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# Determinants of Income Inequality and its Effects on Economic Growth: Evidence from African Countries — Source link

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# Determinants of Income Inequality and its Effects on Economic Growth

## Evidence from African Countries

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**Abstract**

The paper empirically investigates, in the context of African countries, the determinants of income distribution and inequality, the effect of inequality on economic growth, and the channels through which inequality affects growth. Data for 35 countries over different periods in the last four decades were employed. Factors identified as having affected income distribution include the level of economic development attained, regional factors, size of government budget and the amount of it devoted to subsidies and transfers, phase of economic cycle, share of agricultural sector in total labour force, as well as human and land resources endowment. Some evidence that high inequality reduces growth is also found. The channels through which inequality affect growth are found to be through reduction in secondary and tertiary education investment, reduction in political stability, and increase in fertility rate. There is, however, no evidence that it affects private saving and investment or the size of government expenditure and taxation, contrary to what is contended in the theoretical literature.

Keywords: income distribution, income inequality, economic growth

JEL classification: O1, H5



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## 1. Introduction

Empirical studies on income inequality have been addressing two issues: identification of factors responsible for an observed pattern and magnitude of inequality and the direction—whether negative or positive—of the effect of inequality on economic growth. However, contradictory findings have often been reported, partly because of limited guidance provided by the theory. In addition, most of such studies have been based on cross-country (sometimes, panel) data for a particular region or for all countries with available data. But, because of limited number of income distribution data points for African countries, hardly any studies have been reported exclusively for Africa and, in those cases where all countries with available data are included, the number of African countries covered often constitutes a negligible fraction of the total.

There is a need not only to shed more light on the existing contradiction-prone evidence, but also to examine the subject from an African perspective. The use of African data is supported not only by the relatively low level of development and high level of poverty in the region, but also because of the recent renaissance there to fight poverty, which makes Africa-specific evidence of immediate relevance to anti-poverty policies. The present study addresses the aforementioned two aspects, viz: factors accounting for the observed income inequality and the direct and indirect effects of the inequality on economic growth and it is based on cross-country (or, rather, quasi-panel) data for 35 African countries spanning the 1960s to 1990s.

The rest of the paper is organized into 6 sections. Section 2 is on literature review while section 3 presents an overview of the data. In section 4, the methodology adopted in carrying out the study is discussed. The empirical results on determinants of inequality are presented and discussed in section 5 and the same is done in section 6 for the effects of inequality on growth. Section 7 provides a summary and some conclusions.

## 2. Earlier literature

### 2.1 Factors determining income inequality

A number of empirical studies have tried to explain income distribution or inequality from various standpoints. Some studies, and mainly those based on time series data, are often pre-occupied with determining the effects of selected macroeconomic variables (such as inflation and unemployment level) on income distribution, e.g. Mocan (1999) and Blejer and Guererro (1990), while some other time-series studies examine the effects of fiscal policy, especially tax rate, on inequality, e.g. Auten and Carroll (1999) and Feenberg and Poterba (1993). As such studies have been reported mainly for developed countries with adequate time series on income distribution, they are not very applicable to the present cross-country study.

Because of the limited number of time series observations for a single country, particularly for developing countries, most empirical studies have been based on multi-country data sets and the range of potential determinants of income distribution being tested is wider. Studies based on multi-country data have been encouraged recently through maintenance

of multi-country income distribution 'data banks', as pioneered by Deininger and Squire (1996) and subsequently widened by WIDER and UNDP. Some of these focus on testing a specific propositions, e.g. Mushinski (2001) and Thornton (2001) who examined whether the Kuznets' hypothesized inverted U-shaped relationship between inequality and the level of development is supported by data. Others examine the effects of some specific institutional and economic factors on income distribution. For instance, Li et al. (2000) examine the effect of corruption; Tanninen (1999) tests for the effect of government expenditure; while Bourguignon and Morrison (1998) examine the effects of dualism, especially as it relates to agriculture.

Furthermore a number of studies have attempted to examine the effects of a broad range of factors on inequality, within a multi-country setting. Such factors are a combination of the aforementioned ones such as government spending, dualism, level of development, etc. Some of these studies include Deininger and Squire (1998), Vanhoudt (2000), and Barro (2000). It is this last category of multi-country studies that is most relevant to the present paper. Specifically, we test for the effect of a fairly wide range of factors on income distribution, as discussed subsequently.

### 2.2 Effects of income inequality on economic growth

*Theoretical background*

Initially, the conventional wisdom in the literature was that income inequality promotes economic growth. This view was premised on Keynes' idea that average propensity to save increases with income level so that, by redistributing income in favour of the rich, the economy-wide average propensity to save and, hence *ceteris paribus* the fraction of GDP devoted to capital formation would rise, thereby promoting economic growth.

While not necessarily refuting the above channel of effect of inequality on growth, at least four other channels that point to a negative effect of inequality on growth have been identified in the more recent literature. These channels, the details of which are discussed by Perotti (1996), Benabou (1996) and Aghion and Garcia-Penalosa (1999), are as follows:

- *Through endogenous fiscal policy or political economy*. It has been contended, e.g. by Alesina and Rodrik (1994) and Bertola (1993), that a high level of inequality leads to redistributive fiscal policy in the form of higher government expenditure and distortionary taxation which, in turn, are believed to retard growth. This is based on the assumption that political power (e.g. one-person-one-vote in a democratic setting) is more equally distributed than economic power. The poor normally benefit more from a given government expenditure than they lose via the taxes levied on them to finance that expenditure, whereas the opposite is the case for the rich. It follows that the level of expenditure and taxation preferred by each voter would vary inversely with their income level. Hence the greater the amount by which the mean income in an economy exceeds the median income (i.e. the greater the degree of inequality) the more likely it would be that the redistribution of resources from the rich to the poor would be supported by majority voting (i.e. by the median voter).

- *Through credit market imperfections for financing investment in education*. Theoretical expositions underlining this channel include those presented by Galor and

Zeira (1993) and Piketty (1997). In a nutshell, the proponents contend that there are borrowing constraints facing the poor in financing education and, hence, in accumulating human capital. This induces poor households to forgo human capital investments, even if the investments offer very high rates of return. The greater the degree of wealth and income inequality, the greater the number of people for which the constraints would be binding and, therefore, the lower is the stock of human capital in the economy. Economic growth is presumed to be enhanced through human capital accumulation. It should be noted that the effect of this channel would be weaker if education is being financed by the state or is made compulsory, as in the case of primary schooling in some countries.

- *Through sociopolitical unrest and instability.* A number of theoretical frameworks, e.g. Alesina and Perotti (1996) and Benhabib and Rustichini (1996), have been developed, showing the likely negative effect of high inequality on economic growth through increased crime, social unrest and political instability that high inequality tends to cause.

- *Through endogenous fertility.* It has been contended by Perotti (1996) that high inequality, by increasing the fertility rate in an economy, serves to retard the rate of economic growth. A more formal theoretical exposition of this has also been provided by Morand (1999). According to this line of reasoning, there is a poverty trap or threshold below which there exists high fertility rate (say, motivated by old-age support), in preference to the alternative of investment in children's education; i.e. quantity of children is preferred to quality. Above the threshold, the reverse is the case. By increasing the number of people living below the threshold, high inequality would increase the economy-wide fertility rate and thereby reduce economic growth.

*Empirical evidence*

The problem arising from the theoretical expositions, as reviewed above, is the existence of contradictory predictions. The older view predicts a positive effect of high inequality on growth (through increase in saving and investment) while the more recent view predicts a negative one, through a combination of the aforementioned four channels.

At the empirical level, the contradiction persists. While some studies, e.g. Perotti (1996) and those summarized in Benabou (1996, Table 2), report findings that broadly support negative effect of inequality on growth, others like Li and Zou (1998) have reported findings to the contrary. More recently, Barro (2000) has presented evidence that tends to 'reconcile' them by showing that 'negative effect of inequality on growth shows up for poor countries but that the relationship for rich countries is positive'. But this 'reconciliation' is still far from convincing and the present study, which is based almost exclusively on data for poor countries, attempts to shed additional light on the issue.

## 3. Income distribution data and their correlations

### 3.1 Income distribution data

The income distribution data employed in the present study are shown in Table 1. In the first four columns, economy-wide data (i.e. data for combined rural and urban areas) for all the 35 countries are shown. Some of these countries have more than one data point each (with Morocco having a maximum of four) so that there are 65 data points in total. The basic source of the data is the joint WIDER/UNDP *World Income Inequality Database* (internet) that was, in turn, compiled from a number of sources, including Deininger and Squire (1996). This source is augmented by the World Bank's *World Development Report* (various issues), whose income distribution contents greatly overlaps with the WIDER/UNDP source.

While there are more observations reported in the above sources than are presented in Table 1, we have had to be discriminating in our selection. In particular, we avoided including observations that are based on surveys of less than national coverage (e.g. those only based on income tax returns or national accounts or for rural or urban areas only); where there is no clear reference to the primary source; and for any other qualifications that might have made the data sources (particularly, WIDER/UNDP source) not to have included them in their 'high quality' category. Also, for each country having more than one data point, we exclude observations for consecutive years and, in general, we make sure that the 'time series' for a country are some years apart. Barring measurement errors, income distribution statistics are not expected to change markedly between two successive years.

The last eight columns of Table 1 contain income distribution data that are separately analyzed into rural and urban categories. The data, which are available for only 22 (exclusively sub-Saharan) countries (four of which have two data points each, making 26 observations altogether), are from the World Bank's *African Development Indicators* (various issues).[1] Most of the data relate to households (as opposed to individuals) as the recipient units. They also mostly refer to expenditures, rather than incomes. This is particularly the case with those 26 data points that have separate rural and urban disaggregation, as shown in Table 1.

The raw data derived from the sources are the income or expenditure shares of the five population quintiles (i.e. population ordered according to income or expenditure level, at intervals of 20 percent). We add the income/expenditure shares of the lowest two quintiles to arrive at the income share of the 40 percent poorest of the population and do the same for the shares of the next two lowest quintiles to arrive at the share of the next poorest 40 percent (that corresponds to the so-called 'middle class', following Perotti, 1996) while the Gini coefficient is computed from the five quintile shares in the usual manner.[2]

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[1] The economy-wide (or combined rural and urban) equivalents are already contained in the aforementioned WIDER/UNDP/World Bank sources, as presented in the first four columns.

