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The Logo was kindly provided by the Mozambican artist Nlodzy.

Has economic growth in Mozambique been pro-poor?

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Abstract

Using the 1996–97 and 2002–03 nationally representative household surveys, we examine the extent to which growth in Mozambique has been pro-poor. While all segments of the income distribution experienced a rapid increase in consumption between the sample periods, the rate of growth in consumption was slightly higher for richer households. This has led to a moderate increase in inequality at the national level, as demonstrated by the rise in the Gini coefficient from 0.40 to 0.42. However, this slight increase in inequality at the national level is not statistically significant, and its impact on poverty reduction efforts is small: the poverty headcount would have been 53.0 percent in 2002–03 if all sections of society had enjoyed the mean growth rate in consumption, compared with the 54.1 percent at which it actually stood. Interestingly, static decompositions of the generalized entropy class of inequality measures indicate that inequality in real consumption between provinces and regions has diminished over time, in contrast to popular claims. Maputo City continues to have the highest rates of inequality in the country and witnessed a significant increase in inequality between 1996–97 and 2002–03 (the Gini coefficient rose from 0.44 to 0.52).

Key words: inequality, poverty, growth, Mozambique

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1. Introduction

Within the discourse on "pro-poor growth", the long-standing debate about the extent to which the poor benefit from economic growth has re-emerged as a topical and controversial issue. Opponents of the current patterns of economic growth insist that global market forces are leading to ever widening inequalities at national levels. These critics argue that although economic growth may be occurring at an aggregate level, its distribution across income groups is such that the poor see little, if any, benefits (Oxfam, 2000). Others disagree. Dollar and Kraay (2002), for example, in a cross-country analysis conclude that log mean income of the poorest quintile (inferred from distributional shares and GDP per capita) changes one-to-one with the overall log GDP per capita. Empirical evidence is cited to support both views. However, there is considerable controversy over definitions, measurement techniques and analytical approaches, particularly in the analysis of cross-country data sets (see Ravallion, 2001; Shorrocks and van der Hoeven, 2005).

At the time of the first national household survey in 1996–97, Mozambique was recognized as one of the world's poorest countries (UNDP, 1997). In fact, in the 1996–97 national survey of household consumption (known as the IAF96[1]), mean consumption per capita in Mozambique was actually below the absolute poverty line (MPF/UEM/IFPRI, 1998). In other words, if the same level of total consumption had been distributed perfectly equally among Mozambicans in 1996, every man, woman and child would have

[1] The abbreviation IAF is from the Portuguese name for the survey, *Inquérito aos Agregados Familiares*, or "Household Survey".

lived in absolute poverty.[2] Therefore, in the Mozambican context the need for pro-poor growth is self-evident: redistribution efforts alone have extremely little scope to reduce levels of poverty. Poverty reduction in Mozambique requires growth, as it does in many low-income countries.

In the period 1996 to 2002, the economy grew by a cumulative 62 percent according to national accounts data. Crucially for poverty reduction, the agricultural sector contributed strongly to overall growth. The presence of some large investment projects which added substantially to GDP but little to national income contributed to a less rapid but still considerable growth in aggregate consumption of 50 percent. Coincident with this economic growth, poverty and well-being analyses based on a second national household survey carried out in 2002-03 (IAF02) indicated a substantial fall in the poverty headcount from 69.4 percent of the population in 1996–97 to 54.1 percent in 2002–03 (MPF/IFPRI/PU, 2004). Using the two household surveys, real growth in average consumption between the 1996-97 and 2002-03 comes remarkably close to the 50 percent value published by national accounts with the exact value depending upon the deflator employed. At the national level, other indicators, such as the Core Welfare Indicators Survey, an Agricultural Incomes Survey, a Demographic and Health Survey and a host of administrative data, also provide support for relatively rapid growth and poverty reduction (MPF/IFPRI/PU, 2004). While the trend is impressive, that over half the population continues to live in absolute poverty highlights the imperative for poverty reduction to remain at the heart of Mozambican policy.

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[2] As the mean consumption was 97 percent of the poverty line, if there had been no inequality in the 1996–97 survey there would have been a minuscule poverty gap (0.027) and a negligible squared poverty gap (0.001)

This article seeks to examine trends in inequality, particularly the extent to which economic growth in Mozambique has benefited the poor. Inconveniently, despite the pervasiveness in development discourse of the term "pro-poor", there is no consensus on its definition. Kakwani and Pernia (2000) suggest a narrow definition in which growth can be deemed pro-poor if the accompanying change in income distribution by itself reduces poverty. Yet, as Kraay (2004) notes, this is a rather restrictive notion given that patterns of growth would not be deemed pro-poor if the income of the poor grew at a slower pace than the incomes of higher income groups, even if rapid rates of poverty reduction had taken place.

A broader definition is that growth is pro-poor when the poverty incidence falls (Ravallion and Chen, 2003). However, this definition is also not without problems. It is questionable, for example, whether an annual 10 percent growth rate for the population as a whole should really be described as pro-poor if the real income growth of those below the poverty line was considerably smaller – for example, one percent – resulting in only a marginal reduction in absolute poverty and a significant increase in relative poverty. This article attempts to take a nuanced view by considering the pattern of growth across the entire income distribution.

In this article two broad research questions are addressed: (1) What was the inequality profile of Mozambique in 2002–03? (2) How did the inequality profile of Mozambique change between 1996–97 and 2002–03? Static decomposition techniques are used to examine the pattern of inequality between and within different sub-groups of the 2002–03 national household survey of consumption, known as the IAF02. In examining how inequality has changed over time, the IAF96 and IAF02 consumption

surveys are compared using standard inequality measures. The statistical significance of changes in inequality is tested using bootstrapped standard errors. This, coupled with an examination of the average annual growth rate in consumption across the population distribution, enables us to examine how broad-based the growth in consumption was between the two survey periods.

The methodology used in this article is described in the following section, including the construction of the welfare measure, the inequality indexes employed, and the method used to estimate their standard errors. Section 3 presents national and sub-national inequality results for Mozambique for the two surveys (1996–97 and 2002–03). The pattern of economic growth across the income distribution is also examined in this section. Discussion of the results and conclusions are presented in section 4.

2. Methodology

Definition of welfare measure

This study builds on the analysis already undertaken as part of the second national assessment of poverty and well-being and uses consumption per capita as the welfare metric (MPF/IFPRI/PU, 2004). As the current analysis is based on the estimates of real consumption calculated in the poverty assessment, an outline of the methodology is necessary.[3] Both the 1996–97 IAF and 2002–03 IAF were nationally representative surveys containing detailed information on expenditure for 8250 and 8700 households respectively. In the analysis of both surveys, a cost of basic needs approach was

[3] The full methodology is presented in MPF/IFPRI/PU (2004).

employed to ascertain the absolute poverty lines (Ravallion 1994, 1998). Region-specific poverty lines were constructed, with the same 13 spatial regions used in both studies.

