Economic Growth and Income Inequality in Sudan: An Empirical Investigation

(Pertumbuhan Ekonomi dan Ketidaksetaraan Pendapatan di Sudan: Satu Kajian Empirikal)

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ABSTRACT

This article examined from an empirical point of view the relationship between economic growth and income inequality in Sudan. In particular, the study tested Kuznets' hypothesis which suggests that the relationship between the two variables took the form of an inverted U-shape curve. The importance of the study stems from the fact that pro-poor economic growth is often seen as important for poverty reduction not only through raising incomes but also in improving the distribution of income in favour of the poor. Ordinary least squares (OLS) technique is applied to cross-section data covering 36 provinces in Sudan for the year 1996. The data on the Gini coefficient and nominal average income are obtained from the 1996 Migration and Labour Force Survey, while the consumer price index for the year 1990 is obtained from the Central Bureau of Statistic. These data are used to estimate the relationship between Gini coefficient and real per capita income. The empirical result suggests that there is a positive relationship between income growth and the inequality parameter, while the Kuznets' hypothesis is not confirmed by the empirical results. These result indicates that the economy has not yet reached the Kuznets' turning point beyond which income growth leads to less inequality.

Keywords: economic growth; income inequality; poverty; Gini coefficient

ABSTRAK

Artikel ini meneliti dari sudut empirikal hubungan antara pertumbuhan ekonomi dan ketidaksetaraan pendapatan di Sudan. Secara khususnya, analisis yang dibuat menguji hipotesis Kuznets yang mengatakan bahawa hubungan antara kedua-dua pemboleh ubah adalah berbentuk U-terbalik. Kepentingan kajian ini diasaskan kepada kenyataan bahawa pertumbuhan ekonomi pro miskin untuk membasmi kemiskinan bukan sahaja boleh dicapai melalui peningkatan pendapatan, tetapi juga melalui agihan pendapatan yang lebih cenderung kepada golongan miskin. Kaedah OLS digunakan untuk menganalisis data keratan rentas merangkumi 36 wilayah di Sudan bagi tahun 1996. Data mengenai pekali Gini dan pendapatan purata nominal diperolehi dari Kajian Tenaga Buruh dan Migrasi 1996, manakala indeks harga pengguna bagi tahun 1990 diperolehi dari Central Bureau of Statistics. Data ini digunakan untuk menganggarkan hubungan antara pekali Gini dengan pendapatan per kapita benar. Hasil kajian menunjukkan bahawa terdapat hubungan positif antara pertumbuhan pendapatan dan parameter ketidaksetaraan, menyebabkan hipotesis Kuznets tidak dapat disahkan melalui hasil kajian empirikal ini. Keputusan ini menunjukkan bahawa ekonomi Sudan belum mencapai titik pusingan U-terbalik Kuznets di mana pertumbuhan pendapatan membawa kepada pengurangan dalam ketidaksetaraan.

Kata kunci: pertumbuhan ekonomi; ketidaksetaraan pendapatan; kemiskinan; pekali Gini

INTRODUCTION

Theoretical attention to income inequality has a long history. The thought of fair distribution can be dated back to classical economists like David Ricardo and left-wing theoretical masters like Karl Marx. These theorists have already recognized the importance of fair distribution of income in the society, and among different classes. Especially the latter strand argues that extreme unfairness of distribution in productive materials and income are the sources of poverty and the root of severe confrontation and social conflict between classes.

The main purpose of this study is to examine the relationship between income growth and inequality in the distribution of income in the Sudan. In particular, the study tested Kuznets' hypothesis, which suggests that the relationship between the two variables took the form of an inverted U-shape curve. The importance of the study sterns from the fact that pro-poor economic growth is often seen as important for poverty reduction not only through raising incomes but also improving the distribution of income in favour of the poor.

