Demography, Growth, Income Distribution and Poverty: A Survey of Interrelationships[1]

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I. Introduction:

To survey the interrelationships between demography on the one hand and economic growth, income distribution and poverty each on the other hand, it is perhaps important to flag a number of basic demographic terms and concepts. This is done, of course, at the risk of boring those well-versed in demographic analysis.

Abstracting from large scale migration flows, the population growth rate is usually measured as the birth rate minus the death rate. The birth and death rates are usually expressed as numbers per thousand of the population, but the population growth rate is usually expressed in percentage terms. The demographic history of the world is usually discussed in terms of these demographic rates (i.e. the famous demographic transition).

Over the period 1950-1955 the average annual rate of population growth for the world is reported to have been 1.81 percent with Latin America and the Caribbean recording the highest rate of 2.65 percent followed by Africa (2.21), while Europe recorded the lowest rate of 0.99 percent. Over the period 1995-2005 the average annual rate of population growth for the world declined to 1.21 percent while that of Africa declined marginally to 2.18 percent, with Africa now recording the highest population growth rate followed by Latin America and the Caribbean (1.42 percent), and Europe recording a zero rate of growth.

Aggregate population rates of change, it is customary to note, hide fairly important information about the underlying demographic structure of various countries. Such structures are usually looked at in terms of the age distribution of the population involved. Standardized age groups are 0-15 years of age (young dependent population), 15-64 years of age (working population), and 65 years and over (old dependent population). The latest available age distribution for the world (for 2005) shows the young to represent about 28.2% of the population and the old to represent about 7.4%, leaving a share of about 64.5% of the population for the working age group. For Africa as a whole the young represent about 41.5% of the total population with the old accounting for about 3.4%, leaving 55.1% of the total population as a share of the working age group. Thus Africa is clearly characterized by a young

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population[2]. This characteristic is usually summarized in the dependency ratio, defined as the population of the young and the old as a share of the working age population. For the world the dependency ratio is reported as 55.1%, while that for Africa it is 81.3%, the highest among all continents.

It is also customary to note that aggregate population rates of change are affected by the prevailing age distributions in various countries. Important in this respect is the age specific fertility rate which is defined as the average number of children per year born to a woman in a particular age group. The total fertility rate is sum of the age specific fertility rates over different age groups, thus giving the average number of children a woman is expected to have over her lifetime. According to UN estimates, total fertility for the world was 2.65 children per woman in 2000-2005; Africa's 4.97 children per woman was the highest among all continents, followed by that for Latin America and the Caribbean (2.55), with Europe recording the lowest fertility (1.4 child per woman)[3].

With respect to mortality the recent UN (2006: 54) report notes that life expectancy at birth provides a commonly used measure to summarize mortality conditions for a period of time (e.g. a five year period as in the 2004 Revision). In contrast to age specific fertility rates life expectancy provides a convenient, standardized measure (unaffected by age structure differences) for comparing mortality over time and across populations. According to UN estimates life expectancy at birth averaged 65.4 years at the level of the world for the period 2000-2005. All continents achieved a life expectancy in excess of 60 years except for Africa with only 49.1 years, declining from 51.5 years for the period 1985-1990. "Africa, unlike other major areas, has been experiencing declining life expectancy since the late 1980s…. While the downward trend in (SSA) is due in large part to the HIV/AIDS epidemic, other factors also played a role, including armed conflict, economic stagnation and resurgent infectious diseases such as tuberculosis and malaria. The recent negative trends in Africa have set back progress in reducing mortality by at least 25 years" (UN (2006:56)[4].

The rather very long history of population change in the world is customarily described in terms of the demographic transition theory. Without getting involved in finer details this theory is usually summarized in terms of three phases. During the first phase a "spontaneously high rate of reproduction was countered with all manner of disasters, such as regular outbreaks of plague, pestilence, and famine. So although birth rates were high, death rates were sufficiently high to keep growth rates down to a crawl" (Ray (1998: 302)). This low population growth rate phase was followed by the second phase of high population growth (or population explosion) thanks to the

[2] Population Division (2006: 24, table II. UN 1). Indeed Africa is youngest continent.

[3] UN Population Division (2006: 40, table III.4). The UN defines high fertility as total fertility levels of above 5 children per woman; low fertility of levels in the range 2-3 children; replacement fertility of about 2.1 children per woman; below replacement fertility as levels below 2.1 children per woman; and very low fertility levels as those below 1.3 children per woman.

[4] High life expectancy is recorded for Japan (81.9 years), Hong Kong (81.5), Iceland (80.6), and Switzerland (80.4 years). At the other extreme, very low life expectancy is recorded for Swaziland (32.9 years), Botswana (36.6),, and Lesotho (36.7). "In these three countries, the impact of HIV/AIDS epidemic has lowered life expectancy to a level even lower than that of countries affected by civil strife, such as Sierra Leone (40.6 years), and Angola (40.7 years)" (UN (2006: 57)).

advent of sanitation methods (which resulted in the decline of death rates) and technological advances that raised agricultural productivity (increasing the carrying capacity of societies). Moreover, birth rates remained high during this second phase due to the observed inertia that characterizes fertility choices made by households. The third phase saw the birth rates declining, and with declining death rates, population growth rates also declined. European, and North American, regions of the world are said to have experienced this three phase population history, and developing countries are conjectured to be going through the same process.

Having noted the above, the rest of this paper is organized in six sections. Section (II) suggests a unifying framework for the investigation of the interrelationships in question[5]. The framework is based on the dominant money-metric methodology for poverty analysis[6]. Sections (III)- (V) deal respectively with the interrelationships between population change and growth, inequality and poverty. Section (VI) argues that the above interrelationships could be informed at the micro household level by the usual poverty profile analysis. Section (VII) concludes.

II. A Unifying Framework:

A careful reading of the relevant literature suggests that the interrelationships between demography, growth, income distribution and poverty could best be addressed in the context of poverty changes over time. In general, any poverty measure (call it P) could be expressed as depending on mean consumption expenditure in society, the poverty line and on a measure of the underlying inequality in the distribution of consumption. One of the axioms on poverty measures, the scale invariance axiom[7], enables a general form of any poverty measure to be expressed in the following form:

(1) $P = P(\mu/z, \theta)$; such that: ?P/ ?μ < 0; ?P/ ?z > 0; and, ?P/ ?θ > 0.

where μ is mean consumption expenditure, z is the poverty line and θ is a measure of the inequality in the distribution of consumption expenditure usually taken as the Gini coefficient. The theoretical restrictions on the above general form are such that as per capita consumption increases (poverty line declines), other things remaining the same, poverty declines. Similarly, as inequality in the distribution of consumption expenditure declines, other things remaining the same, poverty declines. Note that in this general formulation if the poverty line changes by the same rate of change as mean consumption expenditure, other things remaining the same, poverty does not change[8]. Note also that if the poverty line is set as a constant proportion of mean

[5] For an earlier investigation of the link between population growth and poverty see Ahlburg (1996); but note that the investigation is not done in the context of a unifying framework.

