




Economic Commission for Africa



Economic Policy Research Center

# Pro-Poor Growth Strategies in Africa

## Prospects for 'Pro-Poor' Growth in Africa



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## **Abstract**

This paper examines trends in income distribution and its linkages with economic growth and poverty reduction in order to understand the prospect for achieving poverty reduction in Africa. We examine the levels and trends in income distribution in some African countries and calculate pro-poor growth indices. Different growth patterns are simulated for Ethiopia, Uganda, Mozambique, and South Africa. We conclude that the balance between policies aimed at growth and measures aimed at redistribution should depend on the elasticity of the growth-equity trade-off. We also discuss what the appropriate ingredients of a pro-poor strategy would be in the African setting.

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## 1. Introduction

In recent decades, Africa has been the world's worst performing region in terms of poverty reduction (Ravallion and Chen, 2000). Between 1987 and 1998 poverty incidence remained at 46%, while the number of poor people increased from 217 million to 290 million.<sup>1</sup> Per capita incomes in Sub-Sahara Africa (SSA) fell by 20% between the peak of 1974 and the bottom of 1994 (World Bank, 2002). The 1990s has seen some recovery in terms of improved macroeconomic management, growth and poverty reduction for selected countries in SSA (Christiaensen, Demery, and Paternostro, 2002), and there was a modest 4% increase of SSA per capita incomes between 1994 and 2000. Still, the question remains whether African economies generally can achieve the goals of poverty reduction and improvements in human development set out in the Poverty Reduction Strategy Papers (PRSPs) and the Millennium Development Goals (MDGs).

The 1990s has witnessed diverse and interesting experiences across Africa in terms of growth and poverty reduction that deserve closer analysis.<sup>2</sup> There is a growing policy and research interest in the scope for poverty reduction through pro-poor growth. This paper is a contribution to this literature and it is organized as follows: Section 2 looks at state of income distribution and poverty in Africa, while section 3 reviews pro-poor growth indices. Section 4 presents measures of estimates of pro-poor growth for selected African countries and looks at the implication for poverty reduction in the cases of Ethiopia, Uganda, Mozambique, and South Africa. Section 5 discusses some policy challenges for pro-poor growth in Africa, and Section 6 summarizes and concludes our discussion.

## 2. Trends in income distribution and poverty in Africa

The Deininger-Squire<sup>3</sup> data set on income distribution shows that Africa is one of the most unequal regions in the world, second only to South-America (Table 1). In addition, the Gini-coefficient has varied considerably within short periods of time for many countries in Africa. To some extent this is due to data problems (Deaton, 2003), but there are also real factors that make incomes and income

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<sup>1</sup> Many people are concerned about the ambiguity in the measurement of poverty. While we say that poverty (incidence) declined, on the one hand, we see, on the other hand, that the number of poor people increased. Observers may in such a case evaluate the situation differently depending on whether they are concerned about poverty incidence or the absolute number of poor people.

<sup>2</sup> For example, Mozambique was one of the fastest growing economies in the world in the 1990s, and Uganda registered a very strong reduction in poverty.

<sup>3</sup> See Deininger and Squire (1998) for details on the construction of the income distribution data sets.

distributions unstable in Africa. Income distributions are strongly affected by for example the weather, political changes or policy shocks (Easterly, 2000).

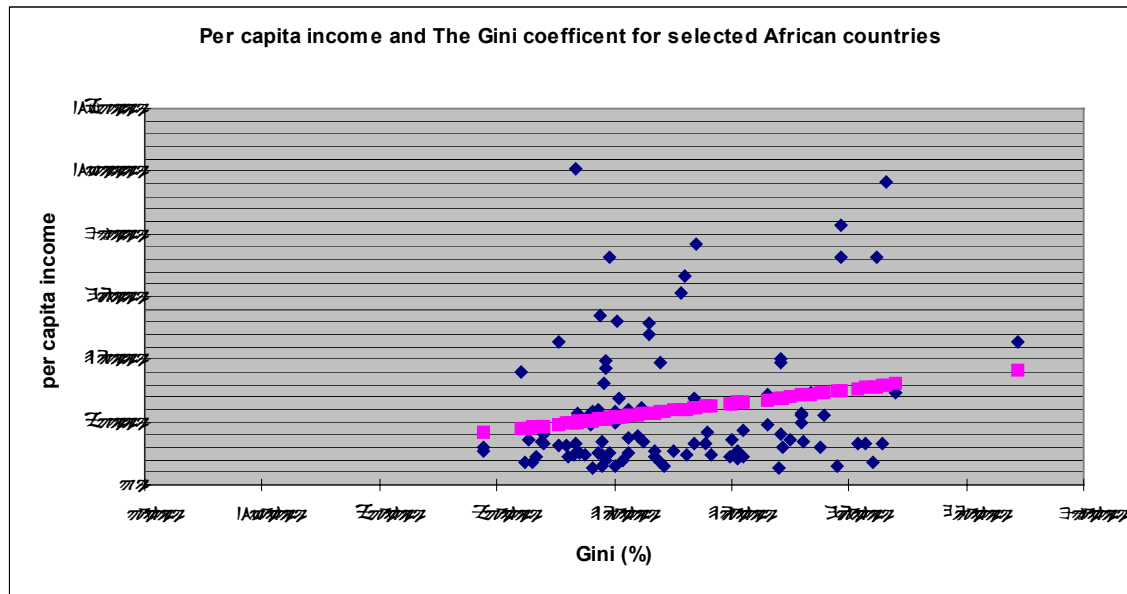
**Table 1**  
Median values of Gini coefficient by region

Region	1960s	1970s	1980s	1990s
Eastern Europe	22.76	21.77	24.93	28.60
South Asia	31.67	32.32	32.22	31.59
OECD and High Income Countries	32.86	33.04	32.20	33.20
East Asia and the Pacific	34.57	34.40	34.42	34.80
Middle East and North Africa	41.88	43.63	40.80	39.72
Sub-Saharan Africa	49.90	48.50	39.63	42.30
Latin America	53.00	49.86	51.00	50.00

Source: Deininger and Squire (1998), p. 263.

Figure 1 shows that the Gini coefficients in Africa are concentrated in the 40-55% range.<sup>4</sup> Out of the sample of 37 countries, close to half has had a Gini coefficient greater than 50% at least one time in the past. This indicates that income distribution is a serious concern in Africa that needs to be understood to facilitate growth strategies that benefit the poor.

**Figure 1**



Source: WIDER data set

<sup>4</sup> The solid points represent a linear regression fit.

Tables 2 and 3 report changes in per capita income and income distribution for 17 African countries covering mainly the 1990s. We see a decline in the income share of the poorest quintile in only 6 cases, 2 with positive and 4 with negative per capita income growth, while the share of the poorest quintile increased in 11 cases, 9 with negative growth and 2 with positive growth. There is thus no clear trend in inequality in this African data set. The poorest quintiles actually did rather well in maintaining or even improving their income shares, but of course they did still not do well in absolute terms. The absolute income of the poorest quintile increased in only 4 cases. In spite of Africa's growth performance being erratic and often negative, its impact on the well-being of the poor has not been dramatic. Distributional changes have rather cushioned the impact. This finding is consistent with the recent work on the dynamics of poverty in Africa (Christiansen, Demery and Paternostro, 2002). Still, there is little that suggests that Africa is on track towards the Millennium Goal in terms of poverty reduction.