Ordinary least squares (OLS) technique is applied to cross-section data covering 36 provinces for the Sudan in 1996 The data on the Gini coefficient and nominal average income are obtained from the 1996 Migration and Labour Force Survey, while the consumer price index for the year 1996 is obtained from the Central Bureau of

Statistic. These data are used to estimate a relationship between the Gini coefficient and real per capita income. The empirical results suggest that there is a positive relationship between income growth and the inequality parameter, while the Kuznets' hypothesis is not confirmed by the empirical results. These results indicate that the economy has not yet reached the Kuznets' turning point beyond which income growth leads to less inequality.

The rest of the paper is organized as follow: section (2) reviews the literature. The poverty and inequality in the Sudan are outline in section (3), while section (4) specifies the empirical model, methodology and data used in the analysis, section (5) reports the empirical results. Finally, a brief conclusion is given in section (6).

LITERATURE REVIEW

Poverty is a complex phenomenon, which is influenced by a wide range of economic, social, political, cultural, and environmental factors. There are numerous definitions of poverty. In the literature however, two elements are shared by all poverty definitions, namely the division of population between "poor" and "non poor", which requires the existence of a cut-off point or the poverty line and a lack of welfare, which is peroxide by income or expenditure (Havcnaars and Van Praag, 1985) In general, poverty may be defined as a lack of command over commodities, and more narrowly as a lack of the minimum food energy intake. Thus people are classified as poor if their incomes are inadequate for physical health and efficiency (Fadallah 2004).

Seri (1980) suggested another approach to poverty analysis based on a subjective perception of deprivation, which is relative in nature According to this approach; poverty is defined as a state of deprivation. The concept of relative deprivation in used to denote the situation of some people who possess less of a desired attribute than others.

Poverty is also defined as being synonymous to inequality. The World Bank (1990) distinguished between the two concepts arguing that -whereas poverty is concerned with absolute standard of living of a part of society ... the poor... inequality refers to relative living standards across the whole society. Poverty can also be defined as a lack of capability, both intrinsic and instrumental (e.g. income, education. Health) that permits people to achieve the things they want to do and the states of existence they want to experience.

According to Wadded (2001) poverty is measured in term of incidence, depth and severity. A poverty index that gives all these three measures as special cases is the one suggested by Foster, Gereer and Thorebeck (1988) namely:

$$p_0 = \frac{1}{n} \sum_{i=1}^{q} \frac{(z - y_t)^{\infty}}{z}$$

Where (q) is the number of the poor, (n) is the size of population. (y_t) is the income of poor person1, and (z) is the poverty line. The incidence of poverty (p_0) is measured by the ratio of those who fall below the poverty line, which is obtained when $\alpha = 0$: its depth (p_1) is measured by the total gap of income of the poor front the poverty line relative to the poverty line, which is obtained when $\alpha = 1$: and its severity (p_2) is measured by squared poverty gap index, which is obtained when $\alpha = 2$.

Regarding the distribution of income, economists usually distinguish between two principal measures of income distribution, namely the size distribution of income and the functional or factor shares in income (Todaro, 1977). The personal or size distribution of income is the measure most commonly used by economists. It simply deals with individual persons or households and the total incomes they receive. The way in which that income was received (rents. profits, inheritance ... etc) and the location (urban or rural) and occupational sources of income (agriculture, commerce. services ... etc.) in this measure are neglected. The functional distribution attempts to explain the share of total national income that each factor of production receives. This measure inquires into the percentage that labour receives as a whole and compares this with the percentages of total income distributed in the, form of rent, Interest and profit. Although individuals may receive income front all these sources, this is not a matter of concern for this measure (Todaro 1977).

Another common way to analyze personal income figures is to construct what is known as Lorenze curve. This curve plots the proportion of population against the share of income received. Staring from the poor, the cumulative percentages of people are plotted on the horizontal axis (the population is divided into deciles). The vertical axis represents the cumulative share of total income received by cumulative percentages of the population. The extreme case of complete equality in income distribution occurs when the Lorenz curve coincides with the 45–degree line (i.e. the diagonal line is the curve of complete equality). The extreme case of inequality (i.e. a situation in which one person having everything while everybody else receives nothing) occurs, when the Lorenz curve coincides with the bottom horizontal axis and the right hand vertical axis. In fact no country exhibits either perfect equality or perfect inequality in its distribution of income. The Lorenze curves for different countries will lie somewhere to the right of the 45-degree line (Todaro 1977).

