

## IMPACT OF GROWTH AND DISTRIBUTION ON POVERTY IN MADAGASCAR

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Poverty in Madagascar has increased between 1962 and 1980 both in the rural and urban areas based on a comparison of some poverty measures, but decreased based on others. However, it remains predominantly a rural phenomenon. Distributional inequality is the major determinant of the variation in rural poverty, while the changes in urban poverty are due to the lack of economic growth. Thus, the urban bias introduced in government policies in the mid-1970s was not justifiable on strictly poverty-reduction grounds. A reduction of sectoral disparities would have led to a significant reduction of aggregate poverty.

### 1. INTRODUCTION

Poverty alleviation may be considered an ultimate goal of economic policy. Poverty is commonly thought to exist if some members of a society fall short of a minimum level of material well-being in an absolute or relative sense. Material well-being or economic welfare of an individual represents the command that the person has over goods and services. This can be a quite limited concept as it may not take into account such things as disutility of work, the rights of the individual, the length or the quality of the life during which this command over commodities is to be enjoyed.<sup>1</sup>

Over time, different governments in Madagascar have revealed various levels of concern about the poverty issue through specific policy actions. From independence in 1960 to the mid-1970s, farmers had access to free markets for both agricultural products and inputs (except for the export crops for which state intervention started even before independence). In 1972, in an attempt to improve the lot of the poorest segment of the rural sector, the government lifted the poll and cattle taxes applicable to the sector.<sup>2</sup>

In 1977 the government introduced policies in favour of the urban sector. The minimum wage was increased, the public pay scale was restructured in favor of the lowest paid workers, and subsidies were introduced to the urban sector on such basic items as rice, edible oils and condensed milk. How effective have these measures been? Pryor argues that they may have been progressive with respect to urban income distribution, but detrimental at the national level as the rural sector had to shoulder the burden of the subsidies (Pryor, 1990a). The results reported in this paper seem to tell a different story.

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<sup>1</sup>See Ravallion (1994a, pp. 1-10) or Lipton and Ravallion (1993, p. 2553).

<sup>2</sup>Pryor (1990a, p. 360).

In the 1980s, the policy context changed significantly in Madagascar, but poverty remained at the forefront of issues. Like many other developing countries, Madagascar has experienced a severe economic crisis characterized by declining per capita GDP and increased poverty. In 1984–86, per capita GDP was 28 percent below its historical peak reached in early 1970s (Pryor, 1990a). The origin of this crisis is traced back mainly to past policy mistakes, in particular, to increasing government intervention in the productive and trade sectors of the economy, and to the failure of the *invest-to-the-hilt* program launched in 1978. The program relied on relatively short-term foreign debt and money creation to finance mostly ineffective and inefficient public projects. These policies led to a short-lived economic boom, high inflation and unsustainable levels of foreign debt. In an attempt to mitigate the negative impact of the crisis, the government, with the help of the international community, initiated a reform program aimed at liberalizing domestic markets and the allocation of foreign exchange. Other objectives of the reform were to limit the role of the government to creating and maintaining an appropriate incentive structure and an adequate system of physical and social infrastructures. These reforms imply a fundamental restructuring of the government budget both on the revenue and expenditure sides.

There are many issues of interest that could be addressed within a poverty assessment in a country, namely: How is individual well-being to be assessed? Who are the poor? How poor are they? How severe is poverty in the given society and why? These issues relate to the *identification* and *aggregation* problems and the search for the *determinants* of poverty (at least in terms of growth and inequality). A person's standard of living is commonly taken as his or her consumption of privately supplied goods, income thus may serve as a proxy for consumption. It is desirable to include also access to publicly provided goods, but in the present study this turns out to be a difficult task due to data limitations. For the purpose of policy recommendations, it is important to identify the causes of poverty in a particular society.