[6] Note that to the extent that multi-dimensional approaches to poverty measurement specify implicitly, or explicitly, cut-off points for the relevant deprivation variables they will be extending the dominant approach to poverty measurement. As such, the proposed unifying framework will hold for such extensions with the appropriate interpretation of the results. For a review of the literature on the multi-dimensional approach to poverty measurement see Bibi (2005).

[7] See Zheng (1997) for a survey of axioms and poverty measures.

[8] This is the property of zero homogeneity of the poverty measure with respect to mean consumption expenditure and the poverty line. This property is thought to hold for most of the widely used poverty

consumption expenditure, then poverty changes will only depend on the change in the distribution of consumption expenditure[9].

Without loss in generality we denote the expenditure-poverty line ratio by ? (=μ/z). The general poverty measure can now be expressed as the following:

(2) P = P(? , ?) ; such that ?P/ ?? < 0; and, ?P/ ?θ > 0

Discreet changes in poverty over two periods (0 and 1) can be obtained by considering changes in poverty due to a change in the consumption poverty-line ratio (reflecting the effect of economic growth) and the change in the distribution of consumption expenditure (reflecting an inequality component). These changes can be looked at using the initial period as a reference point, or alternatively using the terminal period as a reference point. Averaging over these two changes gives rise to an exact decomposition of the change in poverty (so-called Shapely value).

Equation (3) gives the decomposition of poverty change using the initial period as the reference where the change in poverty ? P = P(?$_T$, ?$_T$) - P(?$_0$, ?$_0$):

(3) ?P = [P(?$_T$, ?$_T$) - P(?$_T$, ?$_0$)] + [P(?$_T$, ?$_0$) - P(?$_0$, ?$_0$)]

The first term on the right hand side of (3) is the inequality component of poverty change: the consumption ratio is held constant and the poverty measure is evaluated at the initial distribution. The second term is the growth component of poverty change where the distribution is held constant but the consumption ratio is allowed to change.

Similarly, equation (4) gives the decomposition of poverty change when the terminal period is used as a reference:

(4) ? P = [P(?$_T$, ?$_T$) - P(?$_0$, ?$_T$)] + [P(?$_0$, ?$_T$) - P(?$_0$, ?$_0$)]

The first term on the right hand side of (4) is the growth component while the second term is the distribution component. Adding equations (3) and (4), collecting terms and rearranging we get the change in poverty between two periods as:

(5) ?P = 0.5 {[P(?$_T$, ?$_0$) - P(?$_0$, ?$_0$)] + [P(?$_T$, ?$_T$) - P(?$_0$, ?$_T$)]}
+ 0.5{[P(?$_T$, ?$_T$) - P(?$_T$, ?$_0$)] + [P(?$_0$, ?$_T$) - P(?$_0$, ?$_0$)]}

The first term on the right hand side of (5) is the overall growth component while the second term is the overall inequality component.

A careful reading of the specialized literature on the economic impact of demographic change would show that such impact is postulated to materialize through economic growth channels and inequality in the distribution of income or consumption channels. Either explicitly, or implicitly, such literature looks at both ? (i.e. both per capita consumption expenditure and the poverty line) and ? (i.e. income shares of the

measures.

[9] This can easily be established by direct substitution in equation (1).

various percentile groups or summary measures of inequality such as the Gini coefficient), as functions of real per capita income (representing the stage of development.

To appropriately account for the impact of demographic change in the growth component of the change in poverty, the specialized literature makes a first distinction between output per worker, say w, and output per capita, say, y; and notes the obvious relationship between the two in the form of the identity given by the following where, Y is total output, L is the number of workers and N is total population:

(6) $y = Y/N = (Y/L)\ (L/N) = w\ (L/N)$

Denoting the growth rate for any variable x, by G(x) we have:

(7) $G(y) = G(w) + G(L) - G(N)$

From the above equation it is noted that for a stable population G(L) = G(N) and the net demographic effects are zero. "If the population is unstable as during a transition, then demography matters" (Williamson (2003: 113)). The above channel of the effect of demography on the growth process is then embedded in a conventional neoclassical growth model (i.e. G(w)) of the transition to the steady state where per worker output is determined by a vector of variables (policy, institutional, geographic and social).

On the basis of the above, the consumption-poverty line ratio is assumed, either explicitly or implicitly to be a function of per capita GDP. Most of the literature assumes that the poverty line is constant over space, at one point in time, as well as over time, across space. More reasonably, the poverty line, interpreted as the cost of survival in a social context, can be assumed to be a function of per capita consumption expenditure (representing the standard of living in developing countries). Thus, ? , the ratio of consumption expenditure to the poverty line can also be considered as a function of GDP. The change over time of this ratio will depend on the size of the elasticity of the poverty line with respect to consumption expenditure, as well as on the elasticity of per capita expenditure with respect to GDP per capita. With appropriate substitution of equation (7), the impact of demography on poverty can thus be captured[10].

The demographic impact on changes in poverty over time through the distribution component is captured through a Kuznets relationship. Over long periods of time the Kuznets hypothesis asserts that inequality in the distribution of income tend to increase first as per capita income increases before it declines. Per capita income in this respect is supposed to capture the development process. Under such a process we have:

(8) ? = ? (y) such that [?θ/ ?y] > 0 as y < y*.

[10] Note that the growth component of the poverty change over time for the continuous case is given by [?P/ ??][??/?t]. Now ??/?t = ? (1 – e_z) G(μ), where e_z is the elasticity of the poverty line with respect to per capita consumption expenditure. Note that G(μ) = e_μ G(y) , where e_μ is the elasticity of per capita consumption expenditure with respect to GDP per capita (assuming, of course, that the relationship in question is one of constant elasticity).

Where y^* is the Kuznets turning point.

The above framework is obviously macroeconomic in nature in the sense that the units of analysis are countries, or regions, or sectors within countries. However, due to the reliance of the framework on the distribution of the standard of living among families, and individuals representing families, the framework could easily be linked to the microeconomic level. The interrelationships in question have been debated in the specialized literature in the context of the effect of large family size on the welfare of families. Two views are identified in the debate (see, for example, Birdsall and Sinding (2003: 15-16)). One view notes that high "fertility in poor families may reflect parents' sensible decisions to trade off current consumption for greater future family income when children begin work, or for greater old age security, or it may simply reflect parents' decisions to enjoy children rather than other forms of consumption. The fact that large families tend to have lower incomes should not be construed as meaning that they either are, or that they regard themselves as being, objectively worse-off". The second view notes that at least some fertility among the poor may not have been chosen either implicitly or explicitly to optimize family welfare and as such may not be optimal.