The Gini coefficient is also one of the most commonly used measures of income distribution, which is closely associated with the Lorenzo curve. It could be obtained by calculating the ratio of the area between the diagonal and the Lorenze curve divided by half of the area of the square in which the curve lies (Todaro 1977).

There is a long-standing debate among economists regarding the relationship between economic growth and inequality in the distribution of income. The debate centers

around the trend, in income distribution and whether development in the past has been accompanied by an increase in inequality that the poor have benefited relatively little from overall growth. Much of this debate has its origin in the classical contribution attributed to Kuznet's (1955), who argued that the relationship between inequality and per capita income took the form of an inverted U-shaped curve such that inequality was low in an unchanging (traditional) society, but it increased with the shift from agricultural to industrial activities and the move of population front rural to urban locations. According to Kuznets (1955) inequality within the urban sector was greater than the other sectors and this overall inequality increased as the urban sector grew more than proportionately to the rest of the economy. In addition, the concentration of saving in the upper income groups led to the concentration of an increasing proportion of income- yielding assets in the hands of this group, which in turn led to larger income shares in the future At more mature levels of development, inequality began to decrease (Colman and Nixson 1986).

At the empirical level, Colman and Nixson (1986) argue that in many of the studies made to test Kuznets' hypothesis, although the estimates of income growth are relatively good, we have little reliable information on how the distribution of income has changed over time. This is attributed primarily to the lack of time series data for individual countries about the distribution of income. As a result, some of these studies used cross-section data to investigate Kuznets' Hypothesis. For example Edelman and Morris (1973), Paukert (1973). Chancery and Syrquim (1975) and Ahluwalia (1976) have reported empirical results that support the hypothesis to some degree.

For a group of developing countries. Ali (1988) provided evidence for the existence of Kuznets' relationship whereby inequality first increases at the early stages of development and then declines. He found that for low income countries with income less than the turning point, inequality is fairly inelastic to changes in income with elasticizes of 0.064 for Latin America, 0.1403 for Asia and 0.1243 for sub-Saharan Africa (Quoted in Fadlallah 2004).

In the last decade, time series data have become available and have been analyzed by a number of authors, including Ravallion (1995), Deininger and Squire (1996, 1998) Schultz (1998) and Bruno, Ravallion and Squire (1998). The empirical findings of all these recent studies tend to reject the Kuznets' hypothesis (Quoted in Richard and Adams 2002). Also in recent empirical studies, which controls for relevant factors as education, rule of law, and openness of trade, it is shown that Kuznets relationship exists such that inequality increases up to per capita income level of $3,320. Applying this level of per capita income to 44 African countries, it has been found that 40 of them have not yet reached the Kuznets' turning point. For these countries, this result implies that fast growth might be necessary, but not sufficient for poverty reduction (African Development Bank 2002).

Richard and Adams (2002) argued that the tendency of most recent thinking is such that economic growth does not have much of an impact on inequality, because income distribution generally does not change much over time. According to Deininger and Squire (1996) gross domestic product (GDP) per capita increased by 26 percent in the developing world between 1985 and 1995, while the Gini coefficient in the world changed by only 0.28 percentage points per year over the same period. Since income inequality tends to remain stable over time, economic growth can be expected to reduce poverty, at least to some extent. Exactly how much growth actually reduces poverty depends on at least two factors. The first is the rate of economic growth itself. Regarding this, using an international poverty line of $1.0 per person per day, Squire (1993) regressed the rate of poverty reduction in a country against its rate of economic growth. His results show that a one percentage point increase in the growth rate reduces the poverty headcount index ($1.0 per person per day) by 0.24 percentage points. A similar empirical econometric study was conducted by Bruno, Ravallion and Squire (1998) for 20 developing countries over the period 198.1-1993. These three authors regressed the rate of change in the proportion of the population living on less than $1.0 per person against the rate of growth (change in survey mean income) and obtained a statistically significant regression coefficient of –2.12. This means that a 10 percentage points increase in growth can be expected to produce a reduction by 21.2% in the proportion of people living in poverty (i.e. below $1.0 per person per day).