In this paper, we focus our attention on the structure and the dynamics of poverty in Madagascar over the 1962–80 period. The choice of the sample period is mainly dictated by the available data. The numerical base of our analysis is found in two aggregate data sets on income distribution in Madagascar (1962 and 1980) reported in (Pryor, 1988).<sup>3</sup> Several authors have used the same data set to analyze income distribution in Madagascar (Pryor 1990a, b; Dorosh *et al.*, 1990). Their focus and methodology differ from ours however. They analyze the distribution in terms of sectoral averages and Gini coefficients. Pryor incorporates estimates of the Theil measure of inequality and of the log variance of income. With respect to poverty *per se*, the studies focus on incidence and tend to draw inferences more on the basis of correlates of poverty. In particular, Pryor raises the issue of the impact of the decline of per capita GDP on the income of the poorest segment of the population. However, he bases his analysis mainly on anthropometric indicators (weight of infants at birth, height and weight of children under the age of five). We focus more on the implications of the observed changes in income distribution on poverty. Furthermore, we base our analysis on parameterized Lorenz curves estimated from the available aggregate data. The poverty measures are derived

from these Lorenz curves rather than unit records. This approach allows us to perform some counterfactual analysis. In particular we are able to simulate the effects of distributionally neutral growth and the contribution of intersectoral disparities to aggregate poverty. The search for causes of the observed poverty changes in Madagascar will be directed towards events affecting the rate of growth and the distribution of benefits from growth.

The outline of the paper is as follows. Section 2 reviews the analytical framework. It describes some basic poverty measures and discusses the role of growth and inequality as determinants of poverty over time. The data used in the analysis are described in section 3. Sections 4 and 5 cover rural and urban poverty respectively. Section 6 discusses sectoral disparities and aggregate poverty. Concluding remarks are made in section 7.

## 2. ANALYTICAL FRAMEWORK

In this section we summarize basic concepts and methods underlying poverty measurement and comparisons. It is important at the outset to note that any policy recommendation is constrained by the analytical input. The reliability of this input, in turn, is determined by that of the organizing framework and the data set to which the framework applies.

### 2.1. *Measurement of Poverty*

Typically, there are three dimensions of poverty that we are interested in measuring: *incidence* or prevalence is given by the proportion of the total population living below the minimum standard, depth or *intensity* reflects the extent to which the well-being of the poor falls below the minimum, and the degree of *inequality* among the poor tells us more about “severity.”<sup>4</sup> Three basic ingredients enter the definition of most poverty measures: an indicator of the standard of living, the associated density function and a poverty line.

Several criteria can go into the determination of a poverty line. In the consumption-based approach, one starts with an estimate of the level of expenditure necessary to achieve a minimum standard in terms of nutrition and other basic needs. This estimate is then adjusted upward to reflect additional expenditure on other non-food items necessary for the participation of the individual in everyday life of the society. On the conceptual level, it is undeniable that there exist levels of consumption of commodities (food and non-food) below which survival is threatened.<sup>5</sup> However, based on the *value judgements* that go into the determination of these thresholds, it is clear that the location of poverty lines is uncertain. There are three approaches that may be followed in the computation of a poverty line (Demery, 1993). The absolutist approach is traced to a distinction made by Sen between “capabilities” conferred on individuals by income, and the goods necessary to provide these capabilities (Sen *et al.*, 1987). In this line of thinking, an absolute poverty line is computed on the basis of food and non-food expenditures

<sup>4</sup>This terminology is from Demery (1993, p. 60).

<sup>5</sup>Lipton and Ravallion (1993, p. 2575).

required to provide a minimum set of capabilities. The relativist approach recommends that the poverty line be determined as a fraction of mean income. Finally one may select the poverty line on the basis of a percentile cutoff of the distribution.

Now, suppose that for a particular situation we have resolved to our satisfaction the issues relating to the measurement of living standards and the determination of the poverty line. Let  $y$  be the chosen living standard indicator with  $f(y)$  as the density function.<sup>6</sup> Let the poverty line be denoted by  $z$ . A measure of poverty is a function  $\psi(y, z)$ , assumed to be non-increasing in  $y$ , non-decreasing in  $z$  and homogeneous of degree zero.

If we further restrict our attention to the class of additive poverty measures, then the value of aggregate poverty is given by

$$(1) \quad P(z) = \int_0^z \psi(y, z) f(y) dy.$$

Additivity ensures sub-group consistency. That means, if poverty increases in any sub-group of the population without decreasing elsewhere then aggregate poverty also increases.