**Table 2**  
Average Annual Percentage Change of Quintile Income Shares and the Gini Coefficient

Country	Year	Poorest quintile	2 <sup>nd</sup> quintile	3 <sup>rd</sup> quintile	4 <sup>th</sup> quintile	Richest quintile	Gini coefficient
Gambia	1991 v 1992	113.59	39.10	12.31	-0.92	-10.47	-15.10
Ghana	1992 v 1997	1.23	0.33	-0.38	0.09	-0.24	-0.56
Guinea	1991 v 1994	28.73	7.81	0.45	-3.92	-2.03	-4.82
Kenya	1992 v 1994	21.45	20.14	15.04	9.85	-9.90	-11.82
Mauritania	1993 v 1995	9.62	12.19	12.31	10.58	-9.81	-11.57
Niger	1992 v 1995	0.00	0.00	0.00	0.00	0.00	0.00
Nigeria	1991 v 1997	1.45	-1.44	-2.32	-3.15	2.04	2.01
Senegal	1991 v 1994	22.48	14.00	7.65	2.13	-6.32	-8.63
Tanzania	1991 v 1993	66.94	38.55	20.90	7.47	-14.88	-19.38
Uganda	1992 v 1993	-2.65	5.72	5.85	4.31	-4.43	-4.32
Zambia	1991 v 1997	-5.49	-3.06	-2.00	-0.85	1.93	2.67
Ethiopia	1981 v 1995	-1.33	-1.07	-0.86	-0.45	1.03	1.51
Lesotho	1986 v 1993	-1.35	-2.12	-1.40	0.01	0.51	0.49
Madagascar	1980 v 1993	1.28	0.84	0.44	0.00	-0.40	-0.60
Mali	1989 v 1994	-8.13	-6.72	-5.46	-2.50	5.03	6.78
Rwanda	1983 v 1984	0.00	0.84	-0.90	-0.18	0.21	0.17
Tunisia	1965 v 1971	-2.16	-8.94	-6.33	-5.72	4.80	5.35

*Source:* Authors' computations

**Table 3**  
Average Annual Growth of National and Quintile Per Capita Income

Country	Year		Percentage change in GDP per capita in 1996 PPP \$		Percentage change in mean income of the quintiles in 1996 PPP \$				
			$\mu$	$\mu$ of Q1	$\mu$ of Q2	$\mu$ of Q3	$\mu$ of Q4	$\mu$ of Q5	
Gambia	1991	V	-3.53	106.05	34.19	8.35	-4.42	-13.63	
	1992								
Ghana	1992	v	0.93	2.18	1.26	0.55	1.02	0.69	
	1997								
Guinea	1991	V	0.93	29.93	8.81	1.39	-3.02	-1.12	
	1994								
Kenya	1992	v	-0.25	21.15	19.85	14.76	9.58	-10.12	
	1994								
Mauritania	1993	v	-1.12	8.38	10.93	11.04	9.34	-10.82	
	1995								
Niger	1992	v	-0.86	-0.86	-0.86	-0.86	-0.86	-0.86	
	1995								
Nigeria	1991	V	-0.38	1.06	-1.81	-2.69	-3.52	1.65	
	1997								
Senegal	1991	v	-2.11	19.89	11.59	5.38	-0.03	-8.29	
	1994								
Tanzania	1991	v	-1.76	64.00	36.11	18.77	5.58	-16.38	
	1993								
Uganda	1992	v	3.96	1.20	9.91	10.04	8.44	-0.64	
	1993								
Zambia	1991	V	-4.62	-9.86	-7.55	-6.53	-5.44	-2.78	
	1997								
Ethiopia	1981	V	-1.29	-2.60	-2.34	-2.14	-1.74	-0.27	
	1995								
Lesotho	1986	V	-0.10	-1.45	-2.22	-1.51	-0.09	0.41	
	1993								
Madagascar	1980	V	-2.93	-1.69	-2.11	-2.50	-2.93	-3.32	
	1993								
Mali	1989	v	-1.90	-9.88	-8.50	-7.26	-4.36	3.03	
	1994								
Rwanda	1983	v	-9.70	-9.70	-8.94	-10.51	-9.87	-9.51	
	1984								
Tunisia	1965	v	2.84	0.62	-6.36	-3.66	-3.04	7.77	
	1971								

Source: Authors' computations

Against this background it seems clear that it will not be possible to achieve substantial and sustained reductions in poverty without economic growth. The debate beyond this has come to focus on whether it is possible to bring about a pattern of growth that is particularly beneficial for the poor, and this is the focus of this paper.

### 3. Measures of ‘Pro-poor’ growth

In the 1970s the importance of the pattern of growth for poverty reduction was discussed under the label ‘redistribution with growth’ (Chenery et al, 1974). The resurgence of interest in this issue is largely due to the failure to achieve poverty reduction in Africa under the structural adjustment programmes. There has been an outpouring of empirical research on the link between growth and poverty (see among others Demery and Squire, 1996, Ali, 1996, Ravallion and Chen, 1997, 2000, Fields, 1998, Collier and Dollar, 2000, Easterly, 2000, Dollar and Kraay, 2000, World Bank, 2000, Geda et al, 2002). The advent of the MDGs and the PRSPs has underlined the need to explore the interconnections among growth, poverty and income distribution.

The recent discussion of pro-poor growth started with a focus on evaluating the percentage change in the income of ‘poor’ people in the course of economic growth (Dollar and Kraay, 2000, Eastwood and Lipton, 2001). Statistical exercises to evaluate the elasticities that connect poverty changes with growth are sensitive to functional specification and also data sources used.<sup>5</sup> Besides, one needs some degree of conceptualisation of what it means that a growth process is pro-poor. Recent literature has suggested different ways of measuring pro-poor growth.

White and Anderson (2000) suggest three measures on pro-poor growth using incremental income shares of the poor normalized by their base-year share, population share, or some international norm. The first measure implies that the income share of the poor population must increase for the growth pattern to be regarded as pro-poor.<sup>6</sup> Or equivalently, the rate of growth of the mean income of the poor should be greater than the rate of growth of the mean income for the whole population. The second measure says that the share of the poor in the income increase should be greater than the headcount ratio itself. This implies that the poor should get a share of the income increase that is at least as large as their population share for the process to be characterised as pro-poor. The third

<sup>5</sup> The elasticity estimates may be affected by variations in the sources of underlying variables. Some use distribution data from household surveys and growth data from national accounts, e.g. Ballard, 2002, Karshenas, 2001, Sala-i-Martin, 2002.

