972	...	34.0	...	131.2	...
1973	...	38.0	...	138.1	...
1974	8,839	62.0	136.7	184.6	4.75
1975	8,839	65.0	126.4	178.9	4.53
1976	8,839	65.0	120.3	170.4	4.53
1977	8,839	55.8	116.7	141.8	5.28
1978	9,625	55.0	119.3	131.2	5.83
1979	10,018	55.0	108.8	115.0	6.07
1980	10,877	56.5	100.0	100.0	6.42
1981	13,038	71.3	91.8	96.7	6.10
1982	14,742	118.3	78.8	121.7	4.15
1983	15,591	203.7	69.8	175.6	2.55
1984	17,369	295.2	70.8	231.6	1.96
1985	19,000	410.5	70.1	291.4	1.54
1986	20,699	555.6	66.7	344.4	1.24
1987	24,399	394.9	68.3	212.9	2.06

Sources: Berthelemy (1988), IMF (1988), Toro Ochoa (1988), Hirsch (1986).

<sup>a</sup> 1974-83, Toro Ochoa; 1983-87, IMF.

<sup>b</sup> Spliced consumer price is based on crop year May/April; 1970-74, Berthelemy; 1975-83 riz de consommation ceiling price, Hirsch; 1983-87, IMF.

<sup>c</sup> Using traditional household basket CPI as the price deflator.

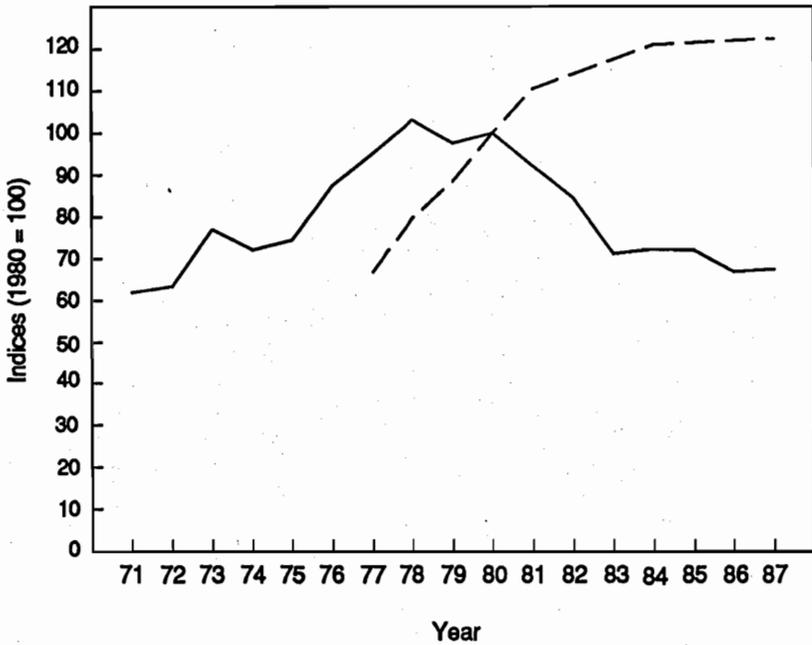
Note: The purchasing power of rice per day is calculated by the following formula: (Minimum wage/consumer price for rice)/30 days.

## EFFECTS OF REDUCTIONS IN GOVERNMENT EXPENDITURE ON THE POOR

The most important linkage between government expenditure and the welfare of lower income groups in Madagascar, the rice subsidy, has already been discussed. Other expenditure, such as that on personnel and on health and education, also has a major effect on the poor. The level of government employment continued to increase, but by an average of only 1.4 percent per year from 1982 to 1987 (figure 15). Government personnel expenditure declined, however, by 20 percent in real terms between 1982 and 1987, and by 35 percent between 1978, the peak year, and 1987. Only the lower skilled levels of government employees would be among the low-income earners in Madagascar, so part of this cut in real personnel expenditure probably fell on the middle to upper income households.