Our empirical results are based on the following specification of the poverty measure for the  $i$ -th individual:

$$(2) \quad \psi(y_i, z) = (1 - y_i/z)^\alpha, \quad \alpha = 0, 1, 2, 3, \dots$$

where  $\alpha$  measures the aversion to inequality among the poor. When this parameter is equal to zero, the aggregate poverty measure collapses to an indicator of poverty prevalence known as the *head-count index*, denoted as  $H$  or  $P_0$ . This index is totally insensitive to differences in the depth of poverty. It will not change no matter how much more poor the poor become as long as no one crosses the poverty line. Concerns about the depth of poverty may be factored in just by setting the inequality aversion parameter to unity. This yields the *relative poverty gap index* which may be defined as

$$(3) \quad P_1 = H \left( 1 - \frac{\mu_z}{z} \right)$$

where  $\mu_z$  is the mean income of the poor given by the following expression:<sup>7</sup>

$$(4) \quad \mu_z = \frac{1}{H} \int_0^z y f(y) dy.$$

Even though the relative poverty gap index does not appropriately capture inequality among the poor, it does have an intuitive interpretation. To see this, consider a situation where  $y$  is observable and it is possible to give everybody a transfer of  $(z - y)$ . Afterwards, there will be no more poverty since every individual would have at least an income equal to  $z$ . Thus, in an ideal world where perfect targeting is possible and there would be no incentive effects associated with such

<sup>6</sup>For analytical convenience only we take  $y$  to be continuously distributed.

transfers,  $zP_1$  represents the minimum amount of resources that must be transferred, on average, from the non-poor to the poor in order to eradicate poverty.<sup>8</sup>

## 2.2. Poverty Comparisons

In general, poverty measures do not constitute the end of poverty analysis. More often, we are interested in understanding poverty changes over time, or across states or socioeconomic groups. An understanding of this change requires explicit reference to the fundamentals underpinning the entire process. It seems reasonable to interpret changes in poverty over time in terms of changes in these fundamentals. Kakwani derives a decomposition of poverty changes into *growth and inequality effects* in terms of point elasticities (Kakwani, 1990). However such a decomposition is valid only for small changes.<sup>9</sup> For large changes, a different approach is required. Instead of summarizing inequality by the Gini index, one may use a parameterized Lorenz curve of the form  $L(\pi; \theta)$  where  $\theta$  is a vector of estimable parameters. In our empirical investigation we have tried the two most common specifications: the Beta Lorenz curve (Kakwani, 1980) and the general quadratic or GQ Lorenz curve.<sup>10</sup> The results reported here are based on the GQ framework which fits our data best. Given that poverty indices are computed on the basis of a distribution of living standards, which is fully determined by the mean and the Lorenz curve, the poverty measure therefore has the general form  $P(\mu/z, \theta)$ .

Datt shows how the estimated Lorenz curve may be used to perform poverty simulations under a variety of circumstances (Datt, 1992). In particular, the methodology allows: (1) a test of the sensitivity of poverty measures with respect to the poverty line; (2) a simulation of the effect on poverty of distributionally neutral growth (i.e. a growth process which entails changes in mean income without a change in relative inequality embedded in the Lorenz curve); (3) a decomposition of changes in poverty into growth and inequality components according to the following formula:

$$(5) \quad P(\mu_1/z, \theta_1) - P(\mu_0/z, \theta_0) = [P(\mu_1/z, \theta_0) - P(\mu_0/z, \theta_0)] \\ + [P(\mu_0/z, \theta_1) - P(\mu_0/z, \theta_0)] + \text{Residual}$$

where 0 and 1 refer to two different dates, e.g. the base and terminal years. Thus the growth component of a change in the poverty measure is the change in the index due to a change in the mean while holding the Lorenz curve constant. The inequality component is associated with the change in the Lorenz curve while holding the mean constant at the base value.