To obtain the poverty line in each region, food and nonfood basic needs were considered. To derive the food component of the line, the minimum caloric requirements of different groups of the population (e.g., children, pregnant or lactating women, adult males) were ascertained and weighted to reflect the average region-specific household composition.[4] In turn, the cost of buying the food necessary to satisfy the caloric requirements was calculated. The composition of the basic needs food basket was determined by the actual consumption patterns of poor households, as recorded in the surveys, rather than by an externally imposed least cost diet. As different commodities may be more or less expensive in different parts of the country this food poverty line was calculated separately for (the same) 13 spatial regions in each of the surveys. Furthermore, because there is considerable spatial variation in relative food prices in Mozambique (Tarp et al. 2002), the composition of the food poverty line bundles was also allowed to vary across the 13 regions.

In updating the 1996–97 poverty lines for use with the 2002–03 data, it was necessary to consider the likely impact of temporal variation in relative prices. Considerable relative price changes took place between the two survey periods in all of the 13 spatial domains (i.e., in many cases a food commodity that was the best value in 1996–97 was no longer so in 2002–03). This means there was a considerable incentive for poor households to change their consumption patterns between the two survey

[4] The same age- and sex-specific calorie requirements were used for both sets of survey data, so that any variation over space or time is entirely attributable to differences in average household composition. In practice, the mean daily calorie requirements varied little, averaging approximately 2150 kilocalories per person.

periods. Under this scenario, poverty would be overestimated in the latter sample if this substitution were ignored and the same baskets of goods used to derive the poverty lines in 1996–97 were adopted in 2002–03. Such overestimations would have considerable ramifications for the accuracy of comparisons between the two surveys. To overcome these problems a flexible approach to estimating the poverty line in 2002–03 was adopted with a different basket of food being used to derive the poverty line in 2002–03 than in 1996–97.

However, in using a flexible approach, one faces the challenge of ensuring that the basic needs poverty bundles reflect the same standard of living, both across space in 2002–03 and relative to the bundles chosen in 1996–97 (Ravallion and Lokshin, 2003). Revealed preference consistent food poverty lines were estimated using the approach described in Arndt and Simler (2005) and summarized in Appendix A. Very briefly, an information theoretic criterion was employed to adjust the food bundles for 2002–03 such that these bundles satisfied both spatial and temporal revealed preference conditions, while adhering as closely as possible to the consumption patterns revealed in the surveys.

Turning to nonfood, even the very poorest households allocate a non-trivial portion of their total consumption to nonfood items. The nonfood component of the poverty line was estimated based on the average nonfood budget share of households whose total expenditure is close to the level of the food poverty line. To ensure an adequate sample, the expenditure pattern of all households whose per capita total consumption was between 80 and 120 percent of the food poverty line was examined. From these households, the cost of the minimum nonfood bundle was then estimated non-parametrically as the weighted average nonfood expenditure. A triangular weighting

scheme was used in constructing the average, giving greater weight to observations the closer they were to the food poverty line (see Hardle, 1990). This method was used in both the 1996–97 IAF and the 2002–03 IAF to derive the nonfood share of the poverty line value in the 13 spatial areas. Table 1 shows the food, nonfood, and total poverty lines for each of the 13 spatial domains.

<Table 1 about here>

The poverty line for each of the 13 spatial areas was calculated as the sum of the food and nonfood poverty lines. To derive per capita daily consumption values, household consumption was divided equally among all household members.[5] To obtain real per capita consumption values these figures were then deflated using the poverty line for the appropriate spatial area. Representing actual consumption as a proportion of the appropriate poverty line facilitates comparisons between spatial areas within the same survey and especially across the two survey periods. For example, the total poverty line in 2002–03 in rural Nampula was 5,972 Meticais per day and in urban Gaza and Inhambane it was 10,721 Meticais. Thus, a person who consumed exactly 5,972 Meticais per day and lived in rural Nampula and a person living in Inhambane city (where the cost

[5] As a form of sensitivity analysis, we also conducted the analysis using consumption per adult equivalent unit (AEU), with the AEU scale based on food energy requirements. The results are almost identical, which is not surprising. Although changing the denominator leads to considerable re-ordering of households, the net effect on the indices is almost zero at the level of aggregation presented here (e.g., national, regional, provincial, rural, urban, broad sub-groups, expenditure percentiles).

of living is much higher) who consumed 10,721 Meticais per day would be viewed as having the same standard of living, exactly 100 percent of the relevant poverty line.[6]

As neither of the household surveys used are self-weighting, all statistics presented here are calculated using the survey sampling weights, which are the inverse of the cluster-specific probability of selection into the sample. Furthermore, as the sample weights reflect probability of selecting a household, and all of the summary statistics are population estimates (e.g., proportion of people below the poverty line rather than proportion of households) the data are also weighted by the number of members in the household. That is, the data are weighted by the product of the survey sampling weight and number of household members.

The poverty headcount and average poverty gap at the national level and for several sub-national groupings are shown in Table 2. The overall impression from the poverty estimates is that poverty decreased substantially in Mozambique between the two survey periods, but remains high, with a national headcount of 54 percent. Poverty reduction was widespread, with statistically significant declines in the poverty headcount and poverty gap indices for most of the regions and provinces presented in Table 2. The main exception to this pattern is in the southern part of Mozambique, where there was no significant change in poverty, with the point estimates actually increasing over time in Maputo Province and Maputo City, and for the southern region as a whole. The poverty

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[6] While this works well for people at or around the poverty line, it is recognized that the use of this form of deflator is less appropriate for comparing wealthy households from different regions. This is because the poverty line is derived from the goods that make up a poverty line basket, which is based on consumption patterns of poor households. To continue with example given above, it is unlikely to be the case that a wealthy individual in rural Nampula consuming 597,200 Meticais a day is really as wealthy in real consumption terms as a person in Inhambane city who consumes 1,072,100 Meticais a day as the goods such an individual consumes are unlikely to be more expensive in Inhambane city in the same way goods which make up the poverty line basket of goods would be.

declines correlate well, particularly at the national level, with information on assets, health, school enrollments, and agricultural inomce (MPF/IFPRI/PU 2004).

<Table 2 about here>

The Gini and GE measures of inequality

To derive an inequality profile for Mozambique, the Gini and generalized entropy inequality measures were used. From its first proposal in 1921, the Gini coefficient or index has been one of the most widely used measures of social and economic inequality. The Gini index was proposed as a summary statistic of the dispersion of a distribution taking on values between zero and one, with zero interpreted as no inequality. There are several ways of expressing the Gini coefficient. We use the formula found in Jenkins (1991),

$$G = 1 + \frac{1}{N} - \frac{2}{mN^2}\sum_{i=1}^{N}(N - i + 1)\, y_i \qquad (1)$$

where m is the arithmetic mean of consumption per capita and persons are ranked in ascending order of consumption per capita, y_i.