The underlying framework for either of the two arguments is the standard household choice model, where the choices of a household with respect to fertility are treated in an analogous manner to all other decisions. A possible formulation of such decisions is the following where x is parental consumption, n is the number of surviving children, q is the level of human capital (child quality) achieved by each child, and U(x, n, q; a) is the utility function of the household with a a vector of exogenous factors influencing the preferences of the household.

A representative household is assumed to maximize its utility subject to a production technology constraint for producing human capital of children and a budget constraint. Production of child quality, q, depends on the consumption of children, c, and time devoted to rearing and caring for them by their parents, s, and a vector of factors affecting production, ß. Thus without loss in generality such production constraint could be formulated as:

(9) $qn = Q(c, s; ß)$

With family wages given by w, the budget constraint facing the household could be formulated as:

(10) $w(1 - s) = p_x x + p_c c$;

where the p's are prices of the consumption goods in question.

In defending a variant of the above approach Behrman (2003: 375) notes that if "individual decision-makers do behave as if they are maximizing their welfare given their resources broadly defined and the constraints that they face, they will make investments at the level at which the additional (marginal) present discounted value of the private benefit of the investment equal its additional (marginal) present discounted value of the private cost.. .. Examples of such investments include population changes such as having more children". As usual private marginal benefit curves are postulated as downward sloping, while private marginal cost curves are assumed to be upward sloping. An optimum investment is identified at the point where the two curves intersect. Shift vectors, a for preferences and ß for production technology among other changes during the development process, could then be invoked to look at policy issues occasioned by the divergence between private costs and benefits from social costs and benefits. Examples of causes of such divergence related to population change and development are enumerated by Behrman (2003: 381-383).

III. Demographic Change and Economic Growth:

According to Williamson (2003: 11) what "matters most in identifying the impact of demographic change on economic performance is the changing age distribution". It is argued that in the early stages of demographic transition , per capita income growth suffers due to large youth dependency burdens and small working-age adult shares (i.e. relatively few workers and savers). "As the transition proceeds, per capita income growth is promoted by smaller youth dependency burdens and larger working-age adult shares: there are relatively many workers and savers. The early burden of having few workers and savers becomes a potential gift: a high share of working-age adults. Later, the economic gift evaporates, as the elderly shares rises".

The above linkages have been explored using conventional growth regressions on a world sample of 78 countries over the period 1965-1990 by Bloom and Williamson (1998). As usual the dependent variable is the average growth rate of real GDP per capita over the period. Explanatory variables include the rate of growth of population over the period; the logarithm of initial income relative to that of the US (i.e. the ratio of GDP per capita to that of US GDP per capita in 1965); the logarithm of life expectancy in 1960; the logarithm of years of secondary schooling in 1965; natural resource abundance; openness; quality of institutions; access to ports; average government savings over the period 1970-1990; tropics location; and, ratio of coastline distance to land area.

Initial regression runs show the coefficient of the population growth rate to be sensitive to the specification as to which explanatory variables are included. Thus, for example, an initially insignificant coefficient turns to become significant when the logarithm of life expectancy, tropics location and ratio of coastline to land area are added!! Population growth is shown to be positively, and significantly, related to the growth rate of per capita GDP (see Bloom and Williamson (1998: 434, table 2) and Williamson (2003: 114, table 5.1)). To appropriately account for both population growth and the demographic transition the growth rate of the economically active population over the period 1965-1990, and its difference from the population growth rate, are added as explanatory variables. A summary of the OLS results is presented in table (x), where figures between brackets are absolute t-values.

Table (1) : The Interrelationship Between Demography and Economic Growth

Explanatory Variables	1	2
Growth Rate of Economically Active Population (G(L)1965-90)	1.46 (4.3)	
Growth rate of Population (G(P) 1965-90)	-1.03 (2.6)	
G(L) – G(P)		1.68 (4.8)
Logarithm of Initial Relative GDP per capita (relative to US: 1965)	-2.00 (9.5)	-1.97 (9.0)
Logarithm of Life Expectancy 1960	3.96 (4.1)	2.94 (3.0)
Logarithm of Years of Secondary Schooling 1965	0.22 (1.6)	0.28 (2.0)
Natural Resource Abundance	-2.35 (2.4)	-2.57 (2.3)
Openness	1.92 (6.0)	1.72 (5.2)
Quality of Institutions	0.20 (2.9)	0.15 (2.1)
Access to Ports (Landlocked)	-0.64 (9.1)	-0.40 (1.5)
Average Government Savings 197-1990	0.12 (4.0)	0.13 (4.3)
Tropics Location	-1.31 (4.4)	-1.20 (3.9)
Ratio of Coastline Distance to Land Area	0.24 (2.2)	0.23 (1.9)
Constant	-19.5 (4.5)	-14.3 (3.5)
Adjusted R^2	0.86	0.85

Source: Williamson (Bloom and Williamson (1998: 436 table 3) and Williamson (2003: 116, table 5.2). Note that the papers report standard errors; the t-values reported above are approximated to the first digit.

The most important results from the perspective of exploring the interrelationship between demography and economic growth may be summarized as follows:

(i) the growth rate of the economically active population tends to have a positive impact on GDP per capita growth. Such impact is statistically significant and rather large: a one percent increase in the growth rate of the working population , other things remaining the same, is associated with about 1.5 percent increase in the growth rate of GDP per capita (column 1);

(ii) the growth rate of population tends to have a negative impact on GDP per capita growth. Such impact is statistically significant and also relatively large: a one percent decrease in the rate of population growth, other things remaining the same, is associated with about one percent increase in the growth rate of GDP per capita (column 1);

(iii) when the growth rates of the working-age and the entire population are constrained to be equal but of opposite sign, to take account of the changes in the age distribution, the results show a positive and statistically significant relationship. This implies that "where the middle of the age distribution (ages 15-64) grows faster than the tails (ages 15 and below and 65 and above), GDP per capita growth is faster" (Williamson (2003: 116).