By how much economic growth reduces poverty also depends on the extent of inequality. In a straightforward statistical sense, economic growth can be expected to reduce poverty more if inequality falls than if it does not. This exception is confirmed by the previously cited study, of Bruno, Ravallion and Squire (1998) for the same 20 developing countries. These authors regressed the rate of chance in poverty on growth (change in the survey mean) and the change in inequality (as measured by the Gini coefficient). They obtained statistically significant coefficient of –2.28 for the growth variable and 3.86 for the inequality variable. These results suggest that even small changes in the overall distribution of inequality can lead to sizeable changes in the incidence of poverty for any given rate of economic growth, the more that inequality fills, the greater is the reduction in poverty.

In view of the above, it must now be clear that the extent of poverty in any country depends upon two factors, namely the average level of income and the degree of inequality in its distribution. Cleary for any given distribution of income, the higher (lower) level of per capita income the lower (higher) will be the number of the absolutely poor. Todaro (1977) estimated the relationship between the levels of per capita income and the distribution of income for 44 developing countries in1969. His results show the lack of any relationship between these variables. Accordingly, he concluded that higher

per capita incomes do not by themselves guarantee the absence of a significant number of absolute poor, implying that, using per capita income as the measure for poverty could be misleading.

With regard to income distribution, Kakwani (1990) argued that poverty is highly sensitive to changes in inequality. The numerical values of poverty elasticity with respect to income inequality were estimated for example for Cote d' Ivories at 7.86, 11.58 and 19.62 for the headcount index, the poverty gap ratio, and F.G.T measure, respectively. Thus, if income inequality increases during economic growth, poverty may even increase because the poverty measures are more elastic to changes in inequality than to economic growth (Quoted in Fadiallah 2004).

It is also argued that, the problems of poverty and inequality are not simply the result of natural economic growth processes: rather they depend on the nature of that economic growth, and the political and institutional arrangements. In this regard and in attempts to analyze the linkages between macroeconomic policies and economic growth variables and their impact on poverty in Poland, Paci, Sasin and Verbeek (2004) show that poverty-reducing growth depends on the ability of the economy to generate jobs.

A REVIEW OF POVERTY AND INEQUALITY IN SUDAN

The first attempts for studying poverty in Sudan were made by Anand and Nur (1984), who computed an absolute poverty line for Sudan. The authors adopted the food Energy Intake (FEI) method and the Recommended Daily Allowance (RDA) of Calories determined by FAO/WHO. Using the 1984 March and April prices, they estimated the annual food poverty line for the Sudan at Ls445. Based on the assumption that the poor spend on average about one-third of their income on food, they multiplied the value of the food poverty line by three to obtain the absolute poverty line for the Sudan estimated at Ls 1335.

Nur (1992) made a comprehensive study on poverty in the Sudan, using data collected by the Central Bureau of Statistics in collaboration with the Social Solidarity Fund. For urban and rural settings, he computed the costs of subsistence living standards per person per day at 1992 prices. These represent the poverty lines for urban and rural areas, estimated at Ls 60.825 and Ls 33.604, respectively. Nur (1992) also made and attempt to measure the poverty indices with and without coping practices. The results suggest that the head count index with expenditure poverty line (poverty with coping practices) was 74.4%, compared to 83.3% with the income poverty line (poverty without coping practices).