<sup>6</sup> Let the income share of the poor at time t and t-1 respectively be  $\phi_t$  and  $\phi_{t-1}$ . Then growth is pro-poor if  $\frac{\phi_t}{\phi_{t-1}} > 1$ . If the LHS is less than 1 growth is said to be anti-poor. Or in other words, this is  $\phi_t$  requirement that the rate of growth in the share of the income of the poor be greater than zero:  
 $\frac{\phi_t - \phi_{t-1}}{\phi_{t-1}} > 0$ .

measure says that the incremental income share of the poor should be measured against some international norm, such as the median income shares of the bottom 20 or 40 percent.<sup>7</sup> This measure appears to use some convergence rule in the incidence of inequality across the globe. That is, in a growth episode pro-poor growth in this case means that the share of the poorest quantile in the growing income at least equals that of the median of share of the poorest quantile around the world. This particular measure assumes that most income shares for the poorest quantiles in poor countries are lower than the median share of the poor in the world income distribution.

What we note from these measures is that the focus is on the relative change in the income of the poor, not on what happens to poverty as a result. That is, it does not matter whether poor people escape poverty or not as a result of growth. We can see this clearly if we write the income share of the poor at time period  $t$  ( $\varphi_t$ ) as:

$$\varphi_t = \frac{\sum_{i=1}^q y_{it}}{\sum_{i=1}^n y_{it}} \dots\dots\dots(1)$$

where  $y_{it}$  is income of individual or household  $i$  at time  $t$ . The numerator on the right-hand side is total income of the poor population in period  $t$  and the denominator is the total income of society (GDP). Rewriting (1) in terms of means, we get:

$$\varphi_t = \frac{q\mu_{p_t}}{n\mu_t} = \frac{H_t\mu_{p_t}}{\mu_t} \dots\dots(2)$$

Equation (2) simply states that the share of the income of the poor is a ratio of mean income of the poor ( $\mu_p$ ) to per capita income of society,  $\mu_t$ , weighted by the proportion of poor people or the headcount ratio ( $H_t$ ). In this case the rate of growth in the income share of the poor will be equal to:

$$\dot{\varphi}_t = \dot{H}_t + \dot{\mu}_{p_t} - \dot{\mu}_t \dots\dots(3)$$

where all the variables are in terms of rates of growth. It is clear from equation (3) that the share of the income of the poor moves *positively* with the rate of change in the headcount ratio. The implication is that growth could be pro-poor, while the proportion of poor people increased. However, in their estimations

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<sup>7</sup> The median income share of the bottom 20 and 40 per cent according to White and Anderson is 5.6 per cent and 16.7 per cent respectively.

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White and Anderson fix the size of the group of poor by only considering the poorest quintile. In addition, if incremental income is equally distributed, equation (3) suggests that the rate of change in the income share of the poor population will be equal to the rate of change in the headcount ratio.

The second definition of pro-poor growth by White and Anderson implies an equal distribution of the income increase. This is an extremely stringent condition and thereby not very useful as a guide for policy makers who are intent in monitoring the progress of pro-poor growth.

There are other pro-poor growth measures that have closer connection with poverty measures and that satisfy desirable axioms. For example, Kakwani and Pernia (2000) propose a measure of pro-poor growth that is derived from poverty elasticities. They use the ratio of poverty elasticities with respect to actual growth and distributional neutral growth, and define a pro-poor growth index as:

$$\phi = \frac{\eta}{\eta_g} \dots (4)$$

where  $\phi$  is their index of pro-poor growth and  $\eta$  is the elasticity of poverty with respect to per capita income (gross elasticity), and  $\eta_g$  is the elasticity of poverty with respect to per capita income, assuming no change in income distribution. If  $\phi > 1$  the growth process is considered to be pro-poor. If  $0 < \phi < 1$ , economic growth reduces poverty, but the 'inequality effect' of economic growth is negative so that the poor benefit proportionately less from economic growth than the non-poor. This is characterised as trickle-down growth. In case of an economic recession, the pro-poor index is inverted to be  $\eta_g/\eta$ . The recession will be pro-poor if  $\eta < \eta_g$ . Kakwani and Pernia (2000) also show how equation (4) can be decomposed into growth and inequality effects. A growth episode is called pro-poor only if inequality declines or remains unchanged. Growth episodes accompanied by even the slightest increase in income inequality are considered anti-poor.

Ravallion and Chen (2003) are concerned about this feature and propose a pro-poor measure, which focuses mainly on the changes in the income of the poor in a growth episode. In addition, their measure is linked to a specific poverty index, that is, Watt's<sup>8</sup> index of poverty, which satisfies several desirable axioms. The measure of pro-poor growth proposed by Ravallion and Chen starts from the basic idea of changes in the income of individual poor people using the cumulative distribution function of income,  $F(y)$ . By definition, if we invert  $F(Y)$  at the  $p$ th quantile, we get the income of that quantile:

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<sup>8</sup> Watt's<sup>h</sup> index can be written as:  

$$W_t^h = \int (\ln z - \ln y_i) dp$$
 where  $z$  is the poverty line,  $y$  income and  $h$  the number of poor.

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$$y_t(p) = L_t'(p)\mu_t \dots(5)$$

Indexing over time and evaluating the growth rate of income of the pth quantile, and using the above expression we get:

$$g_t(p) = \frac{L_t'(p)}{L_{t-1}'(p)}(\gamma_t + 1) - 1 \dots(6)$$

where  $g_t(p)$  is growth rate in the income of the pth quantile and  $\gamma_t$  is the ratio of mean per capita income in period t to that in period t-1. In other words, the change in the income of an individual in the pth quantile is weighted by the shift parameter in the slope of the Lorenz curve. Cumulating (6) up to the proportion of the poor ( $H_t$ ) gives an equivalent expression for a change in the Watt's index of poverty:

$$-\frac{dW_t}{dt} = \int_0^{H_t} g_t(p) dp \dots(7)$$

Normalizing equation (7) by the number of poor people we get Ravallion and Chen's (2003) measure of pro-poor growth. The Ravallion and Chen measure of pro-poor growth essentially cumulates the rate of change in the income of the population identified as poor before growth occurs and takes the average using the number of the poor population. This is different from the rate of change in the mean income of the poor. The two coincide if each poor person's income grows at an equal rate.

Kakwani, Khandker, and Son (2003) suggest a measure of pro-poor growth, which is a generalization of the Ravallion and Chen measure and which can be applied to well-known measures of poverty. They define a poverty equivalent growth rate (PEGR) as an index of pro-poor growth as follows:

$$\gamma^* = \frac{\int_0^H \frac{\partial P}{\partial x} x(p) g(p) dp}{\int_0^H \frac{\partial P}{\partial x} x(p) dp} \dots(8)$$

where  $\gamma^*$  is the PGER and the expressions on the right-hand side are as follows: The numerator is cumulative change in the income of the poor weighted by changes in a specific measure of poverty, and the denominator is a normalizing factor representing total income of the pth percentile weighted by changes in a specific measure of poverty.

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The broad distinction in the debate is between measures that look at the relative growth rate of the incomes of the poor and those that look at absolute income changes of the poor. In the latter type of definition even very unequal growth can improve the real incomes of the poor and in improve their welfare.