Having noted the above it is perhaps instructive to note that a fairly large literature has developed in an attempt to explain Sub-Saharan Africa (SSA) slow growth performance compared to other regions. As is well known this literature, using global samples, followed a standard approach of including a dummy variable that takes the value of one for SSA countries and zero otherwise. The coefficient of this dummy variable is usually found to be negative and statistically significant implying that SSA's growth is on average lower than that for other countries and that such a difference cannot be explained by the standard growth regression model. In a recent paper Hoeffler (2002) argued that an augmented Solow model, where human capital is included in the production function, can account for SSA growth[11]. She suggested that previous studies did not take into account of intial differences across countries (thus encountering the econometric problem of omitted variables) and that they did not take into account that while investment causes growth, economic growth could also cause investment (thus encountering the econometric issue of endogeneity). To correct for these she uses the generalized method of moments estimation which overcomes both technical problems. A comparison of the results of this method of estimation with that of ordinary least squares and that of fixed effects estimation shows that the significance of the SSA dummy depends on the method of estimation. The simple growth model used in the literature, with an appropriate method of estimation, shows that SSA growth has been low because of initial differences, low investment in human and physical capital, and comparatively high population growth.

IV. Demographic Change and Income Distribution:

In view of the fact that demographic change has at its core the passage of time it is perhaps not surprising that the relationship between such change and its impact on income inequality has been explored in the context of the famous Kuznets curve hypothesis. The Kuzents hypothesis, it will be recalled, argues that during the early stages of development inequality in the distribution of income tends to increase, before it declines at later stages of development. To capture both the development process, and the time dimension involved, development is usually proxied by real per capita GDP. Thus testing the non-linear relationship between inequality and development various formats for testing the hypothesis have been tried in the literature. The pioneering attempts by Ahluwalia (1976) used the income share of the richest 20 percent of the population as the dependent variable in a quadratic relationship with GDP per capita as the explanatory variable. Recent contributions, by among others, Barro (1998) and Milanovick (1994) used the Gini coefficient as the dependent variable under the quadratic format. Anand and Kanbur (1976-a, and b), however, have shown that the appropriate format to use for the Gini coefficient is one of GDP per capita and its reciprocal, rather than its squared value.

Williamson (2003: 131-132) reports results on the Kuznets curve where the Gini coefficient is used as the dependent variable. The explanatory variables used are the logarithm of GDP per worker and its squared value (to represent the stage of development); arable land per capita (to represent resource abundance); the Sachs and Warner openness measure; secondary school enrolment rate (to represent the supply of education); and the share of the adult population between ages 29 and 60 in the population between ages 15 and 69 (to capture the demographic structure of the population).

With respect to the demographic variable two ideas are explained. "First, poor people tend to be either young or old. Secondly, people in fat cohorts tend to get low rewards, and when those fat working-adult cohorts tend to lie in the middle of the age-earnings curve when income are highest, the age-earnings curve tends to be flattened, and inequality is moderated. When instead the fat cohorts are younger or old working

[11] It is important to note that this paper was prepared for an AERC collaborative research project on "Explaining African Economic Performance" and appeared as CID working paper no. 36, in 2000 before it was published. Hoeffler (2006) provides a non-technical summary.

adults, the age-earnings curve will rise to and fall from its peak more steeply, and inequality is moderated" (Williamson (2003: 132)).

With an adjusted R-squared of about 0.5, the results show that all the estimated coefficients are significantly different from zero at the 1% level, except for the openness variable which is significant at 10% level. The Kuznets hypothesis is confirmed with the coefficient on the logarithm of GDP per worker positive (0.000036) and that on its squared value is negative (-8.73E-10). The coefficient on the resource abundance variable is positive, implying that "resource-abundant economies tend to have unequal income", and that on secondary school enrolment is negative with the obvious interpretation that increased educational availability tends to reduce inequality in the distribution of income. The coefficient on the openness variable is positive, being interpreted as implying that non-socialist economies tend to have more inequality. This interpretation is based on the observation that the original Sachs and Warner measure is dominated "by whether the country is or was socialist, being 0 if it was" (Williamson (2003: 131).

The coefficient on the demographic structure is negative (-2.95) confirming the two ideas noted above. An increase in the ratio of the adult working population relative to total working population, other things remaining the same, is expected to result in a decline in inequality.

V. Demographic Change and Poverty:

In a very interesting paper Eastwood and Lipton (2003: 212-259) addressed the issue of the interrelationship between the demographic transition and poverty. For a full sample of 59 countries, their preferred equation, from among 7 estimated equations, has the head-count ratio (for a PPP poverty line of US$30 per person per month) as the dependent variable; and the natural logarithm of real consumption expenditure per head, the ten year lagged net birth rate, an interaction term between the two, and a dummy for Latin America as explanatory variables. In another equation it is found that the population growth rate lagged 10 years is as good as the birth rate, while social variables (including the Gini coefficient of land ownership at the year of the survey, population per nurse, and primary school enrolment rate lagged 10 years from the year of the survey) were found not to be significant "either individually or collectively". A summary of these results is presented in table (2) below, where figures between brackets are t-values for the coefficients and p-values for the Wald test[12].

[12] The authors explain that because of the interaction terms "testing for the significance of a given explanatory variable requires a Wald test of the null hypothesis that both the level and the interaction term can be eliminated. (They) therefore place most weight on the Wald statistics in such cases, paying little attention to the t-statistic on the 'level' terms" (Eastwood and Lipton (2003: 223)).

Table (2): Demography and Poverty: Eastwood and Lipton Results

Explanatory Variables	1	2
Natural Logarithm of Mean Consumption Expenditure	-8.13 (0.93)	-21.94 (3.54)
Net Birth Rate Lagged 10 years from Year of Survey(= crude birth rate lagged 10 years minus infant mortality rate lagged 10 years)	3.41 (3.32)	
Population Growth Rate Lagged 10 years from Year of Survey		24.85 (2.39)
[Natural Logarithm of Mean Consumption Expenditure][Net Birth Rate Lagged 10 Years]	-0.64 (2.67)	
[Natural Logarithm of Mean Consumption Expenditure][Population Growth Rate Lagged 10 Years]		-4.37 (1.84)
Dummy for Latin America	9.97 (3.78)	8.69 (3.13)
Adjusted R-Squared	0.854	0.843
Wald Test for Mean Consumption Expenditure	198.0 (0)	234.9 (0)
Wald Test for Demographic Variable	31.6 (0)	25.76 (0)

Source: Eastwood and Lipton (2003: table 9.2, p. 224)

Note that the specification of the regression equation allows the authors to have a poverty elasticity of growth that varies with the demographic variable due to the interaction term and the semi-logarithmic format. Similarly, the estimated coefficients are not directly interpretable as marginal effects of demography. The marginal effects of demography on poverty depend on the level of per capita consumption expenditure per person. This, of course, is an attractive feature. As a result marginal effects of demography on the incidence of poverty are calculated for various percentiles of the distribution of consumption expenditure. Thus, for example, the marginal effect of an increase in the net birth rate at the median of the logarithm of mean consumption expenditure "is of the order of 0.6"; that at the 25th percentile is of the order of 0.85"; and that at the 75th percentile is of the order of 0.33". Similarly, the marginal effect of an increase in the population growth rate at the median of the logarithm of mean consumption expenditure is of the order of 5.7; that at the 25th percentile is of the order of 7.4; and that at the 75th percentile is of the order of 3.8 (see Eastwood and Lipton (2003: table 9.3: p. 227).