[2] This implies assumption that all members of a quintile receive equal amounts has to be made so that the formula for calculating Gini coefficient becomes: Gini = $0.8\text{-}1.6Q_1\text{-}1.2Q_2\text{-}0.8Q_3 - 0.4Q_4$, where $Q_1, Q_2, Q_3$, and $Q_4$ are the shares of the first (i.e., poorest), second, third and fourth quintiles respectively (Barro, 2000, p. 15).

As it can be seen from the last eight columns of Table 1, both the income share of the richest 20 percent of the population and the Gini coefficient are higher for urban areas than for rural areas, except in the case of Central African Republic, Guinea-Bissau, Niger, Nigeria, Sierra Leone and Zambia ( i.e. except in 7 out of 26 data points). This means that, generally, income inequality is higher in the urban areas in sub-Saharan countries than in rural areas there. This observation agrees with the premise or assumption on which Kuznets' (1955) hypothesis concerning the inverted U-shaped relationship between inequality and level of economic development was based.[3]

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It should be noted that the degree of inequality varies directly with the Gini coefficient and the income share of richest 20 percent of the population while it varies inversely with the income shares of the poorest 40 percent and, to a less extent, of the 'middle class'.

[3] According to Kuznets' model, the agricultural and rural sectors are characterized with relatively low level of per capita income and low level of inequality. He posited that the initial phase of economic development process entails shrinking of these sectors through movement of resources (especially, workers) from them to the industrial and urban sectors that both feature higher inequality and higher level of per capita income, thereby establishing a positive relationship between the economy-wide level of per capita income and inequality at the early stages of development. In due course, the new workers who joined the industry and urban area would move up the income ladder vis-à-vis the existing richer workers there and, at the same time, scarcity of workers in the agriculture and rural area would drive up wages there too, thereby reducing inequality in the whole economy. This means that as the level of per capita income increases further, a negative relationship between income and inequality would be established.

Table 1
Income Distribution Data

| Country & Year | Economy-wide, i.e. Rural &Urban | | | | Rural Areas Only | | | | Urban Areas Only | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Poorest 40% | Next 40% | Richest 20% | Gini Coeff. | Poorest 40% | Next 40% | Richest 20% | Gini Coeff. | Poorest 40% | Next 40% | Richest 20% | Gini Coeff. |
| Algeria, 1988 | 0.178 | 0.357 | 0.465 | 0.357 | … | … | … | … | … | … | … | … |
| Algeria. 1995 | 0.186 | 0.388 | 0.426 | 0.329 | … | … | … | … | … | … | … | … |
| Botswana, 1986 | 0.105 | 0.306 | 0.589 | 0.492 | … | … | … | … | … | … | … | … |
| Burk. Faso, 1994 | 0.142 | 0.307 | 0.550 | 0.437 | 0.185 | 0.354 | 0.461 | 0.347 | 0.139 | 0.351 | 0.511 | 0.418 |
| Burundi, 1992 | 0.200 | 0.384 | 0.416 | 0.310 | … | … | … | … | … | … | … | … |
| C. Afr. Rep.,1993 | 0.069 | 0.281 | 0.650 | 0.558 | 0.080 | 0.250 | 0.670 | 0.559 | 0.110 | 0.341 | 0.549 | 0.466 |
| C. d'Ivoire, 1985 | 0.158 | 0.368 | 0.474 | 0.381 | … | … | … | … | … | … | … | … |
| C. d'Ivoire, 1988 | 0.180 | 0.380 | 0.441 | 0.341 | … | … | … | … | … | … | … | … |
| C. d'Ivoire, 1995 | 0.183 | 0.375 | 0.443 | 0.339 | 0.212 | 0.403 | 0.385 | 0.284 | 0.181 | 0.366 | 0.453 | 0.347 |
| Djibouti, 1996 | 0.178 | 0.373 | 0.449 | 0.349 | 0.172 | 0.382 | 0.446 | 0.355 | 0.178 | 0.372 | 0.450 | 0.348 |
| Egypt, 1974 | 0.165 | 0.355 | 0.480 | 0.378 | … | … | … | … | … | … | … | … |
| Egypt, 1991 | 0.212 | 0.377 | 0.411 | 0.295 | … | … | … | … | … | … | … | … |
| Egypt, 1995 | 0.230 | 0.380 | 0.390 | 0.266 | … | … | … | … | … | … | … | … |
| Ethiopia, 1995 | 0.180 | 0.343 | 0.477 | 0.360 | 0.200 | 0.361 | 0.439 | 0.321 | 0.143 | 0.312 | 0.545 | 0.432 |
| Gabon, 1975 | 0.093 | 0.272 | 0.635 | 0.522 | … | … | … | … | … | … | … | … |
| Gabon, 1977 | 0.075 | 0.262 | 0.663 | 0.555 | … | … | … | … | … | … | … | … |
| Gambia, 1992 | 0.134 | 0.339 | 0.528 | 0.432 | 0.178 | 0.406 | 0.416 | 0.331 | 0.158 | 0.337 | 0.505 | 0.396 |
| Ghana, 1988 | 0.186 | 0.382 | 0.432 | 0.332 | … | … | … | … | … | … | … | … |
| Ghana, 1992 | 0.199 | 0.379 | 0.422 | 0.314 | 0.201 | 0.380 | 0.419 | 0.311 | 0.191 | 0.372 | 0.437 | 0.329 |
| Ghana, 1997 | 0.206 | 0.377 | 0.417 | 0.305 | 0.227 | 0.384 | 0.390 | 0.270 | 0.197 | 0.396 | 0.407 | 0.308 |
| Guinea, 1991 | 0.113 | 0.385 | 0.502 | 0.440 | 0.120 | 0.405 | 0.475 | 0.419 | 0.114 | 0.383 | 0.502 | 0.436 |
| Guinea, 1994 | 0.168 | 0.360 | 0.472 | 0.370 | 0.201 | 0.391 | 0.408 | 0.305 | 0.175 | 0.362 | 0.463 | 0.358 |
| Guinea-Bis.,1991 | 0.086 | 0.326 | 0.589 | 0.510 | 0.080 | 0.316 | 0.604 | 0.525 | 0.129 | 0.350 | 0.522 | 0.435 |
| Kenya, 1992 | 0.101 | 0.277 | 0.621 | 0.512 | 0.170 | 0.396 | 0.434 | 0.347 | 0.139 | 0.326 | 0.535 | 0.431 |
| Kenya, 1994 | 0.147 | 0.351 | 0.502 | 0.406 | … | … | … | … | … | … | … | … |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Lesotho, 1987 | 0.093 | 0.306 | 0.601 | 0.510 | … | … | … | … | … | … | … | … |
| Madagascar, 993 | 0.145 | 0.334 | 0.521 | 0.419 | 0.165 | 0.362 | 0.472 | 0.374 | 0.142 | 0.346 | 0.512 | 0.416 |
| Malawi, 1968 | 0.215 | 0.279 | 0.506 | 0.336 | … | … | … | … | … | … | … | … |
| Mali, 1994 | 0.126 | 0.312 | 0.562 | 0.458 | 0.159 | 0.345 | 0.495 | 0.391 | 0.158 | 0.342 | 0.501 | 0.395 |
| Mauritania, 1988 | 0.139 | 0.392 | 0.465 | 0.398 | … | … | … | … | … | … | … | … |
| Mauritania, 1995 | 0.170 | 0.374 | 0.456 | 0.360 | 0.197 | 0.398 | 0.406 | 0.308 | 0.194 | 0.384 | 0.422 | 0.320 |
| Mauritius, 1980 | 0.165 | 0.436 | 0.399 | 0.321 | … | … | … | … | … | … | … | … |
| Mauritius, 1986 | 0.172 | 0.371 | 0.457 | 0.362 | … | … | … | … | … | … | … | … |
| Mauritius, 1991 | 0.183 | 0.383 | 0.434 | 0.338 | … | … | … | … | … | … | … | … |
| Morocco, 1965 | 0.145 | 0.201 | 0.654 | 0.486 | … | … | … | … | … | … | … | … |
| Morocco, 1985 | 0.228 | 0.378 | 0.394 | 0.270 | … | … | … | … | … | … | … | … |
| Morocco, 1991 | 0.171 | 0.367 | 0.463 | 0.361 | … | … | … | … | … | … | … | … |
| Morocco, 1999 | 0.171 | 0.361 | 0.466 | 0.366 | … | … | … | … | … | … | … | … |
| Mozambique., 1996 | 0.173 | 0.362 | 0.465 | 0.361 | … | … | … | … | … | … | … | … |
| Niger, 1992 | 0.193 | 0.366 | 0.441 | 0.330 | 0.096 | 0.368 | 0.536 | 0.473 | 0.170 | 0.379 | 0.451 | 0.358 |
| Niger, 1995 | 0.097 | 0.370 | 0.533 | 0.470 | … | … | … | … | … | … | … | … |
| Nigeria,, 1986 | 0.192 | 0.366 | 0.442 | 0.331 | … | … | … | … | … | … | … | … |
| Nigeria, 1993 | 0.129 | 0.378 | 0.494 | 0.420 | 0.138 | 0.335 | 0.527 | 0.428 | 0.183 | 0.386 | 0.431 | 0.334 |
| Nigeria, 1997 | 0.126 | 0.318 | 0.557 | 0.454 | … | … | … | … | … | … | … | … |
| Rwanda, 1984 | 0.229 | 0.381 | 0.391 | 0.268 | … | … | … | … | … | … | … | … |
| Senegal, 1991 | 0.105 | 0.316 | 0.579 | 0.487 | 0.143 | 0.381 | 0.476 | 0.400 | 0.153 | 0.319 | 0.528 | 0.417 |
| Senegal, 1995 | 0.167 | 0.351 | 0.482 | 0.376 | 0.218 | 0.391 | 0.391 | 0.280 | 0.186 | 0.350 | 0.464 | 0.347 |
| S. Leone, 1968 | 0.053 | 0.327 | 0.620 | 0.550 | … | … | … | … | … | … | … | … |
| S. Leone, 1990 | 0.031 | 0.335 | 0.634 | 0.585 | 0.026 | 0.174 | 0.790 | 0.670 | 0.099 | 0.379 | 0.521 | 0.462 |
| South Afr., 1965 | 0.061 | 0.366 | 0.573 | 0.582 | … | … | … | … | … | … | … | … |
| South Afr., 1994 | 0.084 | 0.269 | 0.648 | 0.543 | 0.134 | 0.302 | 0.564 | 0.450 | 0.098 | 0.328 | 0.574 | 0.494 |
| Sudan, 1968 | 0.165 | 0.376 | 0.460 | 0.336 | … | … | … | … | … | … | … | … |
| Swaziland, 1994 | 0.085 | 0.271 | 0.644 | 0.539 | 0.118 | 0.331 | 0.550 | 0.459 | 0.068 | 0.274 | 0.658 | 0.563 |
| Tanzania, 1964 | 0.126 | 0.264 | 0.610 | 0.480 | … | … | … | … | … | … | … | … |
| Tanzania, 1969 | 0.099 | 0.308 | 0.593 | 0.501 | … | … | … | … | … | … | … | … |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Tanzania, 1993 | 0.178 | 0.367 | 0.455 | 0.352 | 0.198 | 0.387 | 0.415 | 0.311 | 0.177 | 0.362 | 0.461 | 0.355 |
| Tunisia, 1965 | 0.157 | 0.353 | 0.490 | 0.388 | … | … | … | … | … | … | … | … |
| Tunisia, 1971 | 0.107 | 0.244 | 0.649 | 0.514 | … | … | … | … | … | … | … | … |
| Tunisia, 1990 | 0.163 | 0.374 | 0.463 | 0.370 | … | … | … | … | … | … | … | … |
| Uganda, 1989 | 0.206 | 0.375 | 0.419 | 0.305 | … | … | … | … | … | … | … | … |
| Uganda, 1993 | 0.175 | 0.365 | 0.461 | 0.357 | 0.193 | 0.386 | 0.421 | 0.323 | 0.153 | 0.339 | 0.508 | 0.403 |
| Zambia, 1976 | 0.112 | 0.322 | 0.566 | 0.473 | … | … | … | … | … | … | … | … |
| Zambia, 1993 | 0.119 | 0.376 | 0.504 | 0.486 | 0.137 | 0.359 | 0.504 | 0.418 | 0.168 | 0.365 | 0.468 | 0.369 |
| Zambia, 1996 | 0.124 | 0.329 | 0.548 | 0.451 | 0.134 | 0.329 | 0.537 | 0.434 | 0.142 | 0.328 | 0.530 | 0.426 |
| Zimbabwe, 1990 | 0.103 | 0.274 | 0.623 | 0.511 | … | … | … | … | … | … | … | … |
| Mean value | .147 | .343 | .510 | .409 | … | … | … | … | … | … | … | … |
| Coef. of variation | .318 | .131 | .158 | .208 | … | … | … | … | … | … | … | … |