To see some empirical implications of the choice of pro-poor growth indices, we report some estimates of pro-poor growth as they apply to selected African countries in the Appendix. The picture we get is that more growth or recession episodes are characterised as pro-poor under the first White and Anderson measure than under the Kakwani and Pernia measure. The first measure classifies 57% of the growth and recession episodes as being pro-poor, while the second index classifies only 40% of them as pro-poor. The two measures come up with similar classifications only in 45% of the cases. In the Kakwani-Pernia's case, the pro-poor index is problematic in situations where recession leads to reduction in poverty due to decline in income inequality. Example is given in Table 4 where recessions that led to significant reduction in poverty could not be classified unambiguously. In fact, if one follows the definitions provided in Kakwani and Pernia (2000), a value exceeding 1 is considered pro-poor and pro-rich otherwise. According to this definition, thus, the recession episodes in Table 4 are pro-rich, which as is clearly not the case.

**Table 4**  
**Ambiguity in the Kakwani-Pernia Measure of Pro-Poor Growth**

Country	Period	Growth in per capita GDP(%)	Change in the headcount (%)	Kakwani-Pernia index
Cote d'Ivoire	1985-88	-1,77	-3,99	-0,735
Senegal	1991-94	-2,11	-9,60	-0,185
Tanzania	1991-93	-1,76	-14,35	-0,071

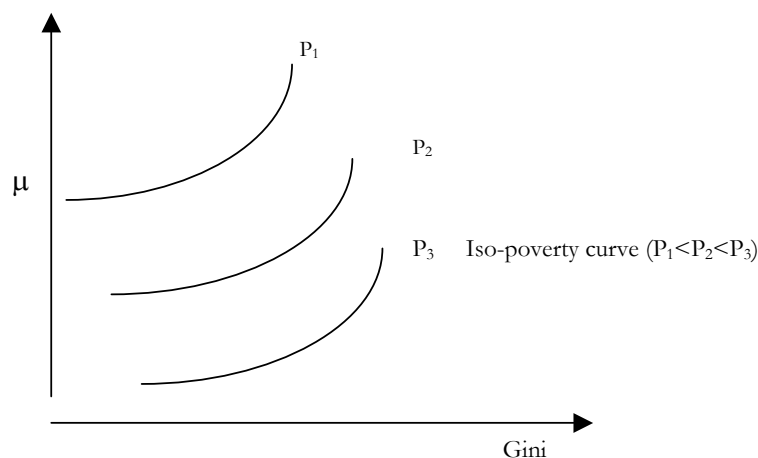
*Source:* Authors' calculations

One conclusion that emerges from the estimates that even in times of economic decline, there are several cases where the poor did not suffer very severely (this is also reported in Christiaensen et al, 2002). That is, poverty did not increase as a consequence of economic decline (e.g. Cote d'Ivoire, the Gambia, Kenya, Madagascar, Mauritania, Nigeria, Senegal and Zambia). Still, as far as poverty reduction and pro-poor strategy is concerned, both distributional changes and growth have a vital role to play. The next two sections deal with these issues.

## 4. The equity-growth trade-off

At the heart of the above discussion on the measurement of pro-poor growth lies the issue of income distribution change as an essential component of poverty reduction in regions such as Africa. At the analytical level any poverty measure can be defined over per capita income and a measure of income inequality (Kakwani, 1991, Ravallion, 1992). By using this feature we can get some idea of the order of magnitudes involved in redistribution efforts for poverty reduction. This is illustrated in Figure 2.

Figure 2: Per capita income -Inequality Trade-off



The above figure carries two messages. One is that, by definition, poverty levels in a country can be generated using information about the per capita income and the distribution of that income (and the poverty line). That is

$$P = P(z, \mu, G) \dots (9)$$

Equation (9) says that if we know the level of the poverty line,  $z$ , mean per capita income,  $\mu$ , and the distribution underlying that per capita income,  $G$ , it is possible to obtain a measure of poverty that is consistent with standard axioms.<sup>9 10</sup> Poverty rises with the poverty line and the Gini coefficient, and declines with per capita income. It is homogenous of degree zero with respect to  $z$  and  $\mu$ . Using these properties of the poverty index, from (9) we can generate a set of per

<sup>9</sup> These axioms mainly are axiom of focus, monotonicity, transfer, sub-group consistency, decomposability (see Haagennars, 1987 for an interesting and in depth discussion of the properties of poverty indices).

<sup>10</sup> Bourguignon (2002, figure 3) uses  $G$  on the vertical axis and  $\frac{z}{\mu}$  on the horizontal axis to depict an iso-poverty curve, which is downward sloping for a given poverty line. His main concern is to address the heterogeneity often reported in the elasticity of poverty with respect to economic growth.

capita income and Gini coefficients that give rise to a given level of poverty that is iso-poverty curves as depicted above. This relationship has been innovatively utilized in Bourguignon (2002) as well as Ashan and Oberi (2002) to establish the link between economic growth and poverty reduction in a consistent and analytically appealing manner. Assuming that the poverty lines remain constant over time, we can link per capita income and the Gini to generate a locus of points for a given level of poverty as shown in Figure 2. The slope of the iso-poverty curve is the issue of concern here. Figure 2 assumes convex iso-poverty curves, where the second order condition depends on the second derivatives of the poverty function with respect to  $\mu$  and  $G$ , and the interactions between  $\mu$  and  $G$ . If we follow Kakwani et al (2003), we tend to get this convex shape for the iso-poverty curves.<sup>11</sup> Bourguignon (2002) used the decomposition that follows from the definition of poverty (a la Kakwani, 1991 and Datt and Ravallion, 1992) to estimate the elasticity of poverty with respect to economic growth, taking the impact of distributional changes fully into account. This leads to a specification of an econometric model that can be used to estimate the connection between growth, poverty and income inequality.

If there is any theoretically or empirically motivated structural relationship between income inequality and per capita income, there is an opportunity to superimpose this on the definition-driven iso-poverty curve and work out possible growth paths for a given country. Here our interest is to get an idea of what it takes in terms of growth and distributional change to maintain a given level of poverty, since there is a *trade-off* between inequality and growth.

Regarding the trade-off we can get some idea by looking at the slope of the iso-poverty curves. We can derive the magnitudes involved by totally differentiating (9) and setting changes in poverty equal to zero.

Thus

$$\frac{d\mu}{dG} \frac{G}{\mu} = - \frac{\frac{\partial P}{\partial G} \frac{G}{P}}{\frac{\partial P}{\partial \mu} \frac{\mu}{P}} \dots (10)$$

and we can rewrite equation (10) as

$$v = - \frac{\theta}{\varepsilon} \dots (11)$$

<sup>11</sup> If we follow the common practice in the empirical literature (e.g. Besely and Burgess, 2002, Fosu, 2002, Ali, 1996), where log of poverty is regressed over log of income inequality and per capita income, to get elasticity values we can think of a Cobb-Douglas specification for the poverty function and determine the shape of the poverty function on the basis of the elasticity values.

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where  $\nu$  is elasticity of per capita income with respect to the Gini,  $\theta$  is elasticity of poverty with respect to Gini and  $\varepsilon$  is elasticity of poverty with respect to mean income. If  $\nu$  is small, (say  $<1$ ), the effectiveness of redistribution as a tool for poverty reduction would tend to be small. When the elasticity is high, on the other hand, the payoff for a strategy of redistribution would be substantial. We have computed this elasticity for 27 countries in Africa as reported in Table 4 using headcount ratio as our measure of poverty.