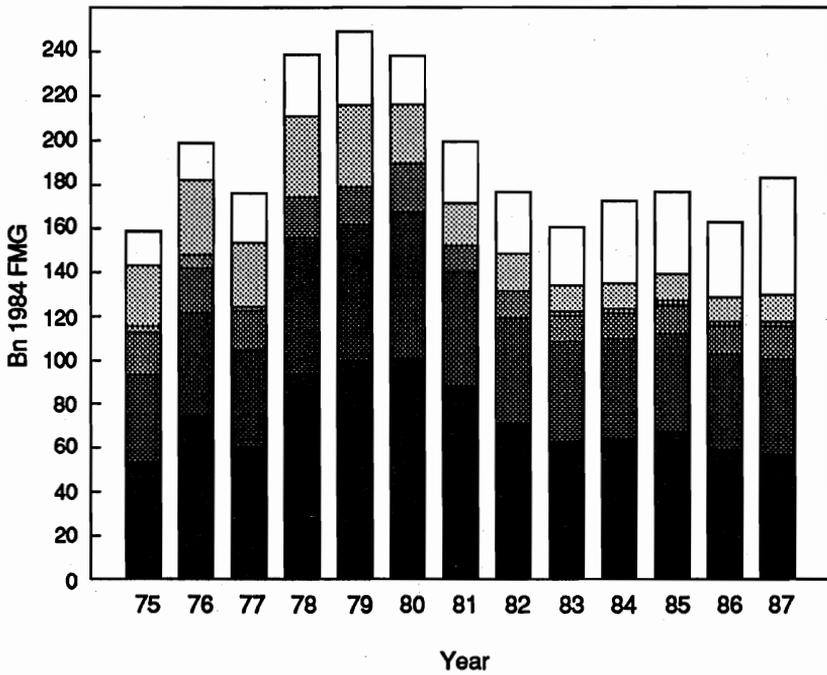
Real current expenditure on education and health, which peaked in 1980 at FMG 66.9 billion (1984) and FMG 22.0 billion (1984), respectively, were also cut back as part of the stabilization and structural adjustment programs (figure 16). Between 1980 and 1983, when total current expenditure was reduced by 32.5 percent in real terms, current expenditure on education fell by 37.4 percent in real terms. In the same period, current real expenditure on health fell by 30.6 percent. Yet the 1983 current expenditure for education was still 5.5 percent greater than real expenditure between 1975 and 1977, the period before the large increase in government spending. However, real expenditure on health had not increased much during the spending boom between 1978 and 1980. Thus the reduction of expenditure on health between 1980 and 1983 resulted in real expenditure that was 38.0 percent lower in 1983 than between 1975 and 1977. Of course, the extent to which the poor were harmed by the reduction in real expenditure depends on their level of access to education and health services, on which little information is available. Nevertheless, the likelihood that the poor suffered significant reductions in health services seems high.

**Figure 15 – Madagascar: Government Employment and Real Personnel Expenditure, 1971 - 1987**



- Government personnel expenditure (1984 FMG)  
- - Government employment

**Figure 16 – Madagascar: Real Current Expenditure, by Function, 1975 - 1987**



- Other
- ▨ Economic services
- ▩ Social and community services
- ▧ Health
- ▦ Education
- Public administration

**Sources:** Pryor (1988), IMF (1988), World Bank (1980, 1986).

## 7. Summary and Conclusions

Madagascar's stabilization and structural adjustment programs have achieved some notable successes in the 1980s in terms of lower inflation, a sustainable balance of trade deficit, and reduced government budget deficits. Yet, the policies have so far failed to achieve significant economic growth and have left some urban low-income households worse off.

At the start of the decade, some form of macroeconomic stabilization was clearly necessary. A huge surge of imports for the investment to the limit development strategy had combined with a decline in the terms of trade to increase the current account deficit to 16.9 percent of GDP in 1981. Government budget deficits were partly financed through domestic money creation, which led to a sharp increase in inflation from 9.1 percent in 1977 to 23.8 percent in 1981.

Madagascar signed standby agreements with the IMF in 1981 and 1982 only when continued financing of the current account deficits solely through Communist-block governments or commercial sources was no longer feasible. The stabilization policies adopted reduced aggregate demand through cutbacks in public investment and other government expenditure, including the subsidy on rice for consumers. By 1984 inflation had dropped to 10.3 percent per year and the trade deficit was cut to only 5.0 percent of GDP. However, real incomes also fell sharply. Average real GDP fell by 5.4 percent between 1979 to 1981 and 1982 to 1984 (average per capita real GDP fell by 12.7 percent). As supplies of imported inputs fell, industrial output suffered most: industrial value added fell by 28.0 percent from its peak of FMG 280.0 billion (1984) in 1979 to FMG 201.5 billion (1984) in 1982.

No clear distinction is possible between structural adjustment policies, which in broad terms can be thought of as designed to increase aggregate supply, and stabilization policies that focus more on reducing aggregate demand. Reforms in rice marketing begun in 1982 were an initial step towards increasing rice production, but major efforts at structural adjustment began only after 1984, and a major piece of the structural adjustment strategy, trade liberalization, was not implemented until 1987. Real economic growth increased slightly, from an average of 0.27 percent per year in 1982 to 1984 to 1.66 percent per year in 1985 to 1987. Given that in many cases, a lag of several years can be expected between changes in production incentives and significant increases in investment, it may

still be too early at this writing (1990) to see much of the effect of policies designed to increase supply.