Source: as discussed in the text.

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### 3.2 Correlation of income distribution and economic growth with other variables

The simple correlation coefficients of the income distribution variables and economic growth with other variables of interest are reported in Table 2. From the Table, it can be seen that the Gini coefficient is highly correlated with the income share of poorest 40 percent of the population and that of richest 20 percent, with correlation coefficients of –0.972 and 0.967 respectively. The negative correlation between the income shares of the poorest 40 percent and the richest 20 percent is also very high, being –0.887. The high correlation between the income distribution variables and the size of arable land per capita is also noteworthy.

Table 2
Correlations of income distribution variables and economic growth with other variables

| | Gini coeff. | Income share of the poorest 40% | Income share of the next poorest 40% | Income share of the richest 20% | 5-year average economic (per capita GDP) growth |
|---|---|---|---|---|---|
| Gini Coefficient | 1.000 | -.972 | -.729 | .967 | -.090 |
| Income share of the poorest 40% | -.972 | 1.000 | .557 | -.887 | .127 |
| Income share of the next poorest 40% | -.729 | .557 | 1.000 | -.877 | -.028 |
| Income share of the richest 20% | -.967 | -.887 | -.877 | 1.000 | -.059 |
| 5-year average economic (per capita GDP) growth | -.090 | .127 | -.028 | -.059 | 1.000 |
| Real per capita income level | .148 | -.148 | -.092 | .136 | -.081 |
| Govt. expenditure/GDP ratio | .226 | -.210 | -.231 | .238 | -.044 |
| Govt. subsidies/GDP ratio | -.236 | .188 | .305 | -.262 | .260 |
| Govt. subsidies/govt. total expenditure ratio | -.232 | .179 | .328 | -.268 | .278 |
| 5-year average inflation rate | .016 | -.041 | .127 | -.045 | -.122 |
| Economic cycle (expansion) indicator | -.174 | .153 | .198 | -.187 | .106 |
| Degree of openness of economy—(export+import)/GDP | .110 | -.139 | .037 | .060 | -.032 |
| Percent of total labour force in agric. sector | .088 | -.064 | -.148 | .119 | -.174 |
| Indicator of control on corruption | .020 | .042 | -.213 | .086 | .212 |
| Size of arable land per capita | .475 | -.469 | -.291 | .432 | -.072 |
| Illiteracy rate | -.103 | .121 | -.022 | -.059 | -.054 |
| Share of govt. consumption in GDP | .115 | -.103 | -.132 | .131 | -.056 |
| Fertility rate | .122 | -.095 | -.167 | .148 | -.088 |
| Private saving/GDP ratio | -.143 | .166 | .034 | -.115 | .256 |
| Private investment/GDP ratio | .238 | -.212 | -.295 | .274 | -.204 |

table continues…

| | | | | | |
|---|---|---|---|---|---|
| Primary school enrolment ratio | -.006 | .026 | -.017 | -.005 | -.062 |
| Secondary school enrolment ratio | -.149 | .124 | .205 | -.185 | -.034 |
| Tertiary school enrolment ratio | -.136 | .120 | .182 | -.170 | -.077 |
| Tax revenue/GDP ratio | .080 | -.070 | -.098 | .087 | .117 |
| Index of political stability | -.348 | .352 | .258 | -.334 | .118 |
| 5-year average population growth | .108 | -.066 | -.187 | .142 | -.257 |

Source: as discussed in the text.

Notes: (i) All variables, except 5-year average annual population growth rate, are for the period preceding the 5-year average annual per capita GDP growth. The following are in logarithms: real per capita income, openness of economy, percent of labour force in agric, arable land per capita, illiteracy rate, fertility rate, and school enrolment ratios.

## 4. Methodology

As already mentioned, the empirical study has two components. The first is the identification of relevant determinants of inequality while the second is to test for the effect of inequality on economic growth and the channels through which the effect is brought about. Four alternative (or, rather, complementary) income distribution or inequality indicators are considered separately. These are Gini coefficient and the shares of income accruing to each the three income brackets (poorest 40 percent, next poorest 40 percent and richest 20 percent). The Gini coefficient is considered because it is a useful summary indicator of inequality. On the other hand, the poorest 40 percent roughly corresponds to the population living below the relative poverty line, according to the World Bank's *African Development Indicators*, from which a part of inequality data were sourced.[4] This is why we have identified this income bracket for analysis, so we can also make some inference on the determinants of poverty. The shares of income accruing to the 40% 'middle class' and the richest 20 percent are also analyzed so as to 'complete the picture' and account for which income group benefits from the loss to the poorest 40 percent of the population (i.e. those living below the relative poverty line). Each of these four measures has been employed in previous studies of inequality.

To identify the factors determining income distribution in these countries, we specify regression equations for each inequality variable and test for the effects of those factors considered as possible determinants, along the line explained further in section 5. Also, to test for their effects on economic growth, we include each of them (one at a time) as a regressor in an economic (per capita real GDP) growth equation. Finally, to identify the channels through which they may have affected economic growth (e.g. whether through private saving, credit market imperfection, sociopolitical stability or fertility rate, as all reviewed in section 2), we include each of them in equations specified for variables proxying each of these channels, as further explained in section 6.

While there are two or more 'time series' income distribution observations for some of the countries, most have only one observation each so that the cross-country data set can hardly be described as a panel type. The data are more akin to ordinary cross-section data. Hence, we consider panel data estimation technique to be inapplicable and use only OLS.

[4] For most countries, the fraction of population living below relative poverty line is between 40 and 50 percent, although there are some outliers with some below 30 percent and others above 60 percent.

In order to correct for the possible existence of heteroscedasticity and to remove the effect of outliers, we employ a robust and homoscedasticity-consistent estimating technique proposed by White (1980).

Some of the variables are in growth rate form, expressed as average annual growth rate over a number of years. The affected variables are per capita income growth (i.e. economic growth), inflation rate (i.e. growth rate of the GDP deflator), population growth rate, and the terms of trade growth rate. Each was computed as an average annual growth rate over five years, through the OLS technique. For most of the other variables (e.g., those expressed as ratios of GDP), a simple average over two or three successive years was taken. The explanatory variables employed in the regression equations are normally for the period preceding the observation years for the dependent variable, so as to minimize the existence of simultaneity in some cases where the contemporaneous values of the regressors might be prone to be endogenous. Most of the data (i.e., other than income distribution statistics, whose sources have been discussed in section 3.1) were downloaded from World Bank (internet) sources, including *African Development Indicators*. The only exceptions are the terms of trade, private investment-GDP ratio and private saving-GDP ratio that were sourced from (unpublished) IMF sources as well as the indicator of control on corruption and index of political stability that both come from Kaufmann et al. (1999).

## 5. Empirical results on the determinants of income inequality

We consider a fairly wide range of possible determinants of income distribution, being guided by previous empirical studies. We report below the outcomes for most of these possible determinants. For brevity, in a number of cases where the results do not support a significant influence of such factors, we do not report the results and simply make passing references to them.

### 5.1 The level of economic development and regional factors

We tested for the Kuznets' hypothesis that there is a positive relationship between the level of economic development (per capita income) and inequality in the early stage of development while the relationship is reversed in a later stage (i.e. the inverted U-shape relationship). But the hypothesis is not directly supported by the data.[5] Hence, we do not include the Kuznets' variables in the reported estimates below. Instead, we feature only the level of real per capita income in all the estimates reported and exclude the square of per capita income. It is then found that per capita income level has positive coefficients (statistically significant in many instances) in the inequality equations (i.e. for the Gini coefficient and for the share of richest 20 percent in the population) while the opposite is the case in the equality equations (i.e., for the shares of the poorest 40 percent and the 'middle class').[6] This observed positive association between inequality and per capita income level does not necessarily contradict Kuznets' relationship if it is borne in mind

[5] The hypothesis predicts that per capita income (say, in logarithms) and its square should respectively have positive and negative statistically significant coefficients in an inequality equation. For the economic rationale behind the hypothesis, see footnote 3.

[6] For brevity, we shall henceforth be referring to equations for Gini coefficient and income share of the richest 20 percent of the population as *inequality* equations while the equations for the shares of poorest 40 percent and the 'middle class' would be referred to as *equality* equations.

that most of the countries covered by the study (at the various periods of income distribution observations as shown earlier in Table 1) were probably still at the early stage of development when only a positive relation between inequality and per capita income are supposed to prevail.