<sup>8</sup>Normalizing the population size to one, we find that the total income of the poor before transfer is equal to  $H\mu_z$ . After transfer, this income becomes  $H_z$ . The total amount of transfer is therefore equal to:  $(H_z - H\mu_z) = zP_1$

<sup>9</sup>Ravallion (1994b) argues convincingly that this decomposition may lead to large errors in the case of big discrete changes. This is due to the fact that the poverty measures are nonlinear and may shift in a variety of ways not necessarily consistent with Kakwani's assumption.

<sup>10</sup>Datt (1992, p. 3) explains that this functional form is due to Villasenor and Arnold (1984, 1989).

### 3. DATA

Pryor provides a wealth of historical statistics on the Malagasy economy compiled from a variety of sources (Pryor, 1988). In particular, it includes population data, a size distribution of land holdings in 1961–62, and estimates of income distribution in 1962 and 1980. The data are presented in the form of class intervals with the associated frequency and mean income. The 1962 distribution is broken down into one for the rural sector and the other for the urban sector.<sup>11</sup> The urban data cover only the six largest cities and are presented in 26 income classes (the rural distribution distinguishes 10 income classes). It is reported that estimates of the distribution of income were made for the secondary urban centers in 1962, however, only summary statistics are available. Pryor's estimation of income distribution in small towns was performed under the assumptions that: (1) the ratio of average income in these secondary centers to the average income in the large cities was equal in 1962 to 77 percent of that observed in 1980; (2) income inequality remained constant within the secondary towns. Having noticed that the aggregate rural and urban incomes from the surveys do not match the estimates of personal income reported in the national accounts, Pryor adjusts the distributions in order to ensure consistency.

The 1980 data is based on two surveys covering the rural area and secondary urban centers. In estimating the change in the average real rural income from 1962 to 1980, Pryor used the average of the GDP deflator and the retail price index (Pryor, 1988). He found an increase of about 14 percent corresponding roughly to the observed decrease of average real production in the primary sector. He concluded that rural income may have been overestimated and therefore scaled estimates of rural incomes by 15 percent. Dorosh *et al.* argue that such an adjustment is unwarranted since the 1962 primary production data may also have overestimated both production and income (Dorosh *et al.*, 1990). They offer a different estimate of income in 1980 constructed from unadjusted Pryor's data and from survey results reported in BDE (1987).<sup>12</sup> Furthermore, their estimate of the distribution for the largest seven cities is based on the assumption that the Gini coefficient for large urban centers in 1980 is the same as that for small urban centers (in the same year). This assumption seems less restrictive than Pryor's.

On the basis of the above discussion, we chose to base our analysis on Pryor's unadjusted data for 1962 and Dorosh's for 1980. We now need to select a poverty line. The available information does not allow us to estimate a poverty line from scratch. We do consider several that have been proposed in different studies. Dorosh *et al.* compute two poverty lines: one for the rural and the other for the urban sector. Their calculations are based on the food-share approach.<sup>13</sup> This involves estimating first for each sub-group the cost of a food bundle that can

<sup>11</sup>Pryor (1988, pp. 43–44) says the rural estimates are based on a sample survey reported in Patrick J. François (INSRE), "Budgets et Alimentations des Ménages Ruraux: Rapport de Synthèse," Imprimerie SPIT, Paris, 1967. The urban income data come from Ministère des Finances et du Commerce, INSRE, 1963, "Enquête sur les Budgets Familiaux en Milieu Urbain Malgache, Antananarivo.

<sup>12</sup>Banque des Données de l'Etat (BDE), Enquête sur les Budgets des Ménages: Revenu/Milieu Rural et Centres Urbains Secondaires, Antananarivo, Présidence de la République.