The cost of adjustment in terms of official foreign debt has increased substantially with the change in emphasis from stabilization to structural adjustment. Madagascar's official foreign debt increased by only 15 percent from 1981 to 1984 during the first years of stabilization policies, but large sectoral adjustment loans contributed to a 48 percent increase in debt by 1987. Madagascar's foreign debt in 1987 of almost US\$4 billion was equal to 151 percent of GDP at the official exchange rate. However, Madagascar received some relief on bilateral debt from the US in 1989 and from France in 1990.

### **IMPACT OF MACROECONOMIC POLICY REFORM ON THE POOR**

Little direct evidence is available on the incomes, expenditure, and nutrition of lower income groups over the period. Clinical records, as well as a number of small sample nutritional surveys, show that malnutrition in children is a serious problem. A national sample of children two years old and under in 1983/84 (Andrianasolo et al. 1986) found that 33 percent of the children in urban areas and 38 percent of children in rural areas exhibited evidence of long-term malnutrition. There are no time-series using statistically unbiased samples from which to draw definite conclusions about whether malnutrition among children (or adults) has increased during the 1980s. Moreover, time-series data by themselves are insufficient to determine the channels by which the stabilization and structural policies affected household welfare, for better or for worse. Thus, this paper focuses on the linkages between several major stabilization and structural adjustment policies, and household incomes and expenditure. The paper attempts to quantify some of the effects of specific policies.

The most direct, and perhaps the most important, effects on household welfare derive from rice-pricing and trade policies. Under the state-controlled marketing system in place before 1982, consumers benefitted from subsidized sales of imported and domestic rice through the official marketing channels. Raising prices of rice for consumers and allowing private traders to purchase rice from producers reduced rice subsidies and led to higher producer and consumer prices. Open market prices for rice in 1987 were 75 percent higher in real terms than the official consumer price in 1982 (table 44). Producer prices increased by 5 percent in real terms between 1982 and 1985 before jumping by another 87 percent in 1986 (table 27).

Urban consumers had been major beneficiaries of the subsidized rice sales; per capita consumption of subsidized, officially distributed rice in 1982/83 was 121 kilograms per person compared to only 4 kilograms per person in rural areas

surveyed. Reduced supplies of officially distributed rice combined with greatly reduced per unit subsidies contributed to a 58 percent drop in per capita consumption of officially distributed rice for urban areas in 1986/87 and a 15 percent drop in their overall per capita consumption of rice. The poorest 25 percent of households in Antananarivo were especially hard hit: their per capita consumption of rice fell by 31 percent as their per capita purchases of official distribution rice fell by 53 percent.

Rice production increased by 16.8 percent (3.1 percent per year) between 1982 and 1987 (table 27), in part due to higher farmgate prices. An estimated 30 to 40 percent of farm households own less than the 0.1 to 0.15 hectare of land per person required for self-sufficiency in rice and so received little benefit from higher paddy prices. Those farmers that do produce a marketable surplus have enjoyed higher revenues due to the price increases. There appear to be significant nonprice barriers to increased production, though, including continued uncertainty over future prices, lack of high-yielding varieties, lack of access to credit and fertilizer, and inadequate water control.

Exchange rate devaluations had little direct effect on agricultural production and incomes in Madagascar because agricultural trade and pricing policies were adjusted to keep domestic producer prices relatively stable and substantially below border prices. The three major export crops, coffee, vanilla, and cloves, were all taxed heavily (e.g., coffee taxes averaged 50 percent of the border price from 1972 to 1987). Real producer prices of the three major export crops fell by 10 percent between 1982 and 1986, despite a 93 percent depreciation of the nominal exchange rate (and a 34 percent depreciation of the real exchange rate). The stagnation in producer prices until 1987, discouraged production of the major export crops which increased by only 1 percent between 1982 and 1987. However, it made sense not to raise real producer prices of the major exports as the world import demand for all three crops was weak. For cloves and vanilla, large increases in production and exports could have resulted in less, not more, export revenues.

The combination of exchange rate devaluations and restrictions on imported inputs, which raised costs and reduced input supplies, contributed to the sharp fall in industrial output. The available data suggest that workers were more affected by declining real wages than through loss of jobs, as private-sector employment continued to increase, albeit slowly. The decline in the real wage (as reflected in the official minimum wage) is a long term phenomenon in Madagascar, though. Real wages fell 27 percent from 1975 to 1981, and 26 percent from 1981 to 1987.