The generalized entropy (GE) set of inequality measures were also used to explore the distribution of the consumption in the sample. This class of measures takes the form given in equations 2a, 2b, and 2c below.

$$GE(c) = \frac{1}{c(c-1)} \sum_i f_i \left[\left(\frac{y_i}{\mu} \right)^c - 1 \right], \text{ for c} \neq 0, 1 \qquad (2a)$$

$$GE(0) = -\sum_i f_i \log \left(\frac{y_i}{\mu} \right), \qquad \text{for c = 0, and} \qquad (2b)$$

$$GE(1) = \sum_i f_i \left(\frac{y_i}{\mu} \right) \log \left(\frac{y_i}{\mu} \right), \qquad \text{for c = 1.} \qquad (2c)$$

In the generalized entropy equations, f_i is the population share of household i, y_i is per capita consumption of household i, μ is average per capita consumption, and c is a weighting parameter. Lower values of c are associated with greater sensitivity to inequality amongst the poor, and higher values of c place more weight on inequality among the rich. The most common values of c used are 0, 1 and 2 which we will refer to as GE(0), GE(1) and GE(2).[7] An advantage of the GE measures over the Gini coefficient is that, in being additive on i, they can be additively decomposed into between-group and within-group components of inequality. For example, the decomposition of total inequality *(I)* into two parts for the GE(1) measure is given in equation 3 below.

$$GE(1) = \left[\sum_j g_j \left(\frac{\mu_j}{\mu} \right) \log \left(\frac{\mu_j}{\mu} \right) \right] + \sum_j GE_j \, g_j \left(\frac{\mu_j}{\mu} \right) \qquad (3)$$

[7] The GE(1) measure is also known as the Theil entropy measure, and the GE(0) measure is also referred to as the Theil L, or mean log deviation, measure.

In equation 3, j refers to sub-groups, g_j refers to the population share of group j and GE_j refers to inequality within group j. The between-group component of inequality (I_b) is captured by the first term in the right-hand side of the equation. This is inequality in mean consumption between the sub-groups and reflects what the level of inequality in the population would be if everyone within each sub-group had the same (i.e., the group average) consumption level μ_j. The second term on the right hand side of the equation reflects within-group inequality (I_w), or what the overall inequality level would be if there were no differences in mean consumption across groups but there was inequality within each group. Total inequality is the sum of I_b and I_w.

At this point, there are features of the data used in this study, and the inequality measures more generally, that merit comment. First, the data are not panel data, but are two representative cross-sections. We have snapshots at two points in time of representative samples of households, but we cannot say anything about poverty or inequality dynamics at the household level. That is, we do not know how much households are moving in or out of poverty, or how much re-ordering is taking place in the expenditure distribution. Second, all of the inequality measures used are "anonymous", in that they only consider the distribution of household expenditure at a point in time, and not movements of a given household within that distribution. As such, they are appropriate for the cross-sectional data used in this article, but they also have an inherent weakness in capturing a broader concept of inequality.

As a somewhat extreme illustration of this weakness, consider an economy in which expenditure is distributed unequally in time t. But expenditure levels are not static,

and in a subsequent period ($t + 1$) the ordering of households by income is completely inverted, with the household that was poorest in time t being the richest in $t + 1$, and vice versa. The same applies to the second poorest (richest) household, and so on down the expenditure distribution. Furthermore, assume that not only is the ordinal ranking of households inverted, but the cardinal ranking is as well. Any of the inequality measures shown above would only reflect the inequality observed in the cross-section, and not detect the economic mobility through which households move up and down the expenditure distribution over time. Indeed, *average* household expenditure over the two periods would be much more equal than indicated by the inequality indices estimated from the cross-sections. If panel data were available it would be possible to estimate inequality indices based on households' average expenditures over time, but panel data on household expenditures are not presently available in Mozambique.

For tests of statistical inference, a bootstrap procedure was used to generate estimates of the standard errors of the Gini and generalized entropy inequality measures. The bootstrap samples were drawn in a manner that mimicked the cluster sample design of the IAF surveys. That is, p clusters were randomly drawn, with replacement, where p is the number of primary sampling units in the survey. When a cluster is drawn, all of the households in that cluster are drawn. Because the bootstrap sampling is done with replacement, each cluster (or household) may appear one or more times in a given bootstrap sample, or not at all. Inequality indices are calculated for each bootstrap sample. The process is repeated 500 times. The standard deviation of the inequality indices over the 500 replications is a consistent estimator of the standard error of the

inequality index. The point estimates of the inequality indices are calculated from the original, non-bootstrapped sample (Efron and Tibshirani, 1993).

3. Results

2002–03 Inequality

The national Gini coefficient based on the 2002–03 IAF is 0.42 which represents a fairly high degree of inequality, though not out of line with other sub-Saharan African countries.[8] Average consumption in the highest quintile is eight times the average consumption in the poorest quintile. In fact, mean consumption in the poorest quintile is only 39 percent of the poverty line, i.e., less than half of what is required to meet basic needs. Mean consumption per capita for the entire population in 2002–03 is 128 percent of the poverty line (see Table 3). Consequently, at this level of total consumption everyone would live above the absolute poverty line if there were no inequality in the country.

<Table 3 about here>

Inequality varies considerably across different regions, provinces and areas (see Table 4). In rural areas the Gini coefficient was just 0.37, compared with 0.48 in urban areas. In other words, consumption in rural areas was far more equal across the sample households than in urban areas, a familiar result because urban areas tend to be more economically heterogeneous. At the regional level, inequality was lowest in the north and

[8] For example, Christiaensen et al. (2003) report Gini coefficients of 0.37 for Ghana, 0.38 for Madagascar, 0.38 for Uganda, 0.47 for Nigeria, and 0.50 for Zambia.

center, with an estimated Gini coefficient of 0.39 in each. Inequality was much higher in the south of the country, particularly in Maputo City, where the estimated Gini coefficient was 0.52.