<sup>13</sup>Ravallion (1994a, pp. 33–34).

achieve a given energy-intake level. The result is then divided by the share of food in total expenditure of some group of households deemed to be poor (say, the 20 percent poorest). In the case at hand, rice is the staple food of Madagascar for all income groups, accounting for over half the daily calorie intake and at least 30 percent of total household expenditure. Furthermore, rice production is an important revenue generating activity for rural households. Based on these considerations, it is estimated that it takes 297 grams of rice per person per day at a cost of FMG 17.84 to meet 50 percent of total calorie requirements at 1980/81 official prices. They further estimate, for a typical low-income family in Madagascar, that expenditure on rice represents 40 percent of total expenditure on food which, itself is 70 percent of total expenditure. These estimates imply a minimum per capita income of FMG 23,256 per year. Assuming an average rural household of 5.67 and an average urban household of 6.47 people, one gets the following poverty lines: FMG 132,000 for rural households and FMG 150,000 for urban households. It is useful to note that in 1980, the minimum wage was FMG 132,900 per year for agriculture and FMG 130,524 per year for non-agriculture. The GDP deflator was used to convert these into their 1962 equivalent. However, one should bear in mind the fact that this method of computing poverty lines may lead to inconsistencies in poverty comparisons across sectors or dates. This may be due to differences in average income or to the fact that a given standard of living may be considered poverty in one state and not in another. Pryor proposes a pragmatic poverty line based on the fortieth percentile of the 1962 distribution (Pryor, 1990b). He notes that, this segment of the population had an annual income of FMG 47,400. In real terms this corresponds to an annual income of FMG 146,400 in 1980. Most of our analysis will be based on Pryor's poverty line. This preference is due to the fact that the cut-off point is chosen from the overall distribution in the base year (1962) and the 1980 line is an extrapolation of the base line. This should ensure some consistency in the comparisons we make. However, other lines will be tried, including Dorosh *et al.*'s, within the admissible range in order to check the sensitivity of the results.

#### 4. RURAL POVERTY

Table 1 contains a time profile of rural poverty in Madagascar for 1962 and 1980. Both poverty and inequality measures are derived from a GQ Lorenz curve fitted to the available data.<sup>14</sup> These indices are expressed in percentage points while the mean is in thousands of Malagasy Francs.

On the basis of the chosen poverty line (Pryor, 1990b), it is estimated that about 47 percent of rural households lived in poverty in 1962 vs. 42 percent in 1980. If the analysis were focused on poverty incidence only, one would be tempted to conclude that rural poverty has declined in Madagascar between 1962 and 1980. However, this conclusion does not hold in the face of the two other poverty indices. In fact, the relative poverty gap and the  $P_2$  indices both show that rural poverty has increased instead. This observation suggests that the two incidence

<sup>14</sup>Estimated with POVCAL. See Chen, Datt, and Ravallion (1991); and Datt (1992).

TABLE 1  
RURAL POVERTY IN MADAGASCAR

Measures	1962			1980		
	Value	Growth Elasticity	Gini Elasticity	Value	Growth Elasticity	Gini Elasticity
$P_0$	46.65	-2.07	0.60	42.25	-1.32	0.73
$P_1$	10.50	-3.44	2.27	15.24	-1.77	2.53
$P_2$	3.15	-4.67	3.91	7.51	-2.06	4.24
$\mu$	60.95			227.1		
$G$	29.90			41.54		

Source: Author's calculations.

curves must cross. Thus the first order dominance test would fail.<sup>15</sup> To check the sensitivity of this result, we re-computed the measures using the poverty line proposed by Dorosh *et al.* converted to its 1962 equivalent on the basis of the GDP deflator. This led to an unambiguous increase in rural poverty. Table 1 also shows an increase of inequality in the distribution of rural incomes as the Gini index goes from 30 to about 42 percent.

To interpret these results, we reconsider the idea that growth and inequality in the distribution of welfare are the basic determinants of the poverty time path. Inequality as measured by the Gini coefficient has increased. As for the economic growth, it is well known that the Malagasy economy has stagnated over a time spanning three decades since independence in the 1960s. Pryor reports that per capita GDP declined on average 0.2 percent annually from 1950 through 1986 (Pryor, 1990a). The major deterioration occurred after 1972. It is estimated that per capita GDP declined on average by 2.4 percent per year between 1972 and 1990. Furthermore, the primary sector (agriculture, forestry and fishing) grew the least. This growth record must have contributed to an increase of rural poverty.

To bring out which factor did contribute more in the increase of rural poverty over time, we decompose the variations in all poverty measures into their growth and inequality components. The results are presented in Table 2.