Putting the above results in context, it is predicted that a hypothetical median country "would attain, by virtue of a the fall of 4 per 1000 in the net birth rate in the pre-survey decade, a fall of 2.4 percent" in the head-count ratio "via the distribution channel alone"!!! "For a country at the 25th percentile of the (consumption distribution), the predicted fall would be about 3.4 percent"[13].

Despite the excitement of the authors with their results a careful scrutiny of their results would show that their specification of the poverty equation is problematic in the sense that it concentrates on only one of the fundamental determinants of poverty (i.e. per capita consumption expenditure) and ignores the other (i.e. any measure of the inequality in the distribution of consumption expenditure such as the Gini coefficient). In what follows we show that appropriately specifying the poverty equation gives rise to results which are distinctly different from those of Eastwood

[13] These results are obtained by multiplying the fall in the net birth rate of 4 per thousand by the calculated marginal effects.

and Lipton (2003). The data set we use is from Dollar and Kraay (2002) and the details of the variables used are presented in the appendix to this paper. We hasten to note that we calculated the poverty related variables from the distribution information in the Dollar and Kraay data set where we allowed the poverty line to change with standard of living. The population growth rate is the 10 year average preceding the survey for each of the countries involved. The tables present the results for the appropriately specified poverty equation where the natural logarithm of the poverty measures is regressed on its fundamental determinants (i.e. the consumption expenditure/poverty line ratio and the Gini coefficient) before we introduce the population growth variable and its interaction with each of the fundamental determinants. Two specifications for the logarithm of the poverty measure are reported: a linear and a logarithmic function. Absolute t-values, which are White heteroskedasticity-consistent, are reported between brackets, and where as usual stars over the bracketed t-values indicate the standard levels of significance with one star meaning significance at the 1 percent level or better and three stars indicating significance at the 10 percent level[14]. Table (3) reports the results for the spread of poverty where the poverty measure is the head-count ratio.

Table (3): Population Growth and the Spread of Poverty

Explanatory Variable	1	2	3	4	5	6	7	8
Consumption Expenditure/Poverty Line Ratio (?= µ/z)	-0.6681 (12.4)*	-0.6759 (11.6)*	-0.3022 (1.5)	-0.6991 (12.9)*				
Gini Coefficient	0.0358 (6.1)*	0.0359 (6.2)*	0.0347 (5.8)*	0.0774 (6.3)*				
Ln (?= µ/z)					-1.3230 (12.9)*	-1.3377 (11.7)*	-0.7461 (1.6)	-1.3657 (12.5)*
Ln Gini Coefficient					1.5619 (5.9)*	1.5659 (5.9)*	1.5344 (5.7)*	3.1703 (5.3)*
Population Growth Rate		-0.0171 (0.3)	0.3202 (1.7)***	0.7483 (3.2)*		-0.0166 (0.3)	0.1693 (1.2)	2.4881 (2.6)**
[Population Growth Rate][(?= µ/z)]			-0.1397 (1.6)				-0.2180 (1.2)	
[Population Growth Rate][Gini Coefficient]				-0.0170 (3.1)*				
[Population Growth Rate][Ln (?= µ/z)] [Population Growth Rate][Ln Gini Coefficient]								-0.6603 (2.6)**
Constant	3.2262 (12.6)*	3.2806 (9.4)*	2.4061 (4.9)*	1.4566 (2.8)*	-1.5959 (1.6)	-1.5594 (1.5)	-1.9632 (1.8)***	-7.6286 (3.4)*
Adjusted R-Squared	0.8052	0.8004	0.8069	0.8442	0.8079	0.8032	0.8041	0.8324

[14] Note that the t-values are approximated to the first decimal. In the text we will report the p-values whenever that is helpful.

Columns (1-4) report the results for the linear format for the explanatory variables. The first column gives the fundamental poverty equation. The results confirm our expectations, at a statistically significant level, that an increase in per capita consumption expenditure, other things remaining the same, reduces the spread of poverty; while a reduction in the Gini coefficient, other things remaining the same, is expected to reduce the spread of poverty. It is important to note, however, that the two fundamental determinants explain about 80 percent of the observed variation in measured poverty in the sample. Column 2 adds the population growth rate showing that, other things remaining the same, an increase in the population growth rate reduces the spread of poverty! This effect, however, is statistically insignificant implying that at this level of aggregation demographic considerations do not affect the spread of poverty. Note also that adding the demographic dimension does not improve the explanatory power of the estimated equation. Column 3 keeps the population growth rate in addition to interacting it with the standard of living variable. As is clear from the results the standard of living variable loses its significance on its own while the Gini coefficient continues to be a significant determinant of the spread of poverty. The population growth rate becomes significant on its own (at the 10 percent level of significance) such that, other things remaining the same including the interaction term, an increase in the population growth rate will be expected to increase the spread of poverty. The interaction term between population growth and the standard of living variable is border-line significant at the 10 percent level (with a p-value of 0.1023). Thus, the marginal effect of the population growth rate on the spread of poverty depends on the stage of development of the country as proxied by the standard of living variable and is given by (0.3202 – 0.1397?): the higher the stage of development the lower is the impact of population growth on the spread of poverty. Indeed it is an easy matter to show that population growth will be neutral for a value of ?=2.29. Column 4 introduces the interaction term between the population growth rate and the Gini coefficient. In this equation all estimated coefficients are significant at the 1 percent level or better. Moreover, the variables in question seem to provide more explanation compared to the fundamental equation of the first three columns, albeit a marginal increase in the adjusted r-squared. In this equation an increase in the rate of population growth on its own, other things remaining the same including the interaction term, is expected to increase the spread of poverty. However, the marginal effect of the population growth rate depends on the degree of inequality in the distribution of consumption expenditure, and is given by (0.7483 – 0.017 ?). For a Gini coefficient of 44.02 percent demographic variables are neutral with respect to the spread of poverty.