<Table 4 about here>

The GE inequality measures parallel the patterns revealed by the Gini coefficients. Consumption is more equal in rural areas, while the south, particularly Maputo City, exhibits the highest inequality in the country, whichever GE measure is used. Interestingly, the GE(2) value for Maputo City is nearly twice that of the national average. This indicates that the higher inequality in Maputo City is attributable to the presence of a small but particularly well-off sub-group of citizens.[9]

Inequality by province was also examined (Table 5). The pattern of inequality within provinces tends to follow the regional figures, with northern and central provinces showing somewhat lower levels of inequality than the southern provinces. Provinces with inequality above the national average were Cabo Delgado, Inhambane, Sofala, and Maputo (province and city). Given the higher levels of inequality recorded in urban areas generally, it is not surprising that inequality was higher in Sofala province than other central provinces, as it is home to the second largest city in the country, Beira. Inhambane was the province with the highest poverty headcount in the 2003–03 IAF and also the province with the lowest mean consumption. The high inequality in general, and

[9] Although this sub-population was extremely rich relative to other sample households, in industrialized country terms there were no super-rich households sampled: the highest real consumption per capita observed in the 2002–03 IAF was less than US$100 per day.

particularly the GE(0) figure, suggest the presence of a significant minority of extremely poor households in the province. More generally, it may be observed that the areas displaying the highest inequality in 2002–03 (Table 5)—the southern provinces, Maputo City, and Cabo Delgado—are those that had the weakest performance in poverty reduction (Table 2). We return to this topic later when we examine the change in inequality between the two IAF surveys.

<Table 5 about here>

The 2002–03 data from Cabo Delgado province has some peculiarities that merit some discussion, especially with respect to inequality measures. As seen in Table 5, inequality appears to be much higher in Cabo Delgado than in other provinces. Also note that inequality is estimated with much less precision: the estimated standard errors in Cabo Delgado are 20 to 40 percent of the point estimate, compared to 5 to 20 percent for most other provinces. The lower precision also carries through, albeit to a lesser degree, in the inequality results for urban areas and the northern region in Table 4. Closer examination of the Cabo Delgado data and completed questionnaires revealed the presence of one urban cluster (12 sample households in Montepuez) with 4 unusually well-off households. It is not clear whether this is a result of data collection errors, or a result of the sampling procedure happening to draw unusually well-off households. There is evidence to support either explanation.[10] While the high consumption of these few

[10] An anonymous referee has pointed out selective non-response as a third possible explanation, along the lines of Korinek et al. (2005). For example, perhaps richer households in other provinces are more likely to

households matters little for poverty headcount estimates (because nonpoor households receive zero weight in poverty measures), they exert an extremely strong influence on measures of inequality. To explore the sensitivity of the inequality results to these outliers, we re-ran the analysis with this cluster excluded. Excluding this cluster reduces the national Gini coefficient from 0.42 to 0.41, and reduces the standard error on the national level Gini coefficient by an order of magnitude. Similarly, excluding the outlier cluster reduces the inequality point estimates and standard errors for urban areas, the northern region, and Cabo Delgado province considerably, so that they fall more in the range of other regions and provinces. Because we cannot conclusively reject the data from this cluster as faulty, and because the standard error captures the large variance of the point estimate, we have retained all households in the results presented here and alert readers to the issue.

In Figure 1, the Lorenz curves for Zambézia and Maputo City—the provinces with lowest and highest Gini coefficients, respectively—are presented along with a 45 degree line. The more equal distribution in Zambézia is demonstrated by the Lorenz curve being closer to the 45 degree line. As can also be seen in Figure 1, in Zambézia the richest 25 percent of the population consume approximately one-half of the total consumption while in Maputo City the richest 25 percent of the population account for over 60 percent of the total consumption in the City.

<Figure 1 about here>

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refuse to participate in the survey, while those in Cabo Delgado are more compliant. Unfortunately, we do not have sufficient information on refusal rates to pursue this line of inquiry.

Changes in inequality between the IAF 1996–97 and the IAF 2002–03

Consumption inequality at the national level has slightly increased between the two survey periods, with the Gini coefficient rising from 0.40 in 1996–97 to 0.42 in 2002–03 for the sample as a whole. However, as the Lorenz curves for the two samples in Figure 2 illustrate, this increase in inequality at the national level is moderate. In the 1996–97 IAF the poorest 50 percent of the population consumed 23.9 percent of the total consumption in the sample. In the 2002–03 IAF the poorest 50 percent consumed 23.3 percent of total consumption. The GE inequality measures also show a moderate increase in inequality in 2002–03 compared with 1996–97 (Table 6).

<Figure 2 about here>

<Table 6 about here>

Of particular concern for poverty reduction efforts is the growth in consumption amongst that percentage of the population who were below the poverty line in 1996–97. While inequality has increased moderately, there has been a rapid increase in the mean real consumption between the two sample periods. As noted, mean consumption per capita in 1996–97 was less than the poverty line. In the 2002–03 IAF the mean consumption in the sample was 128 percent of the poverty line, which represents a 31 percent increase in mean real consumption between the two time periods.

Of course, this increase in the mean consumption for the sample could, in principle, result solely from increases in the consumption among the top 50 percent of the

population. To explore the growth in consumption across the full distribution, the generalized Lorenz curves for the two data sets were drawn (see Figure 3). Unlike standard Lorenz curves, generalized Lorenz curves take into account not only the relative distribution of consumption, but also the absolute level, and can therefore be used to examine how consumption has changed across the distribution (Shorrocks, 1983). The horizontal axis is the same as for standard Lorenz curves, but the vertical axis is re-scaled by multiplying the cumulative share of total consumption times mean consumption per capita for the entire sample. Therefore, when *p* is 100 percent of the population, the y value is equal to the mean real consumption per capita in the sample. Figure 3 shows that the 2002–03 generalized Lorenz curve dominates the 1996–97 curve.[11] In other words, consumption is higher at each percentile point in the distribution in 2002–03 than it was in 1996–97. For reduction of absolute poverty, that households at all percentiles consume more in the 2002–03 IAF than in 1996–97 IAF is arguably of more significance than the marginal increase in inequality.

<Figure 3 about here>

The change in inequality within sub-populations between the two survey periods was also examined. As shown in Table 7, the increase in inequality within both rural and urban areas is negligible. Changes in inequality measures within provinces varied somewhat. In two cases, Nampula and Manica, inequality marginally fell between the two sample periods. Inequality increased slightly in five provinces: Niassa, Zambézia,

[11] Individual households could of course be worse off, implying that they fell to a lower percentile in the consumption distribution over the period.

Sofala, Gaza and Maputo province (excluding Maputo City), and increased more rapidly in four others: Tete, Inhambane, Cabo Delgado and Maputo City. In fact, the increase in inequality in Cabo Delgado and Maputo City accounts for the majority of the rise in consumption inequality seen nationally. Given the aforementioned data issue in Cabo Delgado, it would be unwise to read too much into the apparently dramatic increase in inequality there.[12] The sharp rise in inequality in Maputo City is more cause for concern, especially considering that the poverty headcount has remained essentially flat in the capital city between the two sample periods, despite the increase in mean consumption. The Gini coefficient has risen in Maputo City from 0.44, already the highest of all the provinces in 1996–97, to 0.52 in 2002–03. Moreover the GE(2) value for Maputo more than doubled from 0.95 to 1.97, which indicates a sharp rise in the consumption growth of the richest households relative to the sample as a whole. Of course, given Maputo City's capital status, it is no surprise that it is home to the richest households. However, it is also home to a large impoverished population, including squatters, and is the final destination for many rural-urban migrants. What these results indicate therefore is that the benefits of economic growth in the city in recent years may not be reaching the poorer sections of society.