TABLE 2  
DECOMPOSITION OF CHANGE IN RURAL POVERTY IN MADAGASCAR  
(based on equation (5))

Measures	Total Change	Growth	Inequality	Residual
$P_0$	-4.40	-17.72	6.24	7.08
$P_1$	4.74	-5.67	10.29	0.12
$P_2$	4.36	-2.06	7.68	-1.26

Source: Author's calculations.

<sup>15</sup>One usually relies on the theory of stochastic dominance to compare distributions of living standards when the main concern is with the ordinal ranking of the distributions involved. Thus a distribution  $A$  dominates  $B$  to the first-order if, within the relevant range of the welfare indicator, the curve representing  $B$  lies nowhere above that of  $A$ . In terms of poverty incidence, we must conclude that poverty is lower in  $B$  than in  $A$  regardless of the poverty line chosen.



Except for the head count index, the above results show that the inequality component dominates the growth component in the determination of the time path of rural poverty in Madagascar. In the case of the poverty gap and  $P_2$ , the measures of total change in poverty and of the inequality component have the same sign. The growth component is of the opposite sign and the residual is negligible. The available data suggest therefore that the observed increase in rural poverty in Madagascar is essentially due to increased inequality in the distribution of rural incomes. What might have caused rural inequality to increase?

The inefficiencies in the state-run marketing system led to the appearance of parallel markets for agricultural products and inputs (such as fertilizer). Also the environment, created by a macroeconomic framework characterized by foreign exchange, consumer and intermediate good shortages, and by a deteriorated road network is particularly disabling for poor farmers who may not have the means to deal in the parallel economy. Even the distribution of rural credit is thought to be skewed in favour of the estates and wealthier smallholders. In 1975, the four commercial banks that have existed since independence were nationalized and given specialized roles to play in the financing of the economy.<sup>16</sup> In this context, the National Rural Development Bank (BTM) was created to focus on agriculture.<sup>17</sup> It is reported that on a consistent basis a smaller share of total agricultural credit has gone to smallholders thus forcing them to rely more on informal credit arrangements (Pryor, 1990a).

## 5. URBAN POVERTY

The data contained in Table 3 show that poverty has increased in the largest urban areas in Madagascar from 1962 to 1980. This increase in urban poverty is revealed by all three poverty indicators and has occurred in spite of a drop of about 4 percentage points in the Gini index.

TABLE 3  
URBAN POVERTY IN MADAGASCAR

Measures	1962			1980		
	Value	Growth Elasticity	Gini Elasticity	Value	Growth Elasticity	Gini Elasticity
$P_0$	13.35	-2.34	7.50	18.47	-1.43	3.1
$P_1$	2.72	-3.90	16.70	6.73	-1.75	6.93
$P_2$	0.73	-5.43	25.81	3.31	-2.06	10.78
$\mu$	199.31			462.70		
$G$	50.25			46.52		

Source: Author's calculations.

Contrary to what happened in the rural sector, it appears that the increase in urban poverty is due to the growth component. This conclusion is confirmed by the results presented in Table 4 on the decomposition of the change in urban poverty. It is known that, from 1977 to 1979, the Malagasy government took

<sup>16</sup>Up to this point, all four banks lent to the agricultural sector and mainly to estates.

<sup>17</sup>Bankin' Ny Tantsaha Mpamokatra.

deliberate action to modify urban income distribution: the minimum wage received by the lowest categories was raised faster than that of the highest categories, the public pay scale was also restructured in favour of the lowest paid workers while the salaries of the highest paid civil servants were frozen; these urban wage policies were supplemented by subsidized sales to the urban sector of such basic items as rice. Although these policies might account for the observed decrease in urban inequality, they were not effective in alleviating urban poverty. The “urban-bias” introduced in government policies might have alleviated urban poverty had the invest-to-the-hilt program sparked a sustainable growth at a significantly high level.

TABLE 4  
DECOMPOSITION OF CHANGE IN URBAN POVERTY IN MADAGASCAR

Measures	Total Change	Growth	Inequality	Residual
$P_0$	5.12	9.74	-1.34	-3.28
$P_1$	4.01	3.88	1.20	1.07
$P_2$	2.58	1.73	1.00	-0.15

*Source:* Author's calculations.