Columns (5-8) report the results for the log-linear format for the explanatory variables. Column 5 gives the fundamental poverty equation. Under this format the estimated coefficients of the fundamental determinants give the partial elasticity of the head-count ratio with respect to each of its two determinants. The results confirm our expectations, at a statistically significant level, that an increase in per capita consumption expenditure, other things remaining the same, reduces the spread of poverty; while a reduction in the Gini coefficient, other things remaining the same, is expected to reduce the spread of poverty. It is important to note, once again, that the two fundamental determinants explain about 81 percent of the observed variation in measured poverty in the sample. Moreover, it may be instructive to note that though the absolute value of income elasticity of the head-count ratio (1.32) is lower than that of the distribution elasticity (1.56) , in general the head-count ratio is not very sensitive to the inequality dimension. Column 6 adds the population growth rate showing that, other things remaining the same, an increase in the population growth rate reduces the spread of poverty! This effect, once again, is statistically insignificant implying that at this level of aggregation demographic considerations do not affect the spread of poverty. Note also that adding the demographic dimension does not improve the explanatory power of the estimated equation. Column 7 keeps the population growth rate in addition to interacting it with the logarithm of the standard of living variable. As is clear from the results the standard of living variable loses its significance on its own while the Gini coefficient continues to be a significant determinant of the spread of poverty. The population growth rate, and its interaction with the logarithm of the standard of living, are not significant. Thus, the marginal effect of the population growth rate on the spread of poverty is almost zero. Column 8 introduces the interaction term between the population growth rate and the logarithm of the Gini coefficient. In this equation all estimated coefficients are significant at the 1 and 5 percent levels. Moreover, the variables in question seem to provide more explanation compared to the fundamental double log equation of columns 5-7, albeit a marginal increase in the adjusted r-squared. In this equation an increase in the rate of population growth on its own, other things remaining the same including the interaction term, is expected to increase the spread of poverty. However, the marginal effect of the population growth rate depends on the degree of inequality in the distribution of consumption expenditure, and is given by (0.5305 – 0.012 ?). For a Gini coefficient of 43.85 percent demographic variables are neutral with respect to the spread of poverty.

Results on the interrelationship between population growth and depth of poverty are reported in table (4). The dependent variable is the natural logarithm of the poverty gap ratio. As with the spread of poverty, two specifications for the logarithm of the poverty measure are reported: a linear and a logarithmic function. Absolute t-values, which are White heteroskedasticity-consistent, are reported between brackets, and where as usual stars over the bracketed t-values indicate the standard levels of significance with one star meaning significance at the 1 percent level or better and three stars indicating significance at the 10 percent level[15].

[15] Note that the t-values are approximated to the first decimal. In the text we will report the p-values whenever that is helpful.

Table (4): Population Growth and the Depth of Poverty

Explanatory Variable	1	2	3	4	5	6	7	8
Consumption Expenditure/Poverty Line Ratio (μ/z)	-0.8752 (8.8)*	-0.9252 (9.4)*	-0.3364 (0.4)	-0.9692 (11.1)*				
Gini Coefficient	0.0628 (5.6)*	0.0635 (5.8)*	0.0616 (5.3)*	0.1423 (5.1)*				
Ln (μ/z)					-1.7341 (9.3)*	-1.8184 (9.7)*	-0.9030 (1.0)	-1.8874 (10.8)*
Ln Gini Coefficient					2.7921 (5.5)*	2.8184 (5.7)*	2.7689 (5.3)*	6.0185 (4.7)*
Population Growth Rate		-0.1098 (1.1)	0.4215 (1.2)	1.3438 (2.7)*		-0.1095 (1.1)	0.1822 (0.7)	4.8862 (2.5)**
[Population Growth Rate][μ/z]			-0.2201 (1.3)					
[Population Growth Rate][Gini Coefficient]				-0.0322 (2.8)*				
[Population Growth Rate][Ln μ/z]							-0.3422 (0.9)	
[Population Growth Rate][Ln Gini Coefficient]								-1.3171 (2.5)**
Constant	1.3515 (2.8)*	1.7015 (2.5)**	0.3239 (0.4)	-1.7629 (1.6)	-7.0770 (3.7)*	-6.8346 (3.4)*	-7.4693 (3.7)*	-18.9408 (3.9)*
Adjusted R-Squared	0.6773	0.6780	0.6817	0.7445	0.6797	0.6804	0.6782	0.7299

Columns (1-4) of table (4) report the results for the linear format for the explanatory variables. The first column gives the fundamental poverty equation. The results confirm our expectations, at a statistically significant level, that an increase in per capita consumption expenditure, other things remaining the same, reduces the depth of poverty; while a reduction in the Gini coefficient, other things remaining the same, is expected to reduce the depth of poverty. The two fundamental determinants explain about 68 percent of the observed variation in measured poverty in the sample. Column 2 adds the population growth rate showing that, other things remaining the same, an increase in the population growth rate reduces the depth of poverty! This effect, however, is statistically insignificant implying that at this level demographic considerations do not affect the depth of poverty. Note also that adding the demographic dimension does not improve the explanatory power of the estimated equation. Column 3 keeps the population growth rate and adds its interaction with the standard of living variable. As is clear from the results the standard of living variable loses its significance on its own while the Gini coefficient continues to be a significant determinant of the depth of poverty. The coefficients of the population growth rate, and its interaction with the standard of living variable, are statistically insignificant. Thus, the depth of poverty does not seem to be sensitive to demographic variables through the channel of the standard of living. Column 4 introduces the interaction term between the population growth rate and the Gini coefficient. In this equation all estimated coefficients of the explanatory variables are significant at the 1 percent level or better. Moreover, the variables in question seem to provide more explanation compared to the fundamental equation of the first three columns, albeit a marginal increase in the adjusted r-squared. In this equation an increase in the rate of population growth on its own, other things remaining the same including the interaction term, is expected to increase the depth of poverty. However, the marginal effect of the population growth rate depends on the degree of inequality in the distribution of consumption expenditure, and is given by (1.3438 – 0.0323 ?). For a Gini coefficient of 41.6 percent demographic variables are neutral with respect to the depth of poverty.

Columns (5-8) report the results for the log-linear format for the explanatory variables. Column 5 gives the fundamental poverty equation. Under this format the estimated coefficients of the fundamental determinants give the partial elasticity of the poverty-gap ratio with respect to each of its two determinants. The results confirm our expectations, at a statistically significant level, that an increase in per capita consumption expenditure, other things remaining the same, reduces the depth of poverty; while a reduction in the Gini coefficient, other things remaining the same, is expected to reduce the depth of poverty. It is important to note, once again, that the two fundamental determinants explain about 68 percent of the observed variation in measured poverty in the sample. Moreover, it may be instructive to note that the absolute value of income elasticity of the poverty-gap ratio (1.73) is almost half that of the distribution elasticity (2.79); both suggesting that the depth of poverty is general more sensitive than the spread of poverty with respect to the two fundamental determinants of poverty. Column 6 adds the population growth rate showing that, other things remaining the same, an increase in the population growth rate reduces the depth of poverty! This effect, once again, is statistically insignificant implying that at this level demographic considerations do not affect the depth of poverty. Note also that adding the demographic dimension does not improve the explanatory power of the estimated equation. Column 7 keeps the population growth rate in addition to interacting it with the logarithm of the standard of living variable. As is clear from the results the standard of living variable loses its significance on its own while the Gini coefficient continues to be a significant determinant of the depth of poverty. The population growth rate, and its interaction with the logarithm of the standard of living, are not significant. Thus, the marginal effect of the population growth rate on the depth of poverty is almost zero. Column 8 introduces the interaction term between the population growth rate and the logarithm of the Gini coefficient. In this equation all estimated coefficients are significant at the 1 and 5 percent levels. Moreover, the variables in question seem to provide more explanation compared to the fundamental double log equation of columns 5-7, albeit a marginal increase in the adjusted r-squared. In this equation an increase in the rate of population growth on its own, other things remaining the same including the interaction term, is expected to increase the depth of poverty. However, the marginal effect of the population growth rate depends on the degree of inequality in the distribution of consumption expenditure, and is given by (4.8862 – 1.3171?). For a Gini coefficient of 40.85 percent demographic variables are neutral with respect to the depth of poverty.