<Table 7 about here>

As Table 7 shows, most of the changes in the Gini coefficient and GE(1) index at the national and sub-national levels are not statistically significant. The increase in

[12] Indeed, the GE(2) inequality measure, which gives higher weight to richer households, has increased six-fold.

inequality in the southern region is significant, driven in large part by the increased inequality within Maputo City, which is also significant. Tete province is the only other case where increased inequality is significant, and that only for GE(1). The pattern for GE(0) and GE(2)[13] is qualitatively similar for all of the geographic areas. Quantitatively, the percentage changes in GE(0) tend to be smaller than the changes in GE(1), while the percentage changes in GE(2) are larger than the changes in GE(1). Without making any attempt to disentangle the causality of changes in poverty and inequality, we also note that two of three areas where inequality increased significantly (the southern region and Maputo City) are areas where it is estimated that poverty increased over the same period, although not significantly so. Tete province, on the other hand, experienced a large and significant reduction in poverty (Table 3) even though GE(1) inequality increased significantly.

Another way to examine the relationship between changes in inequality and poverty reduction over time is to examine the growth incidence curve, which illustrates the rate of growth in consumption for different percentiles of the sample population (Ravallion and Chen, 2003). To do this, both samples were ordered from poorest to richest, and the difference in consumption calculated for each percentile. The annual average growth rates were calculated by taking the differences in consumption between the two samples for each percentile. The increase in mean consumption (from 97 to 128 percent of the poverty line) reflects an average annual growth rate in consumption of 4.6 percent. As illustrated in Figure 4, the average annual growth rate was higher among the non-poor, thus increasing total inequality. Naturally, the extent of poverty reduction is

[13] These are not shown in Table 7, but are available from the authors upon request.

less than if the same average growth rate had occurred with no change in inequality, but the difference is small. For example, had all percentiles of the population enjoyed the mean rate of growth in consumption, measured poverty in 2002–03 would only have fallen by a further percentage point to 53.0 percent of the population, rather than the 54.1 percent it actually stood at. At the national level we conclude that broad-based consumption growth has occurred.

<Figure 4 about here>

Inequality decomposed by household characteristics

The GE estimates of inequality were decomposed into within-group and between-group components for a set of household characteristics. Table 8 disaggregates the total 2002–03 sample according to four characteristics: area of residence (rural or urban), sex of the head of household, literacy of the head of household, and whether or not the head of household's principal sector of employment is agriculture. This yields 16 sub-groups. As shown in Table 8, only 10 percent of total inequality is explained by differences in the means of these 16 sub-groups, whereas 90 percent of inequality arises from inequality within the sub-groups. Within-group inequality tends to be higher in urban areas and among households where the head is literate, indicating greater degrees of differentiation by income among these sub-groups of the population. Note also that the within-group share of inequality increases from 88 percent for GE(0) to 97 percent for GE(2), which reflects the higher levels of inequality at the upper end of the consumption distribution.

<Table 8 about here>

By contrast, some 7.2 percent of total inequality was accounted for by differences in consumption between those households whose household head's principal livelihood was in agriculture and those whose employment was non-agriculturally based.[14] This is an important finding as it demonstrates that there is considerably more inequality between agricultural and non-agricultural households than between rural and urban households *per se*. A key reason for this is the large number of urban households whose heads reported agriculture to be her or his chief source of income. Of the 4,005 household heads defined as urban dwellers in the 2002–03 survey, 1,193 identified agriculture as their chief income source. Notably, the mean consumption for these households was just below the poverty line (at 99 percent of the poverty line). By contrast, the other 2,812 urban households—whose heads' primary income source was non-agricultural—had a mean consumption of 178 percent of the poverty line. A similar difference emerges between rural households whose heads main income source was agriculture and those whose income was non-agricultural, though there are relatively few of the latter group (see Table 9). Nevertheless, as the high standard deviations suggest, there is considerable variation among households within these groups, particularly those households whose heads main income source is non-agricultural.

<Table 9 about here>

[14] That 7.2 percent of total inequality is accounted for by the agricultural/non-agricultural household head variable is notable given that this is a simple two-category variable.

Changes over time in inequality between sub-populations were also investigated. The amount of consumption inequality in the sample explained by differences between living in rural and urban areas has remained more or less the same between the two sample periods (see Table 10).[15] By contrast the amount of inequality accounted for by differences in the mean consumption between individuals living in different provinces and regions was far less in the 2002–03 survey. In 1996–97 the inequality between provinces accounted for 9.5 to 4.2 percent of total inequality, depending on the inequality measure used. By 2002–03 inequality between provinces only accounted for 6.8 to 2.0 percent of total inequality. This is important as it indicates that inequality between provinces and regions has actually declined between the two survey periods.[16]

In 2002–03, of the total GE(1) inequality in the sample, only 5.4 percent is accounted for by differences in consumption between provinces leaving 94.6 percent of inequality being explained by inequalities within the provinces. These findings are important as they demonstrate that the difference in mean consumption between provinces is not the major explanation for inequality within the sample. That only 5.4 percent of total inequality can be attributed to differences in the provincial means of consumption may appear surprising. Because of the additive nature of the decomposition it follows that, other things equal, the between share increases with the number of sub-

[15] Similar to the observation on the decomposition of inequality by household characteristics in Table 8, the within-group share of inequality declines in the higher-order GE measures.

[16] Excluding the Maputo City households, the amount of total inequality explained by differences in the mean consumption between provinces fell from 8.0 percent to 5.9 percent in the 1996-97 IAF compared to a fall of just 0.1 percent from 5.4 percent in 2002–03.

groups. Therefore, at the national level, inequality is 100 percent within, and at the individual level inequality is 100 percent between.[17]

<Table 10 about here>

4. Conclusion

The pattern of growth in Mozambique between 1996–97 and 2002–03 has benefited the poor to a considerable extent. The proportion of the population living below the poverty line has fallen by 22 percent (15 percentage points), or about 3.6 percent per year. Moreover, all percentiles of the population have seen their consumption per capita grow in real terms at a rate of more than 3 percent annually during this period. Nevertheless, although all sections of society have enjoyed a rapid annual increase in consumption, the rate of growth in consumption has been slightly higher for richer households.[18] Point estimates of inequality have increased, usually moderately and without statistical significance, with the Gini coefficient rising from 0.40 in 1996–97 to 0.42 in 2002–03.