We also include dummy variables for two regions in all the reported estimates. These are the northern African region and eastern and southern African region.[7] Casual observation of the data suggests that inequality tends to be lower in the north African countries while it tends to be above African average in the eastern and southern African countries—with the latter being explainable by some historical factors, as in the case of South Africa. This casual or informal inference from the statistics is actually supported by the formal analysis, as reported below. The coefficients of northern Africa dummy variable are negative and (in most cases) statistically significant in the inequality equations and positive in the equality equations. The reverse is the case for the coefficients of eastern and southern Africa dummy variable. Thus, the per capita income and these two regional dummy variables are included in every equation, together with the specific variable(s) of interest.[8]

### 5.2 Effects of fiscal actions on inequality

As pointed out in section 2.1, some studies have attempted to evaluate the effect of government spending on income distribution, e.g. Tanninen (1999), who presented mixed findings on the matter. We too examine the issue by including the share of total government expenditure in GDP as an argument in the income distribution equations. We also take a step further by testing for the effects of government subsidies and transfers as a ratio not only of GDP but also as a ratio of total government spending. The results are as reported in Table 3.

As it can be seen from the table, the coefficients of the share of government spending in GDP have statistically significant positive and negative coefficients in the inequality and

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[7] The dummy variable for northern Africa takes a value of unity for Algeria, Egypt, Morocco and Tunisia while the dummy variable for eastern and southern Africa takes a value of unity for Botswana, Burundi, Kenya, Lesotho, Malawi, Mozambique, Rwanda, South Africa, Swaziland, Tanzania, Uganda, Zambia and Zimbabwe.

[8] We do not include more regressors at a time, for at least two reasons. First, the number of observations is limited and, second, missing values that do not overlap much characterize many of the regressors so that including many of them simultaneously would substantially reduce the number of usable observations.

equality equations respectively, indicating that a large size of government *per se* does not appear to have reduced inequality in these countries but, in fact, appears to have done the opposite; i.e. it appears to have aggravated the inequality. On the other hand, the coefficients of the shares of subsidies in both the GDP and total government spending are statistically significant and opposite in sign to those of government expenditure-GDP ratio. This suggests that government subsidies and transfers appear to have been effective in reducing inequality in these countries.[9]

[9] This, however, does not necessarily imply that such subsidies and transfers were well targeted, as the size of the subsidies and transfers may simply be a proxy for the totality of government commitment (in all ramifications) to egalitarian income distribution.

Table 3
Effects of government total expenditure and subsidies on income inequality

| | Effects of Govt. Total Expd./GDP Ratio | | | | Effects of Subsidies/GDP Ratio | | | | Effects of Subsidies/Total Expd. Ratio | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Gini coeff. | Income share of 40% poorest | Income share of next 40% | Income share of richest 20% | Gini coeff. | Income share of 40% poorest | Income share of next 40% | Income share of richest 20% | Gini coeff. | Income share of 40% poorest | Income share of next 40% | Income share of richest 20% |
| Constant | .296 | .210 | .387 | .403 | .176 | .265 | .447 | .287 | .184 | .262 | .442 | .295 |
| | (3.6) | (4.9) | (8.8) | (5.0) | (2.2) | (6.1) | (9.7) | (3.6) | (2.3) | (5.8) | (10.1) | (3.8) |
| Per capita income | .005 | -.003 | -.001 | .004 | .038 | -.020 | -.016 | .036 | .038 | -.020 | -.015 | .035 |
| (logarithm) | (0.4) | (-0.5) | (-0.1) | (0.3) | (2.8) | (-2.6) | (-2.0) | (2.6) | (2.6) | (-2.4) | (-2.0) | (2.5) |
| Dummy variable for | -.106 | .063 | .023 | -.086 | -.083 | .051 | .014 | -.066 | -.092 | .055 | .019 | -.075 |
| N.Africa | (-4.1) | (4.5) | (1.9) | (-3.6) | (-3.6) | (3.8) | (1.5) | (-3.3) | (-3.8) | (3.9) | (2.0) | (-3.6) |
| Dummy variable for E. & | .010 | .0003 | -.020 | .020 | .036 | -.014 | -.028 | .042 | .029 | -.011 | -.024 | .035 |
| S. Africa | (0.4) | (0.02) | (-1.8) | (0.9) | (1.1) | (-0.8) | (-2.0) | (1.5) | (0.9) | (-0.6) | (-1.7) | (1.2) |
| Govt. total expd./GDP | .003 | -.002 | -.001 | .003 | … | … | … | … | … | … | … | … |
| ratio | (2.5) | (-2.4) | (-2.3) | (2.5) | … | … | … | … | … | … | … | … |
| Govt. expd. on | … | … | … | … | -.019 | .008 | .010 | -.018 | … | … | … | … |
| Subsidies/GDP Ratio | … | … | … | … | (-2.2) | (1.9) | (2.1) | (-2.3) | … | … | … | … |
| Govt. subsidies/total | … | … | … | … | … | … | … | … | -.005 | .002 | .003 | -.005 |
| govt. expd. ratio | … | … | … | … | … | … | … | … | (-2.0) | (1.7) | (2.1) | (-2.2) |
| Adjusted $R^2$ | .180 | .183 | .121 | .172 | .176 | .137 | .218 | .204 | .178 | .141 | .217 | .206 |
| Number of obs. | 51 | 51 | 51 | 51 | 36 | 36 | 36 | 36 | 36 | 36 | 36 | 36 |

Source: as discussed in the text.

Notes: (i) The four dependent variables are the Gini coefficient; income share of the poorest 40 percent of the population; the next poorest 40 percent ('middle class'); and the richest 20 percent—as shown above. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10 percent, 5 percent and 1 percent significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.



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Table 4
Effects of inflation and phase of economic cycle on income inequality

| | Effects of Inflation Rate—all usable data points | | | | Effects of Phase of Economic Cycle—all usable data points | | | | Effects of Phase of Economic Cycle –data points for only 1990s | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Gini Coeff. | Income Share of 40% Poorest | Income Share of next 40% | Income Share of Richest 20% | Gini Coeff. | Income Share of 40% Poorest | Income Share of next 40% | Income Share of Richest 20% | Gini Coeff. | Income Share of 40% Poorest | Income Share of next 40% | Income Share of Richest 20% |
| Constant | .269 | .227 | .376 | .396 | .249 | .227 | .432 | .341 | .279 | .208 | .417 | .374 |
| | (4.3) | (6.7) | (8.8) | (6.1) | (3.8) | (6.7) | (11.2) | (5.1) | (3.0) | (4.1) | (9.3) | (4.1) |
| Per capita | .023 | -.014 | -.005 | .018 | .026 | -.013 | -.013 | .026 | .023 | -.011 | -.012 | .023 |
| income (logarithm) | (2.3) | (-2.6) | (-0.6) | (1.7) | (2.4) | (-2.6) | (-2.0) | (2.4) | (1.4) | (-1.3) | (-1.5) | (1.5) |
| Dummy variable for | -.065 | .045 | -.002 | -.043 | -.104 | .059 | .033 | -.092 | -.118 | .064 | .044 | -.108 |
| northern Africa | (-2.4) | (3.4) | (-0.1) | (-1.4) | (-4.5) | (4.8) | (2.9) | (-4.2) | (-3.5) | (3.4) | (3.3) | (-3.6) |
| Dummy variable for | .026 | -.007 | -.030 | .037 | .013 | -.002 | -.017 | .020 | .006 | .000 | -.011 | .011 |
| East & South Africa | (1.1) | (-0.5) | (-2.6) | (1.7) | (0.6) | (-0.2) | (-1.6) | (0.9) | (0.2) | (0.0) | (-0.9) | (0.4) |
| Inflation Rate | -.008 | -.002 | .029 | -.027 | … | … | … | … | … | … | … | … |
| | (-0.2) | (-0.1) | (1.9) | (-0.7) | … | … | … | … | … | … | … | … |
| Rising Phase of | … | … | … | … | -.021 | .011 | .009 | -.020 | -.024 | .011 | .014 | -.025 |
| Economic Cycle | … | … | … | … | (-1.7) | (1.6) | (1.6) | (-1.7) | (-1.7) | (1.4) | (2.2) | (-1.9) |
| Adjusted $R^2$ | .085 | .108 | .049 | .061 | .200 | .189 | .177 | .211 | .177 | .136 | .219 | .209 |
| Number of obs. | 65 | 65 | 65 | 65 | 56 | 56 | 56 | 56 | 39 | 39 | 39 | 39 |

Source: as discussed in the text.

Notes: (i) The four dependent variables are the Gini Coefficient; Income share of the poorest 40 percent of the population; the next poorest 40 percent ('middle class'); and the richest 20 percent—as shown above. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5 percent and 1 percent significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.



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### 5.3 Effects of inflation and economic cycle on inequality

As reviewed in section 2.1, a number of studies (usually, time series) have examined the effects of inflation rate and unemployment on income distribution, e.g. Mocan (1999) and Blejer and Guerrero (1990). We too try to replicate this attempt within a cross-country context. First, we include average annual inflation rate during 5-year preceding the income distribution observation year as a regressor in the equations and the resulting estimates are as reported in Table 4. Due to non-availability of statistics on unemployment rate, we are unable to examine its effect directly. What we do instead is to construct a qualitative variable that represents the phase of economic cycle a country was going through during the income distribution observation year, following Mohtadi (1988). A value of unity is assigned if the country was in the rising phase, minus unity if a declining phase and a zero value if the evidence about the phase of cycle is ambiguous.[10] This variable features in the estimated equations and the results are also presented in Table 4, first for all usable data points and then for data points for only 1990s so as to attest to the temporal stability of the results. The inclusion of the variable is to determine which income group gains more during rising phase of an economic cycle and loses more during the declining phase (that sometimes characterizes the onset of adjustment or reform policies in these countries).

As it can be seen from the table, the coefficients of the inflation rate are statistically insignificant in all cases, except in the equation for the share of 'middle class' where it is positive and some weak significance is recorded. The overall evidence therefore suggests that inflation rate does not appear to have contributed much to the observed income distribution pattern in these countries. This finding is not necessarily counter-intuitive, not just because most other cross-country studies have also not been able to report a clear evidence of inflation effect on income inequality but also because the major distributional effect of inflation, on an *apriori* basis, is believed to be on the distribution of wealth, as opposed to the distribution of income. High inflation is expected to increase wealth inequality, and not income inequality as such.