On the inequality side, the Ministry of Manpower (1997) reported some results on income distribution for the period 1968. 1978. 1990 and 1996. The results indicate that during 196S-1996 the income distribution seems to have been deteriorating. The ratio of the income share of the top 20 percent to the poorest 40 percent has increased from 2.8 in 1968 to 20 in 1996. This degree of household income inequality is indicated by the rise in the Gini coefficient from 61% in 1990 to 74% in 1996 in the 1990s income inequality has become more severe. Between 1990 and 1996, the share of the lowest 20 percent has been declining faster in urban areas than in rural areas. The rural Gini coefficient has declined from 69 percent in 1990 to 65 percent in 1996.

Using household survey data, Fadlallab (20041 examined the distribution of income in Sudan in 2000. The results suggest that inequality has became more severe, where between 1990 and 2000 the Gini coefficient increased from 61% in 1990 to 73% in 2000, also the data reveal that income inequality has grown more rabidly in urban than in rural areas.

In view of the above the question which poses itself is whether the deterioration in income inequality in Sudan could be explained by reference to the Kuznets' type of relationship involving the interaction between economic growth on one hand and inequality and poverty on the other hand. Ali (2003) regressed the Gini coefficient on mean income (consumption expenditure) anti reciprocal to estimate the elasticity of the headcount ratio with respect to consumption expenditure, and the elasticity of headcount ratio with respect to the Gini coefficient (predicted Gini coefficient) and the Kuznet's elasticity for the Sudan during 1968–1999. Ali (2003) observed that the Gini coefficient for the distribution of consumption expenditure fluctuated over the period with changes in per capita consumption expenditure, while the elasticity of the head count poverty index with respect to the Gini coefficient also fluctuated with the fluctuations in the Gini coefficient. The average elasticity for the 1990s decade is estimated at 0.616, % which is lower than the average absolute value of the elasticity of the head count ratio with respect to per capita expenditure, estimated at (−1.18), and the average Kuznets' elasticity for the 1990s decade is 0.1132.

Fadlallah (2004) examined the effect of growth on poverty at the province and household levels. For province-level analysis, Fadlalla (2004) used the data of the 1996 Migration and Labour force survey on a sample of 36 Provinces. The poverty measures used in the analysis are the headcount index, the mean poverty gap index and the sum of squares of poverty gap normalized by population size. The results show that there is a significant negative linear relationship between income and poverty measures with the slopes estimated at (−0 133). (− 0.33), and (−0.426) for the headcount index, the poverty -gap ratio and the squared poverty-gap measure, respectively. In addition, the absolute values of the elasticities of the poverty measure with respect to income growth are estimated at 0.840, 0.685, and 0.83 for

the headcount index, the poverty-cap ratio, and the squared poverty-gap measure, respectively.

For the household-level analysis, Fadlallah (2004) used education and employment of head of household as controlling factors to examine the effect of growth in incomes on household poverty level. The results show that measures of poverty at household level are inelastic to an improvement in household income, literacy and employment opportunities. The study reveals that there is a significant negative linear relationship between income and absolute poverty with a slope of –0.379 which gives an elasticity of poverty with respect to household income estimated at (–0.03). The household poverty measures are more sensitive to changes in income compared to the province poverty measures. Still growth in itself has very little impact on poverty in the short and long run. Even if an annual growth rate of 10% is sustained, poverty would decline only by about 5.8%. Furthermore, it is short run that there is a positive linear relationship between poverty measures and the Gini coefficient. The only exception is that the linear relationship between absolute head count index and the Gini coefficient is statistically insignificant. For the other two measures, the linear relationship is statistically significant with a slope of 0.202 for the poverty gap index (depth of poverty), and 0.363 for the squared poverty gap index (severity of poverty).

THE EMPIRICAL MODEL AND METHODOLOGY

In this section we outline the empirical model that will be adopted to investigate the Kuznets' Hypothesis. The model takes the quadratic form given by:

$$G = a_0 + a_1 U + a_2 U^2 \qquad a_1 > 0, a_2 < 0 \qquad (1)$$

with,

G: Gini coefficient.