In determining whether growth in Mozambique has been pro-poor, it is clear that this depends on what definition is used. Certainly growth in Mozambique has been broad-based, as it has benefited all percentiles of the population and the change in inequality

[17] Elbers et al. (2004) use small area estimation, or poverty mapping, methods to estimate consumption inequality for 424 sub-districts (*posto administrativos*) in Mozambique in 1996–97. They find that even at that level of disaggregation, 78 percent of total inequality (measured by GE(0)) is accounted for by within-group inequality.

[18] It is important keep in mind that a percentage point increase in consumption represents a larger—and sometimes much larger—increase in absolute terms for richer households than for poorer households. In fact, in some cases the value of richer households' increase in consumption is greater than the value of total consumption for poorer households.

measures at the national level have not been significant. Yet, using the definition given by Kakwani and Pernia (2000), in which growth is deemed pro-poor if the accompanying change in income distribution by itself would reduce poverty, growth in Mozambique would not be considered pro-poor. Given the 22 percent decline in the poverty headcount this seems somewhat counterintuitive. Indeed, using the more popular definition proposed by Ravallion and Chen (2003), that growth is pro-poor when the poverty incidence falls, we conclude that the pattern of growth in Mozambique between 1996–97 has been pro-poor.

How does Mozambique's growth pattern compare with other countries? Christiaensen et al. (2003) survey the growth experiences in 8 African countries during the 1990s. In 4 countries (Madagascar, Nigeria, Zambia, and Zimbabwe) the economies contracted or stagnated, inequality declined, and poverty increased. Among the 4 countries that grew during this period (Ethiopia, Ghana, Mauritania, Uganda) and the poverty headcount fell by 3 to 5 percent per year. Changes in inequality were mixed for the countries where poverty declined, with inequality increasing in Ethiopia and Uganda, remaining constant in Ghana, and declining in Mauritania. A recent World Bank (2005) report on pro-poor growth in the 1990s includes some of these countries, plus selected Latin American and Asian countries. As in the Christiansen et al. (2003) review, poverty and inequality moved in opposite directions in the large majority of countries, as it has for Mozambique. Mozambique's changes in poverty and inequality are roughly in line with those seen in Ghana and Uganda in the 1990s. However, Mozambique's growth elasticity of poverty was lower than Ghana's or Uganda's, i.e., the extent of poverty reduction was comparable in the three countries despite higher aggregate growth rate in

Mozambique. This may be attributable in part to a handful of capital intensive "mega-projects" in Mozambique, which contribute significantly to exports and GDP, but have limited linkages to the rest of the economy.

Interestingly, decomposition of the generalized entropy class of inequality measures in Mozambique indicates that inequality in real consumption between provinces and regions has diminished over time, which is in contrast to some popular claims. Nevertheless the rapid rise in inequality observed in Maputo City is of growing concern, especially when coupled with the evidence of increasing poverty in the capital. Indeed, it is likely that the highly visible stratification that is occurring in Maputo has helped shape the opinion that Mozambique's growth has not benefited the poor, even though the national growth incidence curve indicates otherwise. To put it another way, the decline in the share of between-group inequality across regions and provinces is not unambiguously favorable if it comes about as a result of increased inequality within regions and provinces.

This article has sought to describe the pattern of change in inequality in Mozambique rather than state the underlying reasons for the changes observed. Clearly it is imperative that attention now turns to addressing these issues and devising policies to ensure that the growth in Mozambique continues to benefit the poorest sections of society.

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Table 1—Poverty lines, headcount ratios, and standard errors by province and zone of residence, 2002–03

Poverty line region	Food poverty line	Nonfood poverty line	Total poverty line
Rural			
1 Niassa	5,434	1,665	7,099
Cabo Delgado	5,434	1,665	7,099
2 Nampula	4,471	1,501	5,972
3 Zambézia	4,155	1,318	5,473
Sofala	4,155	1,318	5,473
4 Tete	5,629	1,304	6,933
Manica	5,629	1,304	6,933
5 Inhambane	6,614	2,394	9,008
Gaza	6,614	2,394	9,008
6 Maputo Province	11,801	4,963	16,764
Urban			
7 Niassa	7,540	2,690	10,231
Cabo Delgado	7,540	2,690	10,231
8 Nampula	4,853	1,807	6,661
9 Zambézia	6,591	2,183	8,775
Sofala	6,591	2,183	8,775
10 Tete	7,145	2,545	9,690
Manica	7,145	2,545	9,690
11 Inhambane	7,264	3,457	10,721
Gaza	7,264	3,457	10,721
12 Maputo Province	11,898	6,398	18,296
13 Maputo City	12,224	7,291	19,515

Source: Authors' calculations from 2002–03 IAF

Table 2—Estimated poverty headcount ratio and average poverty gap in Mozambique, 1996–97 and 2002–03

	Headcount			Poverty gap		
	1996–97	2002–03		1996–97	2002–03	
National	0.694	0.541	**	0.293	0.205	**
	(0.011)	(0.014)		(0.008)	(0.007)	
Rural	0.712	0.553	**	0.299	0.209	**
	(0.012)	(0.017)		(0.008)	(0.008)	
Urban	0.620	0.515	**	0.267	0.197	**
	(0.027)	(0.022)		(0.018)	(0.010)	
Northern	0.663	0.553	**	0.266	0.195	**
	(0.023)	(0.026)		(0.015)	(0.011)	
Central	0.738	0.455	**	0.327	0.160	**
	(0.016)	(0.024)		(0.012)	(0.011)	
Southern	0.658	0.665		0.268	0.291	
	(0.020)	(0.013)		(0.012)	(0.010)	
Provinces						
Niassa	0.706	0.521	**	0.301	0.158	**
	(0.038)	(0.054)		(0.031)	(0.015)	
Cabo Delgado	0.574	0.632		0.198	0.216	
	(0.042)	(0.034)		(0.023)	(0.017)	
Nampula	0.689	0.526	**	0.286	0.195	**
	(0.033)	(0.038)		(0.022)	(0.018)	
Zambézia	0.681	0.446	**	0.260	0.140	**
	(0.026)	(0.046)		(0.018)	(0.019)	
Tete	0.823	0.598	**	0.390	0.263	**
	(0.032)	(0.042)		(0.029)	(0.025)	
Manica	0.626	0.436	**	0.242	0.168	
	(0.059)	(0.041)		(0.031)	(0.027)	
Sofala	0.879	0.361	**	0.492	0.107	**
	(0.015)	(0.028)		(0.027)	(0.011)	
Inhambane	0.826	0.807		0.386	0.422	
	(0.024)	(0.022)		(0.022)	(0.022)	
Gaza	0.647	0.601		0.230	0.206	
	(0.033)	(0.026)		(0.025)	(0.014)	
Maputo Province[1]	0.656	0.693		0.278	0.311	
	(0.054)	(0.028)		(0.032)	(0.019)	
Maputo City	0.478	0.536		0.165	0.209	
	(0.041)	(0.031)		(0.020)	(0.015)	

Source: Authors' calculations from the 2002–03 IAF

Standard errors in parentheses.