On the other hand, the coefficients of the qualitative variable that stands for the phase of economic cycle are, at least, modestly significant in all equations and have negative values in inequality equations and positive values in the equality equations. The results are similar both for the entire set of (usable) observations and for the observations for only 1990s, suggesting a temporal stability. Thus, the evidence is that the poorer segments of the population lose more during the downturn of the economy and have to wait till the upturn phase to make up for the earlier disproportionate losses. This has implications for adjustment and reform policies which tend to bring about an initial downturn. This means the poor would need to be adequately protected then (e.g., through poverty alleviation measures), because of their disproportionate vulnerability.

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[10] Specifically, we regress the logarithm of real GDP during 12 years preceding the income distribution data year against time trend. If the residuals corresponding to the last three of the 12 observations are all positive, this is taken to mean that the country is going through the rising phase of a cycle so that the qualitative variable is assigned a value of unity. If the residuals corresponding to the three years are all negative, it is taken to mean that the country was going through the declining phase and the qualitative variable is assigned a value of minus unity. Finally, if the residuals alternate between negative and positive, the evidence is taken to be ambiguous and assigned a zero (neutral) value. This approach slightly refines that adopted by Mohtadi (1988) by allowing for ambiguous cases.

### 5.4 Effects of anti-corruption measures on inequality

Following in the footsteps of some previous studies (e.g. Li et al., 2000), we test for whether the level of corruption (and, hence, policy efforts to reduce it) does have any effect on income distribution. This is accomplished by including an index (reported in Kaufmann et al., 1999) of control measures against corruption in the regression equations and the resulting estimates are as presented in Table 5.

The coefficients of the index are not statistically significant except in the equation for the income share of the 'middle class', where it is also negative. This suggests that the 'middle class' benefits most from the existence of corruption at the expense of the other income groups, so that it is the economic class that loses most through anti-corruption efforts. However, this interpretation is tentative, as the results are not robust enough across all the equations.

Table 5
Effects of corruption control on income inequality—data for 1990s only

| | Gini Coeff. | Income Share of 40% Poorest | Income Share of next 40% | Income Share of Richest 20% |
|---|---|---|---|---|
| Constant | .287 | .226 | .351 | .422 |
| | (2.4) | (3.4) | (6.4) | (3.8) |
| Per capita | .020 | -.013 | -.002 | .015 |
| Income (logarithm) | (1.0) | (-1.2) | (-0.2) | (0.8) |
| Dummy variable for | -.098 | .054 | .033 | -.088 |
| northern Africa | (-2.9) | (2.9) | (2.2) | (-2.8) |
| Dummy variable for | .038 | -.017 | -.025 | .042 |
| East + South Africa | (1.5) | (-1.3) | (-1.8) | (1.7) |
| Extent of control for | .001 | .007 | -.021 | .015 |
| corruption | (0.1) | (0.4) | (-2.6) | (0.7) |
| Adjusted $R^2$ | .229 | .199 | .234 | .247 |
| Number of obs. | 34 | 34 | 34 | 34 |

Source: as discussed in the text.

Notes: (i) The four dependent variables are the Gini Coefficient; Income share of the poorest 40 percent of the population; the next poorest 40 percent ('middle class'); and the richest 20 percent—as shown above. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5 percent and 1 percent significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

### 5.5 Effects of openness of economy on inequality

Barro (2000: 27) sums up the propositions on the likely effects of international openness thus:

> From the perspective of standard trade theory, the effect of an opening to international trade on income distribution depends on factor endowments… Hence, this theory suggests that greater international openness would raise inequality in rich countries and lower it in poor countries…. The standard theory seems to conflict with the concerns expressed in the ongoing popular debate about globalization. The general notion is that an expansion of

international openness—including access to foreign technology and culture—will benefit most the domestic residents who are already well of.

Following Barro (2000) and some other earlier studies, we subject these assertions to empirical test by including the degree of international openness (defined as the sum of merchandise exports and imports, in relation to GDP) as an argument in our regression equations. The results are as reported in Table 6, from where it can be seen that none of its coefficients is statistically significant. Thus the recent fear that increased globalization would aggravate the existing inequality is not supported by this evidence and neither is the standard prediction of trade theory.

Table 6
Effects of degree of openness and sectoral distribution of manpower on income inequality

| | Effects of Openness of the Economy | | | | Effects of Share of Agric. In Total Labour Force | | | |
|---|---|---|---|---|---|---|---|---|
| | Gini Coeff. | Income Share of 40% Poorest | Income Share of next 40% | Income Share of Richest 20% | Gini Coeff. | Income Share of 40% Poorest | Income Share of next 40% | Income Share of Richest 20% |
| Constant | .294 | .214 | .360 | .425 | -.022 | .348 | .608 | .044 |
| | (2.8) | (3.7) | (6.9) | (4.3) | (-0.2) | (4.8) | (6.1) | (0.3) |
| Per capita income | .026 | -.015 | -.008 | .023 | .037 | -.020 | -.016 | .036 |
| | (2.7) | (-2.8) | (-1.1) | (2.2) | (4.6) | (-4.3) | (-2.6) | (4.2) |
| Dummy variable for | -.069 | .047 | .001 | -.048 | -.056 | .041 | -.010 | -.031 |
| N. Africa | (-2.4) | (3.1) | (0.1) | (-1.6) | (-2.0) | (3.0) | (-0.5) | (-1.1) |
| Dummy variable for | .025 | -.007 | -.025 | .032 | .024 | -.006 | -.024 | .031 |
| E.+ S. Africa | (1.1) | (-0.5) | (-2.2) | (1.6) | (1.1) | (-0.5) | (-2.1) | (1.5) |
| Degree of | -.010 | .005 | .010 | -.014 | … | … | … | … |
| openness of economy | (-0.4) | (0.3) | (0.8) | (-0.6) | … | … | … | … |
| Share of agric. | … | … | … | … | .049 | -.021 | -.038 | .059 |
| sector in total | … | … | … | … | (1.8) | (-1.5) | (-2.0) | (2.0) |
| labour force | | | | | | | | |
| Adjusted $R^2$ | .086 | .110 | .022 | .057 | .120 | .130 | .092 | .108 |
| Number of obs. | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |

Source: as discussed in the text.

Notes: (i) The four dependent variables are the Gini Coefficient; Income share of the poorest 40 percent of the population; the next poorest 40 percent ('middle class'); and the richest 20 percent—as shown above. (ii) Per capita income, openness of the economy, and the share of the agricultural sector in the total labour force are in logarithms. (iii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5 percent and 1 percent significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

### 5.6 Effects of sectoral allocation of manpower on inequality

We also test for the effects of the share of agricultural sector in the total labour force on income distribution by featuring it as an argument in our regression equations, following the case made by Bourguignon and Morrisson (1998) for inclusion of economic dualism in income distribution relationships. The results are as reported in Table 6, from where it can

be seen that this factor has an inequalizing effect. This is because its coefficients, which are statistically significant in almost all cases, have positive values in the inequality equations and negative values in the equality equations.

### 5.7 Effects of human and natural resource endowment on inequality

Bourguignon and Morrisson (1998) also made a strong case for the inclusion of resource endowments as arguments in income distribution equations. Their empirical tests show that the share of skilled workers in total labour force (which they proxied by lagged value of secondary school enrolment ratio) and availability of land resources (proxied by arable land per capita) exert significant income equalizing effects. We too test for the effects of these factors by including arable land per capita and illiteracy rate (as a proxy for the non-availability of skilled workers) in our equations. The results are reported in Table 7.

Table 7
Effects of human and natural resource endowment on income inequality—all usable data points

| | Effects of Availability of Arable Land per Capita | | | | Effects of Human Resource Quality Constraint—Illiteracy Rate | | | |
|---|---|---|---|---|---|---|---|---|
| | Gini Coeff. | Income Share of 40% Poorest | Income Share of next 40% | Income Share of Richest 20% | Gini Coeff. | Income Share of 40% Poorest | Income Share of next 40% | Income Share of Richest 20% |
| Constant | .356 | .178 | .359 | .463 | .054 | .310 | .571 | .118 |
| | (5.8) | (5.5) | (8.2) | (7.1) | (0.4) | (4.0) | (6.1) | (0.8) |
| Per capita | .003 | -.002 | .001 | .002 | .032 | -.017 | -.013 | .030 |
| income (logarithm) | (0.3) | (-0.5) | (0.1) | (0.2) | (3.7) | (-3.6) | (-1.9) | (3.2) |
| Dummy variable for | -.053 | .039 | -.006 | -.032 | -.073 | .048 | .005 | -.053 |
| northern Africa | (-2.1) | (3.2) | (-0.3) | (-1.1) | (-3.0) | (4.0) | (0.3) | (-2.0) |
| Dummy variable for | .009 | .002 | -.021 | .019 | .042 | -.014 | -.041 | .055 |
| E.+S. Africa | (0.4) | (0.2) | (-1.8) | (0.9) | (1.5) | (-0.9) | (-3.0) | (2.2) |
| Arable land per capita | .029 | -.016 | -.009 | .025 | … | … | … | … |
| (logarithm) | (4.0) | (-4.4) | (-2.0) | (3.3) | … | … | … | … |
| Illiteracy rate (logarithm) | … | … | … | … | .040 | -.016 | -.035 | .051 |
| | … | … | … | … | (1.4) | (-1.0) | (-2.1) | (1.8) |
| Adjusted $R^2$ | .243 | .265 | .068 | .179 | .107 | .120 | .079 | .094 |
| Number of obs. | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |

Source: as discussed in the text.

Notes: (i) The four dependent variables are the Gini Coefficient; Income share of the poorest 40% of the population; the next poorest 40% ('middle class'); and the richest 20%—as shown above. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

Broadly in line with the findings of Bourguignon and Morrisson (1998), our results suggest that a high level of illiteracy (and, hence, low level of skilled workers) exerts inequalizing effects. This is because the coefficients for illiteracy (which are statistically significant in half of the equations) are positive in the equations for Gini coefficient and the share of

richest 20 percent of the population while they are negative in the equations for shares of the poorest 40 percent and 'middle class'.