To retain the same level of poverty, the extent of trade-off between growth and income distribution depends on the slope of the iso-poverty curve. Suppose a country wishes to remain on one iso-poverty curve (see for example Ali and Elbadawi, 1999), then it may have a choice between a policy that increases mean incomes and increases inequality and another one that lowers per capita incomes but reduces inequality. The extent of the trade-off depends on the ratio of the elasticity of poverty with respect to income distribution and per capita income as shown in Table 4.

For most African countries, this ratio is quite small, suggesting that there is little to gain in terms of poverty reduction from redistribution policy. For countries with high initial inequality, such as Gabon, South-Africa, and Zimbabwe, the inequality-growth trade-off is high. In those cases there will be a significant poverty reduction impact also from small reductions in inequality. It is important to notice that the elasticity varies considerably by the point where the poverty line is located and the slope of the Lorenz curve at that point. Nevertheless, Table 4 gives an illustration of the trade-off between growth and redistribution in Africa. One has to be cautious in interpreting these elasticities since they are essentially mechanical, non-behavioural relations.

In Table 5 we apply two different poverty lines to compute the slope of the iso-poverty curve. These are the 1\$ and 2\$ a day per person that are often used in cross-country poverty comparisons. If data had been available it would have been more sensible to use national poverty lines to evaluate the elasticity ratios to get an idea of how a movement along an iso-poverty curve behaves with changes in either income inequality or per capita income. For some countries, we could not compute the relevant elasticities, particularly, for relatively high-income countries when the poverty line was set at 1\$ a day per person. It was too low to compute poverty estimates.<sup>12</sup> Nevertheless, we can observe at least three things from Table 4.

One is that high-inequality and relatively high-income countries (e.g. Namibia, South-Africa, Senegal, Gabon, Zimbabwe) had higher elasticity of the iso-poverty

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<sup>12</sup> We have used the POVCAL program by Ravallion, Chen and Datt (1996). This program returns no results (or run time error) if the poverty line is set either too low or too high compared to the mean.

curve, indicating that redistribution policies may be effective tools in dealing with poverty in those countries. For instance, if we take South-Africa, at the poverty line close to 750\$ per person a year, a one percent decline in the measure of income inequality needs about 9% decline in per capita income to remain on the same poverty level. That means that any reduction in per capita income lower than 9%, following a one percent decline in the Gini, would lead to a reduction in poverty. It takes a large reduction in per capita income following a one percent reduction in the Gini for poverty not to decline. On the other hand, any increase in income inequality, beyond its current level, requires a large per capita income growth to maintain the existing level of poverty.

**Table 5**  
**Equity-Growth 'Trade-off' for Selected African Countries**

Country	Year	V <sub>1</sub>	V <sub>2</sub>	Gini coefficient	Per capita income (in 1996 PPP)
Burundi	1992	1,54	0,268	33,33	926
Burkina Faso	1994	1,67	0,325	48,20	971
Botswana	1986	---	0,510	54,21	3895
CAR	1993	---	0,789	61,33	1306
Cote d'Ivoire	1993	---	1,700	36,91	1970
Ethiopia	1995	0,60	-0,213	40,00	583
Gabon	1960	7,14	3,056	64,00	2966
Ghana	1997	2,54	0,940	32,70	1416
Guinea	1994	6,28	2,742	46,80	2732
Gambia	1992	2,71	0,797	47,80	1312
Kenya	1994	2,34	0,669	57,50	1215
Lesotho	1993	5,06	2,022	57,94	2215
Morocco	1984	---	3,439	39,19	3242
Madagascar	1993	1,43	0,216	43,44	888
Mali	1994	1,35	0,172	50,50	854
Mozambique	1996	1,75	0,371	39,61	1003
Mauritania	1995	2,83	0,914	38,90	1399
Namibia	1993	11,46	---	74,3	4541
Niger	1995	0,61	0,205	50,50	880
Nigeria	1997	1,93	0,467	50,56	1072
Rwanda	1984	---	0,518	28,90	1108
Senegal	1994	3,10	1,050	41,28	1498
Tunisia	1971	---	2,949	53,00	2882
Tanzania	1993	0,51	-0,240	38,20	553
Uganda	1993	1,16	0,083	39,20	788
South Africa	1993	---	8,924	62,30	7289
Zambia	1996	1,40	0,205	49,80	876
Zimbabwe	1990	---	3,031	56,83	2948

Source: Authors' computation

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The second point to note is that, for low-income countries, such as Burundi, Burkina Faso, Niger, Ethiopia, Tanzania and Zambia, the room for poverty reduction via redistribution is very limited. A one percent reduction in income inequality would need a small change in per capita income just to stay on the same level of poverty. The iso-poverty curves for these countries are flatter. Likewise, the effect of rising income inequality on poverty would be offset by a low rate of growth in per capita income. An increase in inequality may not be a significant poverty threat if there is high rate of growth in these countries.

Finally, we note that the elasticity is considerably higher at the lower poverty line. This would seem to suggest that redistribution policies are relatively more beneficial for the very poor. What it shows, when we use the headcount index as our measure of poverty, is that there are more people just below the poverty line of one dollar than immediately below the poverty line of two dollars.

The main message of this section is anyway that the trade-off between redistribution and growth as tools of a poverty policy vary quite a lot by country. Depending on the order of magnitude involved in the trade-off, the best choice of a pro-poor growth path varies. We should add, however, that our estimates are entirely based on the definition of poverty, with no inherent functional relationship between growth and income inequality. If there is a structural relationship between the two, as there is, then the choices that a country have may be restricted. The much harder question to analyse is how different pro-poor policies affect the growth rate of the economy. This requires tools of analysis, such as economy-wide equilibrium-models, which takes us beyond the simple analysis of this paper.

Still, to extend this simple analysis somewhat, we may show the poverty outcomes for four countries of two growth scenarios. One scenario is that income inequality remains unchanged (or Distribution Neutral Growth, DNG) and the other scenario is that additional income is equally distributed, that is growth follows an Equally Distributed Growth path. This is the second measure of White and Anderson (2000) discussed above. The latter is of course an extreme definition of pro-poor growth, but we include it to illustrative the sensitivity of poverty to distributional changes. We look at three countries, which are success cases by African standards, that is Ethiopia, Mozambique, and Uganda. We then also add one high-inequality, high average income case, that is South Africa. In all cases we also compare the outcomes of our simulations with actual changes in poverty.

**Table 6**  
**Simulation of the impact of pattern of growth on poverty in Ethiopia**

Year	Real Per capita GDP in PPP (1996 prices)	Headcount (DNG)	Gini (DNG)	Head- count (EDG)	Gini (EDG)
1995	583	42,0	41,0	42,0	41,0
1996	600	40,0	41,0	36,0	39,0
1997	618	38,0	41,0	33,0	38,0
1998	637	37,0	41,0	29,0	37,0
1999	656	34,0	41,0	26,0	36,0
2000	675	32,0	41,0	20,0	35,0

*Source:* Authors' calculation,

Table 6 reports the impact of the two types of growth patterns mentioned above on Uganda based on GDP in PPP from Penn World Tables using a poverty line of \$1 per day. We took the average growth rate in real per capita GDP that prevailed 1993-2000, which was 3%, as our measure of the long-term growth that can be sustained by the economy.<sup>13</sup> One type of growth pattern is a situation where the Gini coefficient remains unchanged (or Distribution Neutral Growth) throughout the growth episode. The other is an Equally Distributed Growth pattern, where all additional income is divided equally across the population. It can be seen that even under a distribution neutral growth (DNG), poverty in Ethiopia would have declined by 10 percentage points 1995-2000, a very significant reduction.