Reductions in government expenditure fell largely on government investment

and the rice subsidy, but other expenditure affecting the poor was also cut. Although employment levels continued to increase slowly in the 1980s, real expenditure on personnel fell by 20 percent between 1982 and 1987, implying a decline in real incomes of government workers. Current expenditure on education was cut back to the pre-1978 levels. Real expenditure on health was not increased during the spending boom between 1978 and 1980 and budget cuts in the early 1980s reduced health expenditure by 38 percent in real terms compared with 1975 to 1977. Whether these cuts in education and health expenditure fell mainly on the poor or on higher income groups is not, however, clear.

Overall, low-income urban households seem to have been worst affected by the stabilization and structural adjustment policies. The loss of rice subsidies sharply increased consumer prices. On the income side, the minimum wage continued to fall in real terms and the stagnation of the industrial sector and lower aggregate demand slowed growth in employment in both the formal and informal sectors. There was steady growth in agricultural GDP between 1981 and 1987, which compares favorably with agriculture's performance in the pre-1981 period. Larger farmers who are net sellers of rice benefitted by increased rice prices, and output of rice increased by 17 percent between 1982 and 1987. However, many small farm households are net purchasers of rice or have only small net sales. Most producers of export crops enjoyed little gain in real revenues until 1988.

An important reason for the relatively poor overall growth performance is the partial and recent nature of most of the structural adjustment reforms. There is evidence that many structural constraints limiting growth remain, although preliminary data from 1988 and 1989 suggest that real income growth may have accelerated.

Identifying groups that have reaped substantial benefits from the adjustment process in Madagascar is difficult. The appropriate comparison, however, is not between before and after adjustment. Real incomes and consumption were boosted to unsustainably high levels through massive foreign borrowing and government budget deficits in the years leading up to the balance of payments crisis of the early 1980s. A more useful comparison, though one which requires considerably more analysis, is between the outcomes of alternative policy options. For example, delaying stabilization for several years could have resulted in a far worse macroeconomic situation and a more difficult adjustment period afterward.

## POLICY AND RESEARCH ISSUES

The question of whether policies other than those adopted could have achieved similar results in terms of price and balance of payments stabilization but with lower food prices, less foreign borrowing, higher income growth, and more benefits to the poor is not of merely academic interest. Linkages between macroeconomic and sectoral policies and the microeconomy determine the potential effects on the poor of current macroeconomic and sectoral policy options for spurring real income growth.

The analysis presented in this paper suggests that the short-run supply response to exchange rate devaluations in the 1980s has been minimal. Government control over import licenses and domestic prices limited the direct effects of exchange rate changes on domestic prices, but after the 1987 trade liberalization, further exchange rate changes may have a greater effect on prices and incomes. As these effects increase in magnitude, the ways the poor are affected by price-induced changes in domestic, industrial, and agricultural output are likely to become more complex.

Another policy option for increasing aggregate demand and real incomes is a more expansionary fiscal policy. Such a policy risks raising inflation and increasing balance of payments deficits, but offers potential benefits in terms of increased output, particularly in the industrial and informal sectors. To what degree benefits deriving from increased aggregate demand would be reaped by the poor through increased employment and incomes should be a major consideration in deciding on the size and allocation of any increase in expenditure.

Given the importance of rice in the diet and of the rice sector as a source of income and employment, increases in smallholder rice production through technical change could result in significant gains for the poor and overall economic growth as well. Although rice production increased from 1982 to 1987 in response to marketing reforms and higher producer prices, there remains an urgent need for research and extension to allow productivity gains in the medium and long term. Provision of inputs (especially fertilizer) and improvements in rural marketing infrastructure can have more immediate positive effects on production and farmer incomes even with current technology. Thus the question of how much should be allocated to agricultural research and extension and rural infrastructure has important implications for the macroeconomy and the alleviation of poverty.

Some of the major linkages between macroeconomic and sectoral policies and the welfare of lower income households have been outlined in this paper. The analysis presented here, however, is mostly descriptive. In order to quantify the likely effects of policies on household welfare, a more formal modeling framework is needed in which the important linkages between the macro-

economy, factor markets, and household incomes and consumption are distinguished.

Attempts to better conceptualize the linkages between economic sectors and to quantify the effects of policies are not an end in themselves. Rather, the goal is a policymaking process that takes into consideration the effects of policies on the poor and leads to increased welfare for lower income households in Madagascar.

## Appendix 1: Nutrition Surveys in Madagascar

There has not been a study of nutrition of children under five on a national scale in Madagascar. Results of smaller scale studies covering 11 different samples conducted since 1983 are reported, however, in Programme National de Surveillance Alimentaire et Nutritionnelle (PNSAN), and MPARA-Direction de la Programmation, *Synthèse des Données Existantes sur l'Etat Nutritionnel, Document de Travail* (1989).

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Samples 7 through 11 are not representative samples.

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