U: real average income

The restrictions on the parameters of equation (I) ensure that the relationship between income growth and inequality takes the form of an inverted U-shape, or the Kuznets' curve. An alternative specification may take the form:

$$G = a_0 + a_1 u + a_2 \left(\frac{1}{u^2} \right) \qquad a_1 > 0, a_2 < 0 \qquad (2)$$

To estimate the above relationships between inequality and income, we use a cross-section data on the Gini coefficient and nominal average income for 36 provinces of Sudan. This data are obtained from the Ministry of Manpower (1997) for Sudan which was the outcome of the Migration and Labour Force Survey conducted in 1996. The data on the consumer price index (CPI) for the year 1996 is obtained from the Central Bureau of Statistics. The real average income is the nominal average income deflated by the consumer price index in 1996 which is equal to 1123.54. The data are reported in table (A.1) of the appendix. Ordinary Least Square (OLS) method is applied to this data to estimate the relationships in equations (1) and (2) above .In the next section we report the empirical results.

THE EMPIRICAL RESULTS

Appling (OLS) technique to estimate the two forms we obtained the regression results as summarized in the table (1) below, where the figures between brackets are the t-ratios of the estimated coefficients:

From these results we observe that equations (1) and (2) of Table (1) are significant at the 5% level, while equation (3) is significant at the 1% level as indicated by the F-ratios. The estimated coefficient of average income (U) in equation (3) is significant at the 1% level, while in the equation (2) it is significant at the 5% level. The estimated coefficient of (U) in equation (1) has the right sign, but insignificant, while the estimated coefficient of (1/U2) have the wrong sign and is also insignificant. These results indicate that variations in real average income (growth) explain on average only 24% of the variations in inequality (G). All in all, these results suggest that an inverted U-shaped relationship between

TABLE 1.The Regression Result, 1996

| Equitation No | Dependant Variable | Constant | Coefficient of | | | R^2 | R^{-2} | F | F (V ,V) | |
			u	u^2	$\frac{1}{u^2}$				0.05	0.01
1	G	0.53 (12.02)	0.997 (1.64)	-0.525 (0.086)	-	0.26	0.211	5.67	4.08	-
2	G	0.53 (12.07)	0.484 (2.3)	-	-0.014 (-0.07)	0.24	0.193	5.18	3.23	-
3	G	0.56 (14.32)	0.49 (3.27)	-	-	0.24	0.282	10.67	-	7.31
4*	G	-0.701 (-9.80)	0.95 (2.92)	-	-	0.20	0.187	8.52	-	7.31

income inequality and income growth does not exist for the Sudan. Rather, the empirical relationship between these two variables is found to be linear and positive. Thus, as income increases, income inequality will also increase. This result may explain that Sudan has not yet reached Kuznets' turning point beyond which income growth leads to less inequality.

It might be interesting to examine the elasticity of the Gini coefficient with respect to income. For this purpose, we have applied (OLS) technique to a log-linear form of equation (3). The estimated equation (4*) is reported in table (1) above. Front this equation we observe that the elasticity of inequality with respect to income is estimated at 0.95 and is significant at the 1% level as indicated by both the F and the t-ratios. Thus, an increase in income by 1%will lead to an increase sit income inequality by nearly 1%.This may provide an evidence of the increase in inequality with income growth.

CONCLUSION

This paper examined the relationship between economic growth and income inequality at the province level for the Sudan in 1996. The well known Kuznets' hypothesis suggesting that the relationship between economic growth and inequality in distribution of income takes an inverted U-shaped curve is tested. For this purpose, ordinary least square (OLS) method is used on cross-section data covering 36 provinces for the Sudan in year 1996. The data on Gini coefficient and nominal average income are obtained from the 1996 Migration and Labour Force Survey, while the consumer price index for 1996 is obtained from the Central Bureau of Statistic.

The empirical results suggest that there is a positive and statistically significant relationship between economic growth and income inequality in Sudan such that income inequality increases with growth. Accordingly, it may be argued that the economy has not yet reached the Kuznets turning point beyond which income inequality falls with growth. The results also suggest that an increase in income growth leads nearly to an equi-proportionate increase in income inequality.

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