VI. The Micro Dimension:

Within the context of the unifying framework the micro, household level, interrelationships between demographic variables, income distribution and poverty, can be explored through poverty profiles. Poverty profiles reveal differences in the relative poverty of certain sub-groups of the population, and analysis of the poverty profiles is essential for understanding the causes of poverty Such profiles could be descriptive or causal.

Following the identification of the poor, by using an appropriately calculated poverty line, a poverty profile can be constructed using the available information in the household budget survey. A descriptive poverty profile is constructed by comparing the poor and the non-poor households on the basis of a number of dimensions. Examples of the dimensions involved include:

(i) Household Composition and Headship: (e.g. average size of household; age composition of households; working members; dependency ratios; gender of the head of the household; and, income of the head of household by gender);

(ii) Dwelling Characteristics: (e.g. ownership of dwellings; and, structure of dwellings);

(iii) Education: (e.g. average years of schooling and literacy by sector and gender; and, reasons for leaving school);

(iv) Labor Force Participation and Unemployment: (e.g. participation rates; unemployment rates; students and those non-available for work);

(v) Distribution of Labor Force: (e.g. by sector, gender and type of employment: casual labor, farming , salaried work, self emp loyment, and unemployed);

(vi) Poverty Levels by Industry of Employment: (poverty measures by the industry of employment of the head of the household: agriculture and forestry, manufacturing, construction, trade, community services);

(vii) Child Health (e.g. immunization of 1-5 year old children, by gender);

(viii) Inter-household Transfers: (e.g. cash and in-kind transfers to and from households);

(ix) Agricultural Land Holdings: (e.g. poverty measures for households differentiated by their access to, or use of, agricultural land); and,

(x) Access to Community Facilities: (e.g. access measured as time taken to reach facilities: different types of school, hospital, market, agricultural services, agricultural cooperative, village (savings) bank, commercial bank).

A main limitation of the descriptive poverty profile is that, while it gives information on who are the poor, it cannot be used to identify the determinants of poverty, and as such cannot address policy questions.

For the purposes of policy analysis a causal relationship needs to be established between the various household characteristics and the probability of being poor. A number of alternative specifications are available for estimating such a causal relationship using regression techniques. To explore the marginal effects of each of the various factors causing poverty a linear regression specification has recently gained general acceptance.

Under a linear specification the dependent variable is the logarithm of per capita consumption expenditure as a ratio of the poverty line (defined in section II as the standard of living ratio), so that the poverty status of households is identified by the ratio in question with values close to one indicating that the household is in the immediate neighborhood of the poverty line. Denoting the vector of household characteristics by X, the estimating equation can be written as:

(11) $\text{Log}\ (?_i) = a + S_j\, \beta_j X_{ji}$

The vector of household characteristics, X, may include the following broad categories:

(i) geographic location: (e.g. states or regions);

(ii) demographic variables: (e.g. household size, number of infants and children, age and gender of breadwinner, marital status of the breadwinner); and,

(iii) socio-economic variables: (e.g. educational status of head of household, literacy status of spouse, employment status of the head of household, sector of employment, receipt of remittances). The above equation can be estimated for sector of residence (i.e. rural urban) and for the national level.

An example of the results of using the poverty profile to explore the interrelationship between demographic variables and poverty is presented in table (5). The profiles are derived from quintile information provided by the World Bank (2000: 383-404) for 22 Sub-Saharan African (SSA) countries[16]. The information is provided for rural and urban sectors. For each quintile, in each sector, we computed the ratio of mean consumption expenditure to the poverty line (assumed to be equal to 0.67 of sectoral mean consumption expenditure). For demographic variables we used the age dependency ratio (in percentages), and the average size of the household (number of persons per household). Other explanatory variables used are the employment rate

[16] The countries involved are Burkina Faso (with a survey for 1994/95); CAR (1993); Cote d'Ivoire (1995); Djibouti (1996); Ethiopia (1995/96); Gambia (1992); Ghana (1997); Guinea (1994/95); Guinea Bissau (1992); Kenya (1994); Madagascar (1993/94); Mali (1994); Mauritania (1995); Niger (1995); Nigeria (1992); Senegal (1994/95); Sierra Leone (1989/90); South Africa (1993); Swaziland (1994); Tanzania (1993); Uganda (1992/93); and Zimbabwe (1996).

(percentage of members employed), access to sanitation (percentage of households), and access to piped water (percentage of households). Table (5) reports our estimation results where figures between brackets are White-heteroskedasticity-consistent absolute t-values, and where the total number of observations for the rural sector is 110 while that the urban sector is 70.

Table (5): Demographic Variable and Poverty Profiles in Sub-Saharan Africa

Explanatory Variables	Rural Sector	Urban Sector
Age Dependency Ratio	-0.0123 (3.3)*	-0.0108 (1.8)***
Average Household Size	-0.1136 (3.0)*	-0.11102 (2.5)**
Proportion of Employed Persons	0.0080 (2.7)*	0.0102 (1.7)***
Access to Sanitation	0.0026 (1.1)	0.0028 (0.8)
Access to Piped Water	0.0020 (0.42)	0.0033 (0.7)
Constant	1.6630 (4.3)*	0.7929 (1.20)
Adjusted R-squared	0.4121	0.3573

The above results confirm our prior expectation with respect to the interrelationship between the various categories of explanatory variables and poverty. The results for the rural sector show that the coefficients of the population related variables are significantly different from zero at the conventional one percent level of significance. Surprisingly, the coefficients of the health related variable (access to sanitation and access to piped water) are not significantly different from zero. The estimated equation explains about 41% of the observed variation in the consumption/poverty line ratio among the quintiles in the 22 countries. For the demographic variables it is clear that a decline by about ten percentage points in the age dependency ratio is likely to increase the consumption poverty line ratio by 0.12 percent, thus resulting in a decline of any poverty measure by [0.12][the poverty elasticity with respect to consumption expenditure]. Similarly, a decline in the size of the household by one member is expected to increase the consumption poverty line ratio by 0.11 percent, thus leading to a decline in any poverty by [0.11][the poverty elasticity with respect to consumption expenditure].