However, our findings are in direct contrast to those reported by Bourguignon and Morrisson when it comes to the effect of arable land per capita. Here, this proxy for availability of land resources is found to exert unambiguous income unequalizing effects. This is because its coefficients, which are statistically highly significant in all equations, are positive in the inequality equations and negative in the equality equations. This also accords with the evidence earlier presented in Table 2, where the simple correlation coefficients between arable land per capita and income distribution measures are shown to be very high. Possible explanations for this finding may need to await further future studies. What we can only do in the meantime is to speculate that land distribution might have been a major source of income inequality in many of these mostly agrarian countries (see Deininger and Squire, 1998). Available evidence suggests that land distribution is more unequal than income distribution in Africa (with the Gini coefficients for land distribution averaging above 60 percent (Table 2, Deininger and Squire, 1998—in contrast to 40.9 percent for income distribution as reported earlier in our own Table 1). This means that the greater the availability of land (for a given land distribution pattern), the greater should be its impact on income distribution and, hence, the greater the tendency for income inequality to rise.

## 6. Empirical evidence of the effects of inequality on growth

### 6.1 Direct effect of inequality on growth

Evidence on the direct effect of inequality on growth is often inferred in the literature from estimates of the reduced-form economic growth equations where income distribution variables feature as some of the regressors. This same approach is adopted here. Specifically, this is accomplished by estimating economic growth equations, with the regressors being the income distribution variables as well as initial level of per capita real GDP (in 1995 US $), 5-year population average annual growth rate and the share of government consumption expenditure in GDP.[11]

For all the usable data points, the results are as presented in Table 8. The explanatory power of the equations is very low, judging by the very low values of the adjusted $R^2$ square. Also, the coefficients of income distribution variables are all statistically insignificant. Sensing that this poor fit could be due to the very long span of time (about 4 decades) covered by the data, we derived another set of estimates on the basis of more recent data, which cover only 1990s, and the results are as presented in Table 9. These

[11] Economic growth is measured as the average annual growth rate of per capita real GDP during 5 years that follow the year of observation on income distribution. This means that the initial (i.e., in the year preceding the 5-year growth of real GDP per capita) income distribution variables are the regressors so as cater for any possibility of these regressors being endogenous in economic growth equations. For the same reason, it is the initial value of the share of government consumption expenditure in GDP that is employed and its coefficients are expected to be negatively signed, following previous empirical studies. Inclusion of real income per capita is in line with the neoclassical growth theory and we expect its coefficients to be negatively signed. We do not include the share of investment in GDP as a regressor so as not to control for any effects of income distribution regressors on economic growth via capital formation.

recent data-based estimates, though still short of high explanatory power, are a substantial improvement on those reported in Table 8. Because separate income distribution data for the rural and urban areas exist for a few countries in the 1990s, we are also able to derive separate estimates of the effects of rural and urban income distribution pattern on economic growth. These too are reported in Table 9.

Table 8
Effects of income inequality on economic growth—all observations

| | | | | |
|---|---|---|---|---|
| Constant | .091 | .056 | .101 | .091 |
| | (1.4) | (0.9) | (1.6) | (1.4) |
| Per capita income (logarithm) | -.003 | -.003 | -.004 | -.003 |
| | (-0.5) | (-0.4) | (-0.7) | (-0.5) |
| Population growth | -1.711 | -1.708 | -1.914 | -1.744 |
| | (-2.0) | (-2.0) | (-2.2) | (-2.0) |
| Govt. Consumption/GDP ratio | -.0001 | -.0001 | -.0002 | -.0001 |
| | (-0.1) | (-0.1) | (-0.2) | (-0.1) |
| GINI coefficient | -.042 | … | … | … |
| | (-0.9) | … | … | … |
| Income share of the poorest 40 % | … | .108 | … | … |
| | … | (1.2) | … | … |
| Income share of the next 40% (the | … | … | -.036 | … |
| middle class) | … | … | (-0.5) | … |
| Income share of the richest 20% | … | … | … | -.028 |
| | … | … | … | (-0.5) |
| Adjusted $R^2$ | .049 | .062 | .039 | .041 |
| Number of observations | 63 | 63 | 63 | 63 |

Source: as discussed in the text.

Notes: (i) The dependent variable is the 5-year average per capita real GDP growth rate (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

In both Tables 8 and 9, the parameter estimates of Gini coefficient and the share of the richest 20 percent of population are all negative and those of the share of the poorest 40 percent are all positive. In all cases, they are statistically highly significant only in respect of the rural area regressions. The sign of the coefficient of the income share of 'middle class', on the other hand, is mixed. It is positive and statistically significant in respect of the rural area, while it is negative and insignificant in other cases. Notwithstanding the mixed effect of the share of income accruing to the 'middle class', the preponderance or balance of evidence is still that high income inequality retarded economic growth in these countries and that the growth-retarding effect appears to have been higher in the case of rural inequality.

### 6.2 Channels of the effects of inequality on growth

As noted in section 1, the traditionally held view on the channel of effect of inequality on growth is through changes in private saving and capital formation, both of which are supposed to be increased by high inequality, hence a positive relationship between inequality and growth is predicted. The more modern view, however, predicts the opposite effect on growth and this is via the aforementioned four channels—viz: endogenous fiscal

policy; credit market imperfection and human capital accumulation; sociopolitical unrest and instability; and endogenous fertility. The effects of income distribution on growth through each of these channels are also tested for in the study, following the approach recently being adopted in the empirical literature (e.g. Perotti, 1996 and Barro, 2000).

*Effects of inequality on private saving and investment*

The traditional view that high inequality promotes private saving and capital accumulation is empirically examined by including the income distribution variables as regressors in the equations for private domestic saving-GDP ratio and private investment-GDP ratio.[12] The results are presented in Tables 10 and 11 for private saving and private investment equations, respectively.

[12] Other regressors included are the initial level of per capita income (in logarithms) and average annual inflation rate in the previous 5-years. Average 5-year annual terms of trade growth also features in the private saving-GDP equations.

Table 9
Effects of income inequality on economic growth—observations only for 1990s

| | Combined urban and rural income distribution | | | | Rural income distribution | | | | Urban income distribution | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Constant | -.014 | -.070 | -.054 | -.010 | .063 | -.047 | -.061 | .094 | -.008 | -.062 | .019 | -.014 |
| | (-0.2) | (-0.9) | (0.6) | (-0.1) | (1.3) | (-0.7) | (-0.9) | (1.6) | (-0.2) | (-0.7) | (0.3) | (-0.3) |
| Per capita | .010 | .010 | .010 | .010 | .006 | .006 | .005 | .006 | 0.009 | .009 | .005 | .008 |
| income (logarithm) | (1.4) | (1.4) | (1.4) | (1.4) | (1.4) | (1.6) | (1.0) | (1.2) | (1.3) | (1.4) | (1.3) | (1.3) |
| Population | .574 | .601 | .353 | .529 | -.561 | -.155 | -1.44 | -.924 | .444 | .295 | .403 | .547 |
| growth | (0.5) | (0.5) | (0.3) | (0.5) | (-0.5) | (-0.1) | (-1.2) | (-0.8) | (0.4) | (0.3) | (0.3) | (0.4) |
| Govt. Consumption/GDP | -.002 | -.002 | -.012 | -.002 | -.002 | -.002 | -.002 | -.002 | -.002 | -.002 | -.002 | -.002 |
| | (-2.1) | (-2.1) | (-2.3) | (-2.1) | (-1.9) | (-1.7) | (-2.1) | (-1.9) | (-1.7) | (-1.7) | (-1.9) | (-1.7) |
| GINI coefficient | -.079 | … | … | … | -.143 | … | … | … | -.071 | … | … | … |
| | (-1.2) | … | … | … | (-2.5) | … | … | … | (-0.9) | … | … | … |
| Income share of the | … | .162 | … | … | … | .256 | … | … | … | .175 | … | … |
| poorest 40 % | … | (1.4) | … | … | … | (2.3) | … | … | … | (1.1) | … | … |
| Income share of next 40% | … | … | .048 | … | … | … | .283 | … | … | … | -.098 | … |
| (middle class) | … | … | (0.6) | … | … | … | (2.6) | … | … | … | (-0.8) | … |
| Income share of the | … | … | … | -.071 | … | … | … | -.151 | … | … | … | -.039 |
| richest 20% | … | … | … | (-1.1) | … | … | … | (-2.6) | … | … | … | (-0.6) |
| Adjusted $R^2$ | .113 | .133 | .053 | .092 | .364 | .314 | .370 | .383 | .020 | .051 | .000 | -.006 |
| Number of observations | 39 | 39 | 39 | 39 | 26 | 26 | 26 | 26 | 26 | 26 | 26 | 26 |

Source: as discussed in the text.

**Notes**: (i) The dependent variable is the 5-year average per capita real GDP growth rate (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.



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Generally, the coefficients of the income distribution variables are statistically insignificant in the saving and investment equations. The only exception is the coefficient of the income share of the poorest 40 percent that is modestly significant in the saving equation although this has an unexpected positive sign, suggesting that high inequality reduces saving (contrary to what the traditional view predicts). Thus, the existence of significant effects of income distribution on growth through private saving and investment does not seem to have been supported by the data. Barro (2000, Table 2) too reported that Gini coefficients lack explanatory power in investment ratio equations estimated with a larger data set.

Table 10
Effects of income inequality on private savings ratio—all usable observations

| | | | | |
|---|---|---|---|---|
| Constant | -.142 | -.246 | -.258 | -.127 |
| | (-1.7) | (-3.8) | (-2.9) | (-1.3) |
| Per capita | .050 | .051 | .050 | .050 |
| income (logarithm) | (5.1) | (5.2) | (5.0) | (5.1) |
| Terms of trade | .201 | .196 | .198 | .206 |
| growth | (1.3) | (1.2) | (1.2) | (1.3) |
| Inflation | -.003 | -.001 | -.010 | -.006 |
| rate | (-0.2) | (-.1) | (-0.4) | (-0.2) |
| GINI coefficient | -.146 | … | … | … |
| | (-1.5) | … | … | … |
| Income share of the | … | .293 | … | … |
| poorest 40 % | … | (1.7) | … | … |
| Income share of the next | … | … | .175 | … |
| 40% (the middle class) | … | … | (0.7) | … |
| Income share of the | … | … | … | -.144 |
| richest 20% | … | … | … | (-1.3) |
| Adjusted $R^2$ | .343 | .348 | .325 | .339 |
| Number of observations | 53 | 53 | 53 | 53 |

Source: as discussed in the text.