In our second, Utopian scenario, where additional income is equally distributed, Ethiopia could have halved poverty by 2000! It would have required a reduction in the Gini coefficient of 6 percentage points and a 3 percent per capita growth in this period. What would in actual fact mean of a reduction of such order in the Gini coefficient? In our case it means that the income of the richest quintile would grow only by 8% in this period, while the income of the poorest quintile would grow by nearly 50%!

Bigsten et al (2003) showed that poverty (using consumption based estimates) declined by 5 percentage points between 1994 and 1997, while the Gini coefficient increased by 4 percentage points. This suggests that the impact of growth on poverty in Ethiopia was less than what it would have been under the distribution neutral scenario. One might in this case argue that this increase was hard to avoid. Ethiopia was during the period considered in transition from conflict. During conflict episodes it is particularly the transaction intensive sectors that

<sup>13</sup> See World Bank, African Development Indicators CDROM (2002) for the per capita growth figure. In addition, Ministry of Finance and Economic Development (2002) believes that Ethiopia would achieve a 3% per capita growth easily for in the coming decades.

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decline, while the subsistence activities on which the poorest depend decline less. When peace is restored the transaction intensive sectors are bound to bounce back, and thus it is natural to expect an increase in inequality. This effect of a return to normalcy is not to be deplored. However, over the longer term is important for Ethiopia to be aware of the distributional consequences of policy choices.

We also look at the poverty impact of growth patterns in Mozambique and Uganda. Here we computed poverty based on GDP estimates in PPP from Penn World Tables and a poverty line of 2\$ a day per person. Tables 7 and 8 report the Distribution Neutral Growth and Equally Distributed Growth patterns for Mozambique and Uganda, which were among the fastest growing African economies in the 1990s. Mozambique's per capita GDP grew at a rate of 3.1% between 1990-2000, while that of Uganda grew at a rate of 3.3% during this period.

It can be seen that Mozambique could have reduced poverty by about thirteen percentage points between 1996 and 2003 if growth remained to be distribution neutral. But the actual growth scenario of Mozambique did not translate into a poverty reduction of that order, although Mozambique managed to reduce poverty by 9 percentage points during the 1990s (ECA, 2003). The growth pattern of Mozambique was thus similar to that of Ethiopia with a strong recovery in the modern sector. Again one could argue that the role of pro-poor growth should increase, once the economy gets richer and returns to normalcy. To maintain the existing level of inequality the government would probably have to introduce deliberate egalitarian policy measures.

Uganda managed to reduce poverty during the period 1992 to 2000 by 22 percentage points according to the consumption poverty estimates by Appleton (2001). The positive distributional outcome for Uganda was largely driven by the recovery in cash-crop agriculture. The recent dramatic decline in coffee prices may partly have reversed the positive picture we saw up until 2000. Still, our simulations show that the poverty impact of growth that is distribution-neutral is very significant. If Uganda at least could achieve such a pattern of growth and maintain the GDP growth rate this country would certainly meet the MDG of poverty reduction well before 2015.

**Table 7**  
Simulation of Pattern of Growth on Poverty in Mozambique

Year	Per-capita in PPP prices)	GDP (1996	Headcount (Under DNG)	Gini (Under DNG)	Headcount (Under EDG)	Gini (Under EDG)
1996	1003		48	40	48	40
1997	1034		46	40	43	39
1998	1066		44	40	42	38
1999	1133		42	40	40	37
2000	1168		40	40	35	35
2001	1204		39	40	32	34
2002	1241		37	40	29	34
2003	1280		35	40	23	32

*Source:* Authors' calculation

**Table 8**  
Simulation of Pattern of Growth on Poverty in Uganda

Year	Per capita GDP In PPP	Headcount (Under DNG)	Gini (Under DNG)	Headcount (Under EDG)	Gini (Under EDG)
1993	788	62	40,0	62	40,0
1994	814	60	40,0	59	38,0
1995	841	58	40,0	57	37,0
1996	868	56	40,0	54	36,6
1997	897	54	40,0	51	34,5
1998	926	52	40,0	49	34,0
1999	957	50	40,0	45	32,0
2000	989	48	40,0	42	31,0
2001	1021	46	40,0	38	29,6
2002	1055	44	40,0	34	29,0
2003	1090	42	40,0	29	28,0

*Source:* Authors' calculation

Finally, we simulate the development in a high-inequality case, namely South-Africa (Table 9). Per capita income in South Africa hardly grew over the last decade. The average growth in real per capita GDP between 1993 and 2000 was about 0.5%. Taking this as a proxy to long-term growth (though one may hope for a growth recovery after the transition in South Africa), we see that such growth does not have much of an impact on poverty. The slow growth in per capita GDP and the very high level of income inequality provides a case for policy measures that focus on redistribution. The impact of such redistribution on incentive structure, productivity and growth is uncertain, but some forms of transfers might actually even speed up the process of growth. The results of the simulation of the radically egalitarian growth pattern (EDG) shows that in a

high-income country even slow growth generates large resources that can potentially be used to fight poverty.

**Table 9**  
**Simulation of Growth Pattern on Poverty in SA**

Year	Headcount (DNG)	Gini (DNG)	Headcount (EDG)	Gini (EDG)
1993	22,0	62	22,0	62
1994	21,5	62	20,0	61,5
1995	21,7	62	19,7	61,2
1996	21,6	62	19,6	61,2
1997	21,3	62	19,5	61,1
1998	20,7	62	16,8	59,0
1999	20,6	62	16,7	58,6
2000	20,5	62	16,5	58,2
2001	20,4	62	11,2	57,2

*Source:* Authors' computations at a poverty line of 3 USD per day per person in PPP

In short, the preceding discussion illustrates the potential poverty impact of policies that target both distribution and growth. The big challenge, however, is to identify policy instruments that address both growth and distributional issues in the context of Africa. The next section looks briefly at some of the challenges of addressing distributional issues in the African context.

## **5. The challenges of Pro-poor growth strategies**

We have observed that average incomes in Africa are very low at the same time as inequality is quite high. So there are two problems for policy makers to worry about, namely how to increase aggregate growth and how to improve the distribution of the proceeds of this growth. There has been a very extensive debate about the growth failure of African countries referred to as “Africa’s growth tragedy” by Easterly and Levine (1997). Here we will not enter into this general debate. It may suffice to note that growth tends to be high in environments that have the following characteristics: Macroeconomic stability and a realistic exchange rate, competitive domestic markets, a stable financial system, an abundance of human capital, an effective physical infrastructure, unbiased institutions, good governance, political maturity, a broad-based development pattern, limited aid dependence, and a controlled level of foreign debt.