Developments in the urban labour market during the sample period are consistent with the observed increase in urban poverty. Unlike poor smallholder farmers who may own land in addition to their labour, the urban poor draw their income solely from the sale of labour services to the private or the public sector. There is evidence that urban income levels have fallen significantly in the 1970s.<sup>18</sup> Between 1966 and 1984, real average annual wages in the private sector fell on average 0.8 percent per year; for the industrial workers, the annual average wages fell at a rate of 2.3 percent during the same period. The behaviour of wages offered by the public sector was no different.

## 6. SECTORAL DISPARITIES AND AGGREGATE POVERTY

As stated earlier, one important analytical advantage of the class of poverty measures used here is that additive separability allows us to compute aggregate poverty as a population weighted average of sectoral poverty. Various estimates of the sectoral distribution of the Malagasy population show that, in 1962, 89 percent of the population lived in the rural area, 3 percent in small towns and 8 percent in the six largest cities. Not having a separate estimate of income distribution for secondary urban centers in 1962, we derive aggregate poverty for that year as if 11 percent of the total population were urban. In 1980, the sectoral distribution of the population was as follows: 81 percent rural, 7 percent in small towns and 12 percent in the 7 largest.

Three factors determine poverty at the aggregate level: sectoral disparities in average living standards, intra-sectoral inequalities and the overall mean living standard. Understanding how sectoral disparities contribute to aggregate poverty can help us in assessing whether and to what extent aggregate poverty may be

<sup>18</sup>World Bank (1989).

TABLE 5  
CONTRIBUTION OF SECTORAL POVERTY TO AGGREGATE POVERTY

Aggregate Poverty	1962			1980			
	Value	Rural Share	Urban Share	Value	Rural Share	Semi-urban Share	Urban Share
$P_0$	42.99	96.6	3.4	38.29	89.4	4.83	5.77
$P_1$	9.64	96.8	3.2	13.86	89.1	5.10	5.80
$P_2$	2.88	97.2	2.8	6.84	88.9	5.30	5.80

Source: Author's calculations.

reduced by policies aimed at reducing these sectoral disparities. Conversely, such a structural analysis helps us understand the extent to which sectoral disparities may have aggravated overall poverty.

We present our estimates of the contribution of sectoral poverty in aggregate poverty in Table 5. The results show that poverty in Madagascar has remained essentially a rural phenomenon. In 1962, regardless of the indicator used, the rural sector has accounted for about 97 percent of aggregate poverty. This figure stood at about 89 percent eighteen years later. This naturally explains why changes in aggregate poverty presented in Table 5 have the same pattern as rural poverty. It is thus clear that the policy reversal of the mid-1970s could not be defended strictly on the grounds of poverty alleviation.

Table 6 depicts the contribution of sectoral disparities in mean income to aggregate poverty. The simulated values indicate what poverty would have been if the rural and urban average incomes were set to the national average. The national average income was estimated at FMG 76,170 in 1962 and FMG 254,110 in 1980. The contributions computed in the above table are partial since the observed measures embody all three determinants of poverty and the simulations control only for inter-sectoral inequality in mean income. The control is achieved by maintaining the same overall mean and by maintaining the intra-sectoral distributions constant (using equation (5)). Subject to the limitations of the methodology used, the results do suggest that the difference in average income between the urban and rural populations was an important factor underlying the overall poverty in Madagascar in 1962. For the three poverty measures used, the contribution of this inequality in average income ranges from 28 to 34 percent. The estimated contribution is much less in 1980, ranging from 9 to 11 percent. This may be due

TABLE 6  
PARTIAL CONTRIBUTION OF SECTORAL DISPARITIES IN MEANS TO AGGREGATE POVERTY

Measures	1962			1980		
	Observed	Simulated	Contribution of Unequal Means	Observed	Simulated	Contribution of Unequal Means
$P_0$	42.99	28.60	33.47	38.29	34.94	8.74
$P_1$	9.64	6.02	37.51	13.86	12.35	10.91
$P_2$	2.88	2.08	27.71	6.84	6.09	10.94

Source: Author's calculations.

to the fact that the income gap between the rural and the urban sectors became narrower in 1980. The ratio of the average rural income to average urban income increased from 0.31 in 1962 to 0.42 in 1980. Average family incomes in the major cities (excluding expatriates) in Madagascar declined about 27 percent between 1962 and 1980, while average family incomes in the rural sector remained roughly constant (Pryor, 1990b).