Notes: (i) The dependent variable is private saving-GDP ratio. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

Table 11
Effects of income inequality on private investment ratio—all usable observations

| | | | | |
|---|---|---|---|---|
| Constant | -.344 | -.255 | -.113 | -.379 |
| | (-2.1) | (-2.3) | (-1.3) | (-2.1) |
| Per capita | .065 | .066 | .065 | .065 |
| income (logarithm) | (3.3) | (3.2) | (3.4) | (3.3) |
| Inflation | .017 | .017 | .024 | .018 |
| rate | (0.6) | (0.6) | (0.8) | (0.6) |
| GINI coefficient | .148 | … | … | … |
| | (1.2) | … | … | … |
| Income share of the | … | -.217 | … | … |
| poorest 40 % | … | (-1.0) | … | … |
| Income share of the | … | … | -.480 | … |
| next 40% (the middle | … | … | (-1.4) | … |
| class) | | | | |
| Income share of the | … | … | … | .199 |
| richest 20% | … | … | … | (1.3) |
| Adjusted $R^2$ | .359 | .354 | .380 | .368 |
| Number of obs. | 57 | 57 | 57 | 57 |

Source: as discussed in the text.

Notes: (i) The dependent variable is private investment-GDP ratio. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

*Effects of inequality on fiscal policy—taxation and government spending*

According to the more recent perception, high inequality is expected to trigger pressures (e.g., by majority voters in a democratic setting) on the government to embark on equalizing expenditures which would be financed (at least, partly) by raising more (and, presumably, distortionary) taxes. By so doing, economic growth would be retarded. Following Perotti (1996) and others, we test for this proposition by including income distribution factors in the equations for government consumption expenditure and tax equations and the results are as presented in Tables 12 and 13 respectively.[13] The results of the effects of income distribution on tax ratio show some difference, depending on whether it is rural or urban income distribution pattern. Therefore, the results featuring rural and urban income distribution patterns are also separately reported in Table 13, in addition to those including economy-wide income distribution variables.

The coefficients of income distribution variables are all statistically insignificant in the government consumption equations in Table 12, indicating absence of evidence that high inequality triggers pressures that make the governments increase spending in these countries. Also, the coefficients of economy-wide income distribution variables are statistically insignificant in the Table 13 tax ratio equations (reported in the first 4 columns

[13] Both of these dependent variables are expressed as percentage of GDP. The level of per capita income (in logarithm) is the only other regressor in the equations. Government consumption expenditure is chosen in preference to total government expenditure because of data availability and because populist pressures on the government to raise spending is likely to affect government consumption than government investment spending.

of the Table) that are based on all usable data points. But when the economy-wide income distribution is analyzed by rural and urban segments (as noted earlier, data are only available for the 1990s), it is found (see last 8 columns of the Table) all the coefficients for the rural and urban income distribution variables (with the exception of the share of the urban area 'middle class') are statistically highly significant. While the parameter estimates for the Gini coefficient inequality measure and the share of the richest 20 percent of the population are negative, those of the other inequality measures are positive. Based on this further analysis of rural and urban income distribution patterns, the evidence therefore is that high inequality reduces the tax ratio, which again does not support (and, in fact, actually contradicts) the proposition that high inequality leads to high tax ratio.

Table 12
Effects of income inequality on government consumption expenditure ratio—all observations

| | | | | |
|---|---|---|---|---|
| Constant | 9.459 | 12.91 | 16.13 | 8.324 |
| | (2.0) | (3.1) | (3.5) | (1.6) |
| Per capita | .477 | .493 | .483 | .463 |
| income (logarithm) | (0.8) | (0.9) | (0.9) | (0.8) |
| GINI coefficient | 5.549 | … | … | … |
| | (0.9) | … | … | … |
| Income share of the | … | -8.819 | … | … |
| poorest 40 % | … | (-0.7) | … | … |
| Income share of the next 40% (the | … | … | -12.91 | … |
| middle class) | … | … | (-1.2) | … |
| Income share of the | … | … | … | 6.850 |
| richest 20% | … | … | … | (1.1) |
| Adjusted $R^2$ | -.011 | -.013 | -.006 | -.007 |
| Number of observations | 63 | 63 | 63 | 63 |

Source: as discussed in the text.

Notes: (i) The dependent variable is government consumption-GDP ratio. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

Explanations for the above findings are not far-fetched. For instance, most of the countries (at the income distribution observation periods) do not have democracies that would enable voters to trigger the high inequality-induced populist pressures of the type being envisaged so as to compel governments to embark on equalizing fiscal policies. In addition, as rightly observed by Barro (2000: 7): 'If more economic resources translate into correspondingly greater political influence, then the positive link between inequality and redistribution need not apply.' It may be that this situation characterized many of the countries sampled in the study so that the rich would be able to lobby the authorities against equalizing fiscal actions. Most previous studies have similarly contradicted this endogenous fiscal policy channel (e.g. Perotti, 1996).

Table 13
Effects of income inequality on tax ratio—observations for 1990s only

| | Combined urban and rural income distribution | | | | Rural income distribution | | | | Urban income distribution | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Constant | -9.865 | -13.91 | -10.87 | -10.27 | -4.632 | -17.05 | -24.3 | -2.589 | -4.621 | -21.32 | -2.332 | -5.577 |
| | (-1.7) | (-2.5) | (-1.0) | (-1.4) | (-0.9) | (-3.7) | (-3.9) | (-0.4) | (-0.6) | (-2.8) | (-0.2) | (-0.5) |
| Per capita | 4.515 | 4.494 | 4.575 | 4.536 | 4.350 | 4.346 | 4.393 | 4.367 | 4.638 | 4.721 | 4.371 | 4.493 |
| income (logarithm) | (6.1) | (6.1) | (6.0) | (6.1) | (6.2) | (6.5) | (5.3) | (5.8) | (5.1) | (5.2) | (5.6) | (5.2) |
| GINI coefficient | -5.565 | … | … | … | -18.50 | … | … | … | -22.29 | … | … | … |
| | (-0.6) | … | … | … | (-3.2) | … | … | … | (-1.4) | … | … | … |
| Income share of the | … | 12.834 | … | … | … | 33.468 | … | … | … | 48.205 | … | … |
| poorest 40 % | … | (0.8) | … | … | … | (3.0) | … | … | … | (2.0) | … | … |
| Income share of next 40% ( | … | … | -4.578 | … | … | … | 34.268 | … | … | … | -26.90 | … |
| middle class) | … | … | (-0.20 | … | … | … | (3.0) | … | … | … | (-0.7) | … |
| Income share of the | … | … | … | -3.928 | … | … | … | -19.18 | … | … | … | -14.19 |
| richest 20% | … | … | … | (-0.3) | … | … | … | (-3.2) | … | … | … | (-0.7) |
| Adjusted $R^2$ | .336 | .339 | .331 | .333 | .298 | .281 | .303 | .306 | .229 | .254 | .201 | .201 |
| Number of observations | 48 | 48 | 48 | 48 | 24 | 24 | 24 | 24 | 24 | 24 | 24 | 24 |

Source: as discussed in the text.

Notes: (i) The dependent variable is tax revenue-GDP ratio. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

*Inequality and credit market imperfection-induced human capital accumulation*

As noted in section 2, it is claimed in the theoretical literature that, due to existence of borrowing constraints in the credit markets, poor households are unable to finance investments in education, even when such investments offer relatively high rates of return. High inequality would increase the number of people affected by this credit market constraint and, hence, would reduce economy-wide investment in education which, in turn, should retard economic growth. Previous studies, like Perotti (1996), have tested this proposition by including income distribution variables as regressors in equations for school enrolment ratios and have reported education-retarding effect of high inequality. We follow a similar approach in the present study. Specifically, we have estimated equations for primary, secondary and tertiary school enrolment ratios by including income distribution variables as regressors (with the only other regressor being the level of per capita income). The results are presented in Table 14—the first 4 columns, the next 4 columns and the last 4 columns for primary, secondary and tertiary school enrolment ratio equation estimates, respectively.

The coefficients of the income distribution variables are statistically very significant in all, except in the equations for primary school enrolment ratios. While the parameter estimates of Gini coefficient and the share of richest 20 percent of the population are negative, those of the income shares of the poorest 40 percent and the 'middle class' are negative. This evidence is very robust and also very much in line with the prediction. When compared with higher-level education, that income distribution variables are not significant factors in primary school education is also in line with expectation and an added support, since primary education is generally free, highly government-subsidized or compulsory in many of the sampled countries—unlike higher-level education.

Table 14
Effects of income inequality on school enrolment ratios—all observations

| | Primary school enrolment ratio | | | | Secondary school enrolment ratio | | | | Tertiary school enrolment ratio | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Constant | 2.769 | 2.405 | 2.471 | 2.813 | .369 | -1.219 | -2.32 | .839 | -2.809 | -4.893 | -6.202 | -2.204 |
| | (10.4) | (8.1) | (6.8) | (9.3) | (0.4) | (-1.8) | (-2.5) | (0.9) | (-2.8) | (-4.7) | (-4.2) | (-2.1) |
| Per capita | .268 | .269 | .264 | .267 | .570 | .566 | .559 | .570 | .760 | .757 | .745 | .761 |
| income (logarithm) | (7.6) | (7.6) | (7.4) | (7.6) | (5.6) | (5.4) | (5.4) | (5.7) | (5.3) | (5.3) | (5.40 | (5.5) |
| GINI coefficient | -.490 | … | … | … | -2.483 | … | … | … | -3.206 | … | … | … |
| | (-1.2) | … | … | … | (-2.4) | … | … | … | (-2.1) | … | … | … |
| Income share of the | … | 1.061 | … | … | … | 4.042 | … | … | … | 5.394 | … | … |
| poorest 40 % | … | (1.4) | … | … | … | (2.1) | … | … | … | (1.9) | … | … |
| Income share of next | … | … | .373 | … | … | … | 5.073 | … | … | … | 6.341 | … |
| 40% ( middle class) | … | … | (0.5) | … | … | … | (2.6) | … | … | … | (2.2) | … |
| Income share of the | … | … | … | -.465 | … | … | … | -2.922 | … | … | … | -3.769 |
| richest 20% | … | … | … | (-1.1) | … | … | … | (-2.8) | … | … | … | (-2.4) |
| Adjusted $R^2$ | .386 | .390 | .377 | .384 | .413 | .402 | .424 | .429 | .380 | .373 | .386 | .394 |
| Number of obs. | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 | 65 |

Source: as discussed in the text.