We will here confine our discussion to policies that can improve the poverty reduction impact of growth and thus make it pro-poor. Again, this is not an easy

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analytical task. To understand the determinants of income distribution one needs to understand the process that generates the income pattern? The income distribution of a country is the outcome of the whole economic process, where factor prices are determined within an interdependent system. To analyse changes in income distribution properly it would thus be very useful to use an economy-wide computable general equilibrium model, where it is possible to identify the variables that drive both economic growth and income distribution in a given setting. Without such information, it is difficult for policy makers to implement pro-poor growth policies.

The importance of the pattern of growth for poverty reduction was discussed already in the 1970s under the label ‘growth with redistribution’ (Chenery et al, 1974). The issue was out of focus during the 1980s, when policy debate centred on macroeconomic stabilisation and structural adjustment. The World Development Report of 1990 (World Bank, 1990) reflected a renewed focus on poverty, and argued for a three-pronged pro-poor development strategy. The three pillars of the strategy was that it should increase demand for the assets of the poor, it should help build up the assets of the poor, and there should also be a safety-net for those that could not earn money in the market. During the 1990s poverty gained in importance in the policy debate. At present the base for development lending and strategy are the Poverty Reduction Strategy Papers and the Poverty Reduction Growth Facilities. Stern (2003) notes that there are two main components in a strategy for pro-poor growth. First, it should create a good investment climate and thus generate aggregate growth, and secondly there should be empowerment and investment in poor people so that they can participate in the growth.

The first point we would like to note is that the sector focus of development efforts has a strong bearing on the poverty impact. Growth patterns where agriculture and other rural activities figure prominently generally have a good distributional profile.

There are also significant regional or urban vs. rural differences in incomes (Bigsten, 1980, Bigsten et al, 2003). In general, inequality in urban areas tends to be higher than in rural areas in most parts of Africa. Similarly, within urban and rural areas, inequality tends to vary across agro-climatic zones and economic sectors (such as formal vs. informal, service vs. manufacturing). As much as the sources of growth are important to account for overall economic growth, so is important to have disaggregated information on the sources of income inequality. Such exercise have been done for poverty in the literature (e.g. Ravallion and Datt, 2002 for India) trying to capture the effect of changes in the regional and sectoral distribution of income on overall reduction of poverty. The findings suggest that initial inequality interact with such factors as literacy, farm productivity, and asset distribution affect the impact of growth on poverty.

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Standard explanations of income inequality relate to the underlying asset distribution. Several studies have shown particularly the land distribution to be important in the determination of income inequality. However, in terms of the Gini coefficient for land distribution, Sub-Saharan Africa is the least unequal region (Deininger and Squire, 1998). Physical and human capital, however, are scarce in Africa, and their distribution is highly skewed. This certainly contributes very significantly to the extent of inequality. Still, a policy of redistribution is politically difficult. Asset redistribution may have costs in terms of lost growth. These could arise from efficiency and output losses from one-off redistribution, or through the impact on investment incentives.

Widespread poverty is often accompanied by several forms of market imperfections, indivisibility of investment, and strategic complementarities among economic agents can have a dampening effect on economic growth (see Lustig et al, 2002 for review of the literature). Credit rationing in these economies make it very difficult for poor people to break out of the poverty trap. The strategic complementarities introduce the issue of coordination failures, where incentives for the expropriation of other people's wealth dominate the strategy of individual economic agents. Poverty itself generates a high degree of risk aversion and reduces the incentive for investment. One policy implication is for governments to invest in basic infrastructures, such as physical and financial infrastructures, that reduce transaction cost to individuals. Redistribution of assets, such as land, can also ease the credit constraint poor people face.

Another aspect highly correlated with poverty is the low level of human development, which in itself affects subsequent growth. The literature has indicated that better education and health are very important for economic growth, and thus on poverty reduction. Analyses of poverty profiles confirm that the poor have relatively low level of education and health. One reason is the very fact that they are poor. The opportunity cost of sending children to school for poor households is higher than in better-off households. Against this background it is clear that the efficiency and composition of public expenditures are critical determinants of growth and poverty. This is an area where African countries face extremely serious problems. The countries are generally good at producing well-written strategy papers and PRSPs, but they have immense problems in getting the day to day work of the administration to function with civil servants that are underpaid, badly trained, and poorly motivated. Provision of public services is constrained by low levels of public revenue, which could, in principle, be solved by higher levels of *taxation*. However, in some countries, rapidly increased taxation might pose a severe constraint on private investment, and thus might impact negatively on future growth, and hence on revenue collection as well.

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The Development Report 2000 extended the concept of poverty beyond income and consumption plus education and health, to include risk and vulnerability, as well as voicelessness and powerlessness. Poor households are susceptible to a wide range of risks, some which are idiosyncratic, such as illness, while others are common, such as natural disasters. As a result, poor households may adopt production plans or employment strategies to reduce their exposure to the risk, even if this entails lower average income. Poor households may also try to smooth consumption by creating buffer stocks, withdrawing children from school, and developing credit and insurance arrangements. Social networks also help provide informal insurance. Still, there are limits to the usefulness on networks that do not extend outside the local community. This makes them very vulnerable to natural disasters and economic shocks, since geographically confined networks provide little protection against this type of shocks. In such instances the government needs to intervene with *targeted measures*. It is very hard for African governments to target the poor, since the information that is required is often lacking. The government therefore have to devise other methods of reaching the poor such as indicator targeting or self-targeting.

Finally, along with these factors is the ill feeling and social unrest that widespread poverty instils among members of society. Poverty undermines stability, well-functioning institutions, and good governance. Many African countries have gone through destructive civil wars, conflicts, and social upheavals in the recent past. A major cause of such instability is poverty itself. Therefore, the challenge for Africa is to ensure a growth process that benefits the larger segment of the poor population.

## **6. Conclusion**

Countries that have been successful in terms of aggregate economic growth have generally been successful in reducing poverty. How strong a poverty-reducing effect growth has, depends on what happens to income distribution. This paper has investigated some dimensions of income distribution in Africa. The focus has been on the link between changes in average per capita income and the incomes of the poor. We have estimated different pro-poor growth indexes. The results suggest that the poor in several cases have been surprisingly little affected by economic declines. On the other hand, there were also cases where the poor did not benefit from economic growth, leading to rising poverty.

Using the definition of income poverty as a function of income distribution and per capita income, this paper has attempted to show the implied trade-off between the two that exists to maintain a given level of poverty. Such trade-offs illustrate the choices open to different countries between growth and redistribution depending on their level of inequality and per capita income. High inequality and high-income countries were found to have a higher value of the elasticity of

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the iso-poverty curve, indicating that redistribution policies for poverty reduction may be more effective there. For most of these countries, if inequality were to increase further, the rate of growth in per capita income needed to maintain existing levels of poverty is very substantial. Thus, policies that lead to a further rise in income inequality must have a very strong growth effect for the poor to benefit. On the other hand, low-income countries tended to have had on average flatter iso-poverty curves, implying that a one percent increase in income inequality needs a much lower rise in per capita income to stay at the same level of income inequality. Here growth strategies leading to inequality are more acceptable from a poverty point of view, provided that they generate sufficient growth.