The results for the urban sector, given by the third column in the above table are almost identical to those for the rural sector save for the level of significance of the estimated coefficients. The coefficients of the age dependency ratio, and the proportion of people employed are significant at the 10 percent level while that for the average household size is significant at the 5% level. The estimated equation explains about 36% of the observed variation in the consumption/poverty line ratio among the quintiles in the 22 countries. For the demographic variables it is clear that a decline by about ten percentage points in the age dependency ratio is likely to increase the consumption poverty line ratio by 0.11 percent, thus resulting in a decline of any poverty measure by [0.11][the poverty elasticity with respect to consumption expenditure]. Similarly, a decline in the size of the household by one member is expected to increase the consumption poverty line ratio by 0.11 percent, thus leading to a decline in any poverty by [0.11][the poverty elasticity with respect to consumption expenditure].

VII. Concluding Remarks:

In this paper we reviewed the evidence on the interrelationship between demography, growth, income distribution and poverty. We suggested that at the macro level such interrelationships could be explored in the context of the standard money metric approach to poverty analysis. In a sense this is an obvious suggestion in view of the fact that the identification of the poor requires information on the distribution of consumption expenditure so that automatically issues of income distribution are taken into account. Further, changes in poverty over time could easily account for population change especially if the time periods involved are fairly long. Changes in poverty over time involve a growth component and a distribution component. As a result it not surprising to note that most of the empirical literature forged the link between demography, growth, income distribution and poverty by looking at the ways and means by which population change can be introduced in standard empirical growth models. It is through these models, and mechanisms such as the Kuznets hypothesis, that the link with distribution is investigated. It is also suggested that the link between population structure and poverty, given the distribution, can be investigated at the micro level through the use of causal poverty profiles. Such micro links are also aggregative in nature; but it seems that they are the best we have given the data limitation.

With respect to these problematic micro links it is perhaps important to note the in his review of the micro aspects of population change and development Behrman (2003: 387) notes that "good empirical estimates of the underlying micro relations are very difficult to obtain. One basic problem is that behavioral data, rather than experimental data, generally must be used ". An example of he reviewed empirical aspects include the impact of schooling on population change and productivity (i.e. the rates of return to schooling: including their level, trend over time, gender differentials, behavior with respect to schooling level and level of income, and the comparison of private and social returns). The international compilation of results from this type of literature has been "used by many for increasing policy support, particularly for basic (primary and lower secondary) schooling and particularly for females. But the systematic empirical basis for these policy recommendations is weak" (Behrman (2003: 390).

Another example of the reviewed evidence from a micro perspective deals with the question of whether increased non-earned resources at the disposal of women will result in better quality of children in terms of education, health and nutrition. Not surprisingly the cases cited were based on detailed unit record data for households in two countries (Brazil 25000 urban households; and, Thailand 8000 households). These studies have direct relevance to the household decision model noted in section (II) of this paper. They may hold a promising avenue for investigation for SSA, provided relevant data could be accessed.

Despite the difficulties associated with the availability of relevant data for micro investigation of the linkages between demography, growth, income distribution and poverty, it seems reasonable to suggest that there is room for designing special survey instruments to capture the nature of African household decisions in the context of HIV/AIDS epidemic.

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Appendix (A.1) : Demography and Poverty Data Set

Country	Survey Year	Head-count Ratio (H; %)	Poverty-Gap Ratio (P; %)	GINI (%)	Per Capita Expenditure (µ; US$)	Population Growth Rate (%)	Poverty Line (z; US$)
BDI	1992	39.51	11.03	33.33	540	2.97	372
BFA	1994	72.57	34.36	48.2	384	2.71	372
BOL	1990	13.54	2.26	42.04	1272	2.2	420
BRA	1993	37.96	18.92	61.55	2400	1.88	804
CHN	1990	28.15	8.16	34.6	660	1.44	372
CIV	1993	21.38	5.16	36.91	792	3.79	372
COL	1995	28.56	11.91	57.4	2496	2.02	828
CRI	1996	23.57	8.13	47.08	2172	2.55	720
DOM	1989	24.35	8.17	50.46	1860	2.22	624
ECU	1994	17.93	5	43	1968	2.35	660
ETH	1995	59.21	20.63	40	264	2.67	216
GIN	1991	46.7	24.12	46.8	552	2.7	372
GNB	1991	57.91	33.04	56.12	504	2.53	372
GTM	1987	32.69	13.21	58.26	1776	2.42	588
GUY	1993	20.14	6.62	40.22	828	0.73	372
HND	1996	35.42	15.79	53.72	912	2.95	372
JAM	1993	10.45	1.58	37.92	1404	0.94	504
JOR	1991	12.29	2.96	40.66	1908	3.74	636
LSO	1993	35.78	17.64	57.94	1092	0.58	372
MDG	1993	49.29	17.44	46.85	540	2.86	372
MLI	1994	70.37	34.56	50.5	396	2.5	372
MNG	1995	16.98	4.78	33.2	816	1.82	372
MRT	1993	44.72	15.59	50.05	660	2.34	372
NER	1992	58.09	18.91	36.1	336	3.12	288
NGA	1991	42.24	19.01	37.02	600	2.8	372
NIC	1993	23.62	8.45	50.3	1104	2.47	372
NPL	1995	11.03	1.42	38.78	900	2.42	372
PAN	1995	32.45	16.74	57.07	1968	2.06	660
PER	1994	19.08	5.09	42.76	1788	2.08	660
PHL	1991	21.76	4.94	46.08	1236	2.39	408
PRY	1991	14.19	2.7	59.13	1632	3.02	552
SEN	1991	35.45	15.94	54.12	900	2.91	372
SLV	1989	22.18	14.25	48.96	1500	1.07	504
THA	1992	22.21	8.07	51.5	2124	1.57	708
TUN	1990	11.01	3.32	40.2	1692	2.47	564
TUR	1994	18.13	5.06	49	2460	2.14	828
TZA	1991	52.75	18.27	59.01	492	3.31	372
YEM	1992	45.01	16.31	39.5	528	4.05	372
ZAF	1993	40.5	19.72	62.3	1884	2.34	636
ZMB	1991	64.01	27.12	43.51	408	3.2	372
ZWE	1990	50.98	21.42	56.83	744	3.67	372