** = Difference between the two periods is statistically significant at 1 percent level.

* = Difference between the two periods is statistically significant at 5 percent level.

[1] Excludes Maputo City

Table 3—Mean consumption by quintiles in 2002–03.

Population quintile	Mean consumption	
	As proportion of poverty line	As proportion of highest quintile's mean consumption
1	0.39	0.13
	(0.01)	(0.00)
2	0.66	0.22
	(0.00)	(0.00)
3	0.94	0.30
	(0.01)	(0.00)
4	1.32	0.43
	(0.01)	(0.00)
5	3.08	1.00
	(0.12)	(0.04)
Mean	1.28	0.41
	(0.04)	(0.01)

Source: Authors' calculations from 2002–03 IAF
Standard errors in parentheses.

Table 4—Inequality estimates at the national, rural, urban and regional levels in 2002–03

	Mean consumption (as a proportion of poverty line)	Gini	GE(0)	GE(1)	GE(2)
National	1.28	0.415	0.296	0.367	0.986
	(0.04)	(0.011)	(0.015)	(0.029)	(0.191)
Rural	1.16	0.371	0.240	0.267	0.552
	(0.03)	(0.010)	(0.013)	(0.018)	(0.103)
Urban	1.53	0.479	0.387	0.502	1.446
	(0.11)	(0.017)	(0.027)	(0.052)	(0.315)
Northern	1.22	0.385	0.250	0.346	1.131
	(0.10)	(0.023)	(0.032)	(0.064)	(0.405)
Central	1.40	0.393	0.269	0.309	0.651
	(0.05)	(0.012)	(0.017)	(0.024)	(0.128)
Southern[1]	1.00	0.439	0.328	0.401	0.972
	(0.04)	(0.015)	(0.024)	(0.038)	(0.250)
Maputo City	1.69	0.524	0.465	0.604	1.971
	(0.17)	(0.029)	(0.049)	(0.068)	(0.449)

Source: Authors' calculations from the 2002–03 IAF

Standard errors in parentheses, estimated by bootstrapping with 500 replications.

[1] Excludes Maputo City

Table 5—Estimated inequality measures by province in 2002–03

	Mean consumption (as proportion of poverty line)	Percent of population that is rural	Gini	GE(0)	GE(1)	GE(2)
Northern						
Niassa	1.29	80.8	0.358	0.216	0.265	0.481
	(0.10)		(0.025)	(0.026)	(0.040)	(0.101)
Cabo Delgado	1.27	77.5	0.445	0.347	0.621	3.039
	(0.28)		(0.086)	(0.147)	(0.252)	(1.217)
Nampula	1.18	59.7	0.361	0.214	0.236	0.334
	(0.10)		(0.024)	(0.030)	(0.034)	(0.064)
Central						
Zambézia	1.35	89.2	0.351	0.206	0.226	0.321
	(0.08)		(0.021)	(0.026)	(0.029)	(0.052)
Tete	1.06	84.9	0.400	0.291	0.296	0.470
	(0.06)		(0.019)	(0.029)	(0.030)	(0.079)
Manica	1.41	63.9	0.401	0.287	0.300	0.453
	(0.09)		(0.029)	(0.053)	(0.047)	(0.082)
Sofala	1.81	60.1	0.428	0.309	0.409	1.126
	(0.16)		(0.028)	(0.037)	(0.069)	(0.369)
Southern						
Inhambane	0.77	77.9	0.444	0.337	0.400	0.798
	(0.05)		(0.023)	(0.037)	(0.053)	(0.199)
Gaza	1.24	74.3	0.406	0.275	0.381	1.108
	(0.07)		(0.026)	(0.034)	(0.070)	(0.448)
Maputo[1]	1.01	38.4	0.434	0.312	0.363	0.645
	(0.06)		(0.020)	(0.028)	(0.037)	(0.116)
Maputo City	1.69	0	0.524	0.465	0.604	1.971
	(0.17)		(0.028)	(0.047)	(0.067)	(0.432)
National	1.28	67.9	0.415	0.296	0.367	0.986
	(0.04)		(0.011)	(0.015)	(0.029)	(0.191)

Source: Authors' calculations from the 2002–03 IAF

Standard errors in parentheses, estimated by bootstrapping with 500 replications.

[1] Excludes Maputo City.

Table 6—Changes in inequality at the national level over time.

	Gini	GE(0)	GE(1)	GE(2)	Mean consumption (as proportion of poverty line)
1996–97	0.396	0.266	0.311	0.593	0.97
	(0.009)	(0.012)	(0.016)	(0.049)	
2002–03	0.415	0.296	0.367	0.986	1.28
	(0.010)	(0.014)	(0.026)	(0.167)	

Source: Authors' calculations from the 2002–03 IAF
Standard errors in parentheses, estimated by bootstrapping with 500 replications.

Table 7—Changes in inequality over time.

Area	Increase in mean real consumption from 1996–97 (percent)	Gini			GE(1)		
		1996–97	2002–03		1996–97	2002–03	
National	32	0.396	0.415		0.311	0.367	
		(0.009)	(0.010)		(0.016)	(0.026)	
Rural	26	0.366	0.371		0.255	0.267	
		(0.009)	(0.009)		(0.015)	(0.017)	
Urban	24	0.469	0.479		0.439	0.502	
		(0.018)	(0.017)		(0.035)	(0.049)	
Regions							
Northern	20	0.384	0.385		0.285	0.346	
		(0.017)	(0.024)		(0.032)	(0.064)	
Central	63	0.374	0.393		0.271	0.309	
		(0.013)	(0.012)		(0.020)	(0.023)	
Southern	4	0.429	0.475	*	0.373	0.495	**
		(0.012)	(0.016)		(0.024)	(0.038)	
Provinces							
Niassa	45	0.355	0.358		0.215	0.265	
		(0.020)	(0.024)		(0.024)	(0.039)	
Cabo	8	0.370	0.445		0.270	0.621	
		(0.027)	(0.090)		(0.050)	(0.267)	
Nampula	20	0.391	0.361		0.301	0.236	
		(0.026)	(0.022)		(0.047)	(0.032)	
Zambézia	44	0.324	0.351		0.196	0.226	
		(0.016)	(0.021)		(0.021)	(0.030)	
Tete	49	0.346	0.400		0.208	0.296	*
		(0.020)	(0.019)		(0.027)	(0.031)	
Manica	22	0.413	0.401		0.359	0.300	
		(0.045)	(0.031)		(0.082)	(0.050)	
Sofala	207	0.405	0.428		0.321	0.409	
		(0.026)	(0.026)		(0.050)	(0.066)	
Inhambane	–1	0.382	0.444		0.312	0.400	
		(0.038)	(0.023)		(0.081)	(0.053)	
Gaza	12	0.380	0.406		0.272	0.381	
		(0.022)	(0.024)		(0.033)	(0.063)	
Maputo[1]	–6	0.424	0.434		0.346	0.363	
		(0.018)	(0.022)		(0.030)	(0.040)	
Maputo City	10	0.444	0.524	*	0.412	0.604	*
		(0.025)	(0.027)		(0.052)	(0.066)	