There may be a conflict between short term distributional measures and immediate poverty reduction on the one hand, and long term growth-supporting measures and long term poverty reduction, on the other. But there may also be win-win situations, where a policy for equity has a beneficial effect on growth. Typically, those policies have built up the assets of the poor, and helped increase the demand for those assets. This has meant, for example, expansion of education (building up assets), and measures that increase the relative prices of agricultural commodities and the wages of unskilled labour (increasing demand). Along with measures to secure long term growth of the incomes of the poor, there is a need for transfer schemes that help households to cope with risk, which is high for many poor groups.

The main point is that without growth in per capita incomes poverty will persist. Governments intent on poverty reduction must therefore create an environment that is conducive to growth. For the efforts to be effective, the government must develop good institutions, and provide good governance. The way in which the interaction between civil society and the government is played out will have major implications for the growth outcome. Understanding the nature of domestic politics is thus a key to successful economic reform.

Poverty can generally be reduced if there is sufficient economic growth, and it can be reduced faster if it has a pro-poor pattern. Growth can be substantial if the policy and institutional environment is right, but some aspects of the environment are hard to change, and some politicians may be unwilling to change them. This environment also determines the distribution of the proceeds of growth. It is therefore largely in the social and political arenas that scope for poverty reduction will be determined. It is important to complement the analysis of growth policy with the analysis of its distributional consequences. It has to be put on the political agenda to increase the chances of achieving rapid poverty reduction.

## Appendix

**Annex Table 1: Pro-Poor Growth Measure for Selected African Countries**

Country	Year	White and Anderson Measure of Pro-Poor Growth	Kakwani and Pernia's Measure of Pro-Poor growth ( $\phi$ )	Growth of GDP per capita_1996 PPP	Growth in the Gini Index
Cote d'Ivoire	1985 v 1993	2,72	4,063	-2,34	-1,37
Cote d'Ivoire	1986 v 1993	0,08	1,687	-2,85	-0,64
Cote d'Ivoire	1987 v 1993	1,42	2,274	-2,90	-1,34
Cote d'Ivoire	1988 v 1993	0,78	1,326	-2,68	0,01
Cote d'Ivoire	1985 v 1988	6,02	-0,735	-1,77	-3,62
Cote d'Ivoire	1986 v 1988	-1,65	1,814	-3,27	-2,27
Ethiopia	1981 v 1995	-1,33	1,085	-1,29	1,51
Gambia	1991 v 1992	113,59	-0,206	-3,53	-14,83
Ghana	1987 v 1997	1,88	0,458	1,11	-0,78
Ghana	1988 v 1997	2,14	0,606	1,04	-1,03
Ghana	1989 v 1997	2,36	0,975	1,05	-1,45
Ghana	1992 v 1997	1,23	0,295	0,93	-0,72
Ghana	1993 v 1997	1,39	0,437	0,72	-0,82
Ghana	1987 v 1993	2,22	0,724	1,37	-0,75
Ghana	1988 v 1993	2,75	0,387	1,30	-1,20
Ghana	1989 v 1993	3,34	1,171	1,37	-2,07
Ghana	1992 v 1993	0,63	-0,027	1,78	-0,32
Ghana	1987 v 1992	2,54	0,4	1,29	-0,83
Ghana	1988 v 1992	3,29	0,856	1,18	-1,42
Ghana	1989 v 1992	4,26	1,738	1,24	-2,65
Guinea	1991 v 1994	28,73	22,81	0,93	0,00
Kenya	1992 v 1994	21,45	-0,014	-0,25	2,82
Lesotho	1986 v 1993	-1,35	0,064	-0,10	0,48
Lesotho	1987 v 1993	-1,57	0,206	-0,45	0,56
Madagascar	1960 v 1993	1,24	-12	-2,34	-0,60
Madagascar	1980 v 1993	1,28	-11,52	-2,93	-0,58
Mali	1989 v 1994	-8,13	0,382	-1,90	6,70
Mauritania	1988 v 1995	8,38	6,845	-0,03	-1,27
Mauritania	1993 v 1995	9,62	-10,98	-1,12	-11,84
Mauritania	1988 v 1993	7,89	-11,18	0,41	3,31

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Niger	1960 v 1995	-0,11	0,096	-1,73	1,14
Niger	1992 v 1995	0,00	0,09	-0,86	11,84
Niger	1960 v 1992	-0,12	0,096	-1,81	0,19
Nigeria	1959 v1997	-1,24	2,12	0,47	-0,02
Nigeria	1985 v 1997	-2,65	-3,857	0,42	2,26
Nigeria	1986 v 1997	-4,16	-10,33	0,22	2,87
Nigeria	1991 v 1997	1,45	6,253	-0,38	1,96
Nigeria	1992 v 1997	-7,96	-3,055	0,88	4,20
Nigeria	1993 v 1997	2,24	-0,95	<b>3,37</b>	7,78
Nigeria	1959 v1993	-1,64	12,66	0,13	-0,90
Nigeria	1985 v 1993	-5,01	0,791	<b>-1,02</b>	-0,40
Nigeria	1986 v 1993	-7,64	0,554	<b>-1,53</b>	0,17
Nigeria	1991 v 1993	-0,13	0,117	<b>-7,48</b>	-8,75
Nigeria	1959 v 1992	-0,18	5,139	0,40	-0,65
Nigeria	1985 v 1992	1,32	-6,323	0,10	0,89
Nigeria	1986 v 1992	-0,88	7,953	-0,32	1,78
Nigeria	1985 v 1991	-6,59	-1,212	1,24	2,55
Nigeria	1986 v 1991	-10,49	-3,894	0,96	3,98
Rwanda	1983 v 1984	0,00	0,072	-9,70	0,00
Senegal	1960 v 1994	2,27	-1,176	-0,81	-0,89
Senegal	1991 v 1994	22,48	-5,416	-2,11	-8,63
Senegal	1960 v 1991	0,50	-0,134	-0,68	-0,11
Tanzania	1964 v 1993	1,21	15,04	0,09	-1,19
Tanzania	1991 v 1993	66,94	-14,05	<b>-1,76</b>	-19,54
Tanzania	1964 v 1991	-2,47	12,66	0,23	0,33
Uganda	1989 v 1993	-6,18	-0,678	2,21	4,40
Uganda	1992 v 1993	-2,65	1,604	3,96	-3,87
Uganda	1989 v 1992	-7,33	-2,235	1,64	7,31
Zambia	1959 v 1996	-1,09	0,032	-1,76	0,10
Zambia	1976 v 1996	0,64	0,082	-3,37	-0,12
Zambia	1991 v 1996	-5,49	0,535	-4,62	2,74
Zambia	1993 v 1996	2,50	0,863	-2,84	2,53
Zambia	1959 v 1993	-1,40	-0,02	-1,66	-0,11
Zambia	1976 v 1993	0,31	-0,018	-3,46	-0,58
Zambia	1991 v 1993	-16,32	0,522	-7,24	3,04
Zambia	1959 v 1991	-0,38	-0,144	-1,30	-0,31
Zambia	1976 v 1991	2,76	-2,517	-2,94	-1,05

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