Notes: (i) The dependent variables are (the logarithm values of) primary school, secondary school and tertiary school enrolment ratios, respectively. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

Table 15
Effects of income inequality on political stability—observations for 1990s only

| | Combined urban and rural income distribution | | | | Rural income distribution | | | | Urban income distribution | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Constant | .261 | -1.995 | -3.007 | .598 | 1.601 | -.451 | .582 | 1.982 | 1.522 | -1.225 | -.467 | 1.846 |
| | (0.3) | (-1.8) | (-1.6) | (0.6) | (1.5) | (-0.5) | (-0.3) | (1.4) | (1.4) | (-0.9) | (-0.2) | (1.6) |
| Per capita | .099 | .094 | .114 | .104 | -.171 | -0.178 | -.193 | -.170 | -.098 | -.080 | -.191 | -.129 |
| income (logarithm) | (0.6) | (0.6) | (0.7) | (0.6) | (-1.1) | (-1.2) | (-1.1) | (-1.0) | (-0.5) | (-0.5) | (-1.2) | (-0.7) |
| GINI coefficient | -3.352 | … | … | … | -3.263 | … | … | … | -3.710 | … | … | … |
| | (-2.4) | … | … | … | (-2.5) | … | … | … | (-2.0) | … | … | … |
| Income share of the | … | 6.221 | … | … | … | 5.894 | … | … | … | 7.613 | … | … |
| poorest 40 % | … | (2.6) | … | … | … | (2.8) | … | … | … | (2.3) | … | … |
| Income share of next | … | … | 5.259 | … | … | … | 3.247 | … | … | … | 3.044 | … |
| 40% ( middle class) | … | … | (1.5) | … | … | … | (0.7) | … | … | … | (0.7) | … |
| Income share of the | … | … | … | -3.420 | … | … | … | -3.227 | … | … | … | -3.252 |
| richest 20% | … | … | … | (-2.2) | … | … | … | (-1.9) | … | … | … | (-1.6) |
| Adjusted $R^2$ | .080 | .081 | .027 | .072 | .144 | .158 | .009 | .106 | .100 | .125 | .002 | .066 |
| Number of obs. | 34 | 34 | 34 | 34 | 22 | 22 | 22 | 22 | 22 | 22 | 22 | 22 |

Source: as discussed in the text.

Notes: (i) The dependent variable is the index of political stability. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

*Effects of inequality on political instability*

The proposition is that high inequality perpetrates high rates of social and political unrest, including political instability—which, in turn, tend to hinder economic growth. Perotti (1996) included inequality variables in the index of sociopolitical instability equations for a larger data set and reported the predicted positive effect. In the present study, we estimated a similar relationship for the index of political *stability* (as opposed to *instability*), with income distribution variables being the regressors (in addition to the level of per capita income). The resulting estimates are as reported in Table 15. The estimates are for 1990s only, as the cross-country data on political stability index are available for mid-1990s (specifically, around 1997). The estimates with economy-wide income distribution variables are reported in the first 4 columns. We also estimated the relationship by substituting rural and urban income distribution variables for the economy-wide ones and the results are those reported in the middle and last 4 columns respectively. These latter results are presented to show the similarity of the findings with those based on economy-wide income distribution data.

In all cases, the parameter estimates of Gini coefficients and the share of richest 20 percent of the population are negative while those of the share of the poorest 40 percent and the 'middle class' are positive. While the coefficients of the share of 'middle class' are not statistically significant, the coefficients of all others are. Thus, there is a robust and consistent evidence that high inequality is associated with reduced political stability in these countries.

*Effects of inequality on fertility*

As discussed in section 2, it has been posited that, by downgrading more people from above 'poverty trap' to below the 'poverty trap' (where fertility is higher), high inequality would raise the overall fertility rate which would, in turn, reduce economic growth. A way of testing this proposition that we adopt in the study is to include income distribution variables in a fertility rate equation, following Perotti (1996) who reported results that support the proposition.[14] The resulting estimates are presented in Table 16.

While the coefficients of the income distribution variables are only marginally significant in the equations, their signs are as expected. Specifically, those of the Gini coefficient and the income share of the richest 20 percent of the population are positive while those of the shares of the poorest 40 percent and 'middle class' are negative. This provides some evidence which, though not very strong, does suggest that high inequality has increased fertility rate in these countries.

[14] Other regressors included in the fertility equations are the level of per capita income and secondary school enrolment ratio, both of which are supposed to (and actually do) feature with negative coefficients.

Table 16
Effects of income inequality on fertility—all observations

| | | | | |
|---|---|---|---|---|
| Constant | 2.654 | 2.928 | 3.111 | 2.580 |
| | (17.9) | (14.5) | (9.6) | (16.2) |
| Per capita | -.129 | -.126 | -.128 | -.131 |
| income (logarithm) | (-4.3) | (-4.3) | (-3.9) | (-4.1) |
| Secondary School | -.112 | -.116 | -.110 | -.108 |
| enrolment (logarithm) | (-4.4) | (-4.7) | (-3.8) | (-4.0) |
| GINI coefficient | .446 | … | … | … |
| | (1.6) | … | … | … |
| Income share of the poorest 40 % | … | -.679 | … | … |
| | … | (-1.5) | … | … |
| Income share of the next 40% (the middle | … | … | -.843 | … |
| class) | … | … | (-1.5) | … |
| Income share of the richest 20% | … | … | … | .504 |
| | … | … | … | (1.6) |
| Adjusted $R^2$ | .531 | .526 | .531 | .533 |
| Number of observations | 65 | 65 | 65 | 65 |

Source: as discussed in the text.

Notes: (i) The dependent variable is the (logarithm value of) fertility rate. (ii) The numbers in the parentheses below the parameter estimates are the t-values. At 10%, 5% and 1% significance level, a parameter estimate would be statistically significant if its t-value is absolutely up to 1.6; 2.0; and 2.6 respectively.

## 7. Summary and conclusions

Given the recent reawakening of interest on the need to reduce inequality as a way of fighting poverty in Africa, coupled with the dearth of previous empirical studies on inequality based on data from the region, the present study analyses income inequality within African regional context. Quasi-panel data for 35 countries over different periods during 1960s to 1990s were employed and the two complementary issues on income inequality that have attracted attention in the empirical literature and in policy circles were covered. These two issues are identification of factors that determine income inequality and whether the effects of high inequality on economic growth is negative or positive, including the channels through which those effects are brought about.

Our methodology on the former centres primarily on specification of a series of regression equations for various income inequality measures to identify the effects, if any, of those factors (i.e., explanatory variables) tested for. The methodology adopted in respect of the latter, on the other hand, consists of featuring the income distribution factors as arguments in economic growth equations (to determine their effects on growth) and in the equations for other variables that are proxies for the possible channels of effects on growth. These variables are private saving ratio and private investment ratio (both proxying the traditional channel), government consumption-GDP ratio and tax ratio (both acting as proxies for endogenous fiscal policy channel), school enrolment ratios (proxies for credit market imperfection-induced human capital accumulation channel), political stability index (proxy for sociopolitical instability channel), and fertility rate (proxy for endogenous fertility

channel). In all cases, the income distribution variables considered are the Gini coefficient and the income share of richest 20 percent of the population (high values of both of which signifies high inequality) as well as the income share of the poorest 20 percent of the population (a high value of which signifies low inequality) and the income share of the next 40 percent ( that corresponds to the income share of the 'middle class').

The above relationships were estimated and the highlights of our findings are as follows:

*On determinants of income distribution*

- The level of economic development (or per capita income) attained is found to have exerted inequalizing effect. The popular Kuznets's effect (whereby the level of development exerts inequalizing effect only in the early stage of development and equalizing effect at a latter stage) is not detected, possibly because most (or probably all) of the countries were yet to attain this latter stage of development during the sampled periods.
- Regional factors too were found to have exert some influence in the sense that inequality was generally higher in southern and eastern African countries, with the reverse being the case in the northern African countries.
- The overall size of the government (as measured by government budget in relation to GDP) is observed to have had inequalizing effect while the reverse is the case with the size of government subsidies and transfers (in relation to both the overall budget and the GDP).
- No perceptible effect of inflation rate on income distribution is recorded. However, the phase of economic cycle is found to have exerted a reckonable effect, with the rising phase of the cycle having equalizing effect and declining phase (i.e., during an economic slump), inequalizing effect. This suggests the need for more forceful implementation of poverty alleviation policies at the onset of an economic recession (e.g., that sometimes characterizes the initial phase of economic reform policies) as the poor are found to be disproportionately more vulnerable than the rich during such periods.
- No remarkable effect of anti-corruption measures on income distribution except that it appears to have reduced the income share of the 'middle class', possibly because this was the class profiting mostly from the type of corruption being checked.
- International openness of the economy is found to have had no effect on income distribution, allaying the popular fear that have been raised in anti-globalization circles to the effect that globalization would aggravate the existing inequalities.
- High proportion of labour force being engaged in agricultural sector is found to have inequalizing effect.
- Human and natural resources endowment are also found to have shaped the observed pattern of income distribution in the countries. While a lack of skilled manpower (as measured by illiteracy rate) had inequalizing effect, abundance of land resources (i.e., arable land per capita) too is, 'paradoxically', found to have the same effect.

*On the effects of income inequality on economic growth*

- Though the evidence is not very robust, there is the overall impression that high inequality hindered economic growth in the countries during the sampled period.

*On the channels of effect of inequality on economic growth*

- No evidence supporting the traditional channel that inequality reduces private saving and investment (and, hence, economic growth) is detected.
- Similarly, no evidence supporting the endogenous fiscal policy (or political economy) channel that high inequality increases distributive or equalizing government spending, financed by an increase in (distortionary and growth-reducing) taxes is spotted. This is not too surprising as the sampled countries were not having democracies that would have 'coerced' the government to accede to the majority voters.
- There is a very strong and robust evidence in support of the credit market imperfection-induced human capital channel. Specifically, high inequality is found to have reduced both secondary and tertiary school enrolment ratios (and little, if any, effect on primary school enrolment ratio), as the operation of this channel would require.
- Similarly, there is a very strong and robust evidence in support of sociopolitical instability channel. This is because high inequality is found to have been negatively associated with political stability (and, hence, positively associated with instability) in the countries.
- Finally, there is also evidence supporting the endogenous fertility channel as high inequality is found to have increased fertility rate in the countries.

The above findings are based on statistics, the quality of which is far from being perfect. This constitutes a risk factor inherent in the above results and their interpretations, which should therefore be taken with due caution. It is hoped that more reliable income distribution and related statistics would become available in the not-too-distant future so as to permit more reliable estimates. Meanwhile, it is also hoped that the findings of the present study have shed some light on those issues addressed and, hence, would provide some basis for income distribution-related policies for the countries.

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