Source: Authors' calculations from the 1996–97 and 2002–03 IAF

[1] Excluding Maputo City.

Standard errors in parentheses, estimated by bootstrapping with 500 replications.

Difference between the two periods significant at 5 percent (*) or 1 percent (**) level.

Table 8—Static decomposition of inequality by sub-groups using generalized entropy (GE) measures in 2002–03

Characteristics of the household and head of household	Population share	GE(0)	GE(1)	GE(2)
Rural, male, agricultural, illiterate	25.0	0.210	0.221	0.333
Rural, male, agricultural, literate	22.6	0.193	0.199	0.272
Rural, male, non-agricultural, illiterate	1.5	0.209	0.182	0.197
Rural, male, non-agricultural, literate	6.7	0.364	0.427	1.179
Rural, female, agricultural, illiterate	11.4	0.234	0.248	0.389
Rural, female, agricultural, literate	1.8	0.310	0.319	0.465
Rural, female, non-agricultural, illiterate	0.1	0.219	0.188	0.181
Rural, female, non-agricultural, literate	0.2	0.276	0.335	0.631
Urban, male, agricultural, illiterate	2.9	0.136	0.141	0.171
Urban, male, agricultural, literate	4.4	0.306	0.496	3.080
Urban, male, non-agricultural, illiterate	1.4	0.163	0.181	0.247
Urban, male, non-agricultural, literate	15.7	0.425	0.523	1.299
Urban, female, agricultural, illiterate	2.7	0.187	0.208	0.300
Urban, female, agricultural, literate	1.0	0.422	0.683	3.060
Urban, female, non-agricultural, illiterate	0.9	0.208	0.222	0.284
Urban, female, non-agricultural, literate	1.7	0.360	0.383	0.604
Within-group inequality		0.260	0.331	0.966
Between-group inequality		0.036	0.038	0.042
Within percent of total		87.9	89.6	95.9
Between percent of total		12.1	10.4	4.1

Source: Authors' calculations from the 2002–03 IAF

Table 9—Rural and urban agricultural and non-agricultural households mean consumption in 2002–03

Grouping	Number of households	Mean consumption (as proportion of poverty line)	Standard deviation
Urban Non-Agricultural Head	2,812	1.78	3.00
Urban Agricultural Head	1,193	0.99	1.23
Rural Non-Agricultural Head	745	1.55	2.27
Rural Agricultural Head	3,950	1.08	0.87

Table 10—Static decompositions by sub-groups for both samples using generalized entropy (GE) measures.

	Percentage of total inequality in sample					
	1996–97			2002–03		
Sub-grouping	GE(0)	GE(1)	GE(2)	GE(0)	GE(1)	GE(2)
Rural-urban	2.9	2.6	1.5	3.1	2.5	1.0
Region (4)	4.1	3.8	2.3	3.4	2.7	1.0
Province	9.5	8.0	4.2	6.8	5.4	2.0

Source: Authors' calculations from the 2002–03 IAF.

Figure 1—Lorenz curves for Zambézia and Maputo City, 2002–03

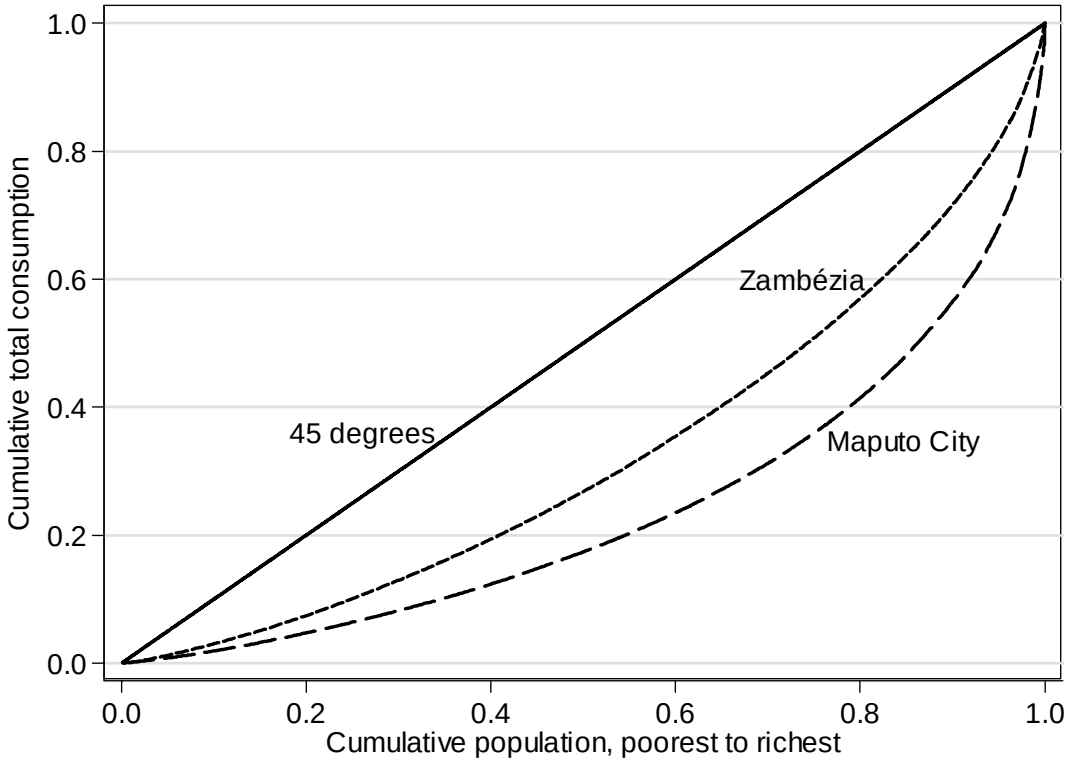

Figure 2—Lorenz curves for 1996–97 and 2002–03 IAF surveys