Given the narrowing of the average income gap between the two sectors and the increase in the rural inequality (and hence of overall poverty), we decided to estimate the impact of a reduction of this inequality on aggregate poverty. To do this, we conducted two sets of simulations. Holding the sectoral means, urban and semi-urban distributions constant, we altered the rural distribution in 1962 and 1980 in such a way that the Gini coefficient is reduced by 5 and 10 percent respectively. We then calculated the corresponding aggregate poverty on the basis of population weights. The comparison of the simulated measures to the observed ones gives the impact of rural inequalities on aggregate poverty. The results are presented in Table 7 and reveal that changes in aggregate poverty associated with a reduction in the rural Gini are higher for the poverty measures that take into account both the depth of poverty and inequality among the poor. Furthermore, the reduction of rural inequalities would have had about the same impact in 1962 as in 1980.

TABLE 7  
IMPACT OF RURAL INEQUALITY ON AGGREGATE POVERTY IN MADAGASCAR

Measures	1962			
	Simulation 1 (5% Drop in $G_r$ )	Change in Poverty (%)	Simulation 2 (10% Drop in $G_r$ )	Change in Poverty (%)
$P_0$	41.24	-4.08	40.21	-6.47
$P_1$	8.61	-10.67	7.60	-21.56
$P_2$	2.42	-15.94	1.90	-33.86
1980				
$P_0$	36.14	-5.61	34.69	-9.41
$P_1$	12.59	-9.20	11.10	-19.95
$P_2$	5.96	-12.87	4.84	-29.20

Source: Author's calculations.

Note:  $G_r$  represents rural Gini.

However, when contrasted with the results in Table 6, it appears that a 5 percent reduction in the Gini coefficient of the rural distribution would have accomplished about the same level of poverty alleviation as a full equalization of average income for the two sectors. In fact, a 10 percent reduction in the rural Gini would have accomplished more in 1980 than full mean equalization. Such a reduction in rural inequality would have certainly entailed land redistribution. This obviously is a very difficult political task.

## 7. CONCLUDING REMARKS

In this paper we have inferred poverty measures from two aggregate estimates of income distribution in Madagascar: 1962 and 1980. Using a relative poverty

line defined on the base year data and kept constant in real terms over time, we estimated three poverty indices for the rural and urban sectors on the basis of parameterized Lorenz curves. Aggregate poverty was estimated using population weights and the additive decomposability of the chosen class of poverty indicators. Observed changes in poverty over time were decomposed in three components: growth, inequality and a residual.

Our results suggest that, in spite of the observed decline in the head-count index from 47 to 42 percent, the depth of poverty as well as inequality among the poor in the rural area may have increased between 1962 and 1980. In fact, the Gini coefficient of this distribution increased from 30 to 42 percent. It is most likely that the macroeconomic framework led to a distorted environment within which it became harder for an average smallholder to cope. The situation may also have been exacerbated by the bias in the rural credit policy in favour of richer farmers.

Urban poverty increased by all poverty measures. The head-count index moved from 13 percent in 1962 to 18.5 percent in 1980. Inequality decreased slightly as the Gini coefficient dropped from 50 to 46.5 percent. The decomposition of these changes suggest that the increase in urban poverty is due mostly to the lack of economic growth.

At the aggregate level, poverty remains a rural phenomenon in Madagascar. In 1962, it accounted for at least 97 percent of national poverty vs. 89 percent in 1980. Sectoral disparities in terms of mean income seem to be higher in 1962 than in 1980. Our simulations suggest that a significant reduction in aggregate poverty could have been achieved in Madagascar if government policies had dealt effectively with the reduction of these disparities. Even though our results also show that redistributive measures in the rural economy could lead to a significant reduction of poverty at the national level, we doubt this could be politically feasible.

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