Poverty and Growth:

The Costarican Example

Rolf Schinke

Ibero-American Institute for Economic Research

University of Goettingen, Germany

ABSTRACT

The role of growth in poverty reduction is analysed using Costa Rica as a case study. Estimation results are presented. Income elasticity of the headcount index varied between –2 and –3 depending on the model specification. Growth rates were found to have a significant positive influence on poverty when the poverty line was used as predetermined variable. However, when substituting the poverty line for the Gini coefficient the growth variables had a negative and partly significant influence on growth. A tentative explanation is given for this result.

1. Some Earlier Results

Since the eighties there has been a revival of poverty issues. One of the yet unresolved questions has been how important is the growth of income per capita on the reduction of poverty. The aim of this paper is to shed some light on this problem.

The results of recent research on the poverty-income relationship are:

a) Usually, the elasticity of poverty with respect to income is negative and relatively high. Using a common fixed poverty line of 1 $PPP1985 *1* per day Ravallion (1995) found an elasticity of the headcount index with respect to per capita consumption of –2.4. In their study, Sautter/Schinke (1995) analysed the poverty-income relationship for seven countries from the seventies to the nineties. The resulting elasticity of the headcount index with respect to income was in the range of –3.5 for Bangladesh to –0.45 for India. The mean for seven countries was around –2. *2*

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1 In his sample all variables were converted to US-Dollars adjusted for purchasing power parities (PPP) of 1985.

2 The countries under study and their respective income elasticities of poverty (in parentheses) were: Bangladesh (-3.5), Brazil (-1.8), China (-1.59), Costa Rica (-3.12), India (-0.45), Indonesia (-1.58), and Malaysia (-2.1).

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b) Development of poverty follows a cyclical pattern (de Janvry/Sadoulet, 1996), rising strongly

during the recession period of the eighties and declining during periods of growth with growth occurring after the recession period being more effective in poverty reduction than that occurred before the recession;

c) the rate of change of the Gini coefficient influences positively the rate of poverty change (de Janvry/Sadoulet, 1996).

Ravallion's result was obtained from a cross section of 33 countries. Results b) and c) were obtained from a cross section analysis of growth spells defined as periods of uninterrupted growth or recession. All types of analyses mentioned above are not without problems. Common to all is that they do not observe the influence of changes in the poverty line which varies in scope and in value even within a country at different, sometimes even at the same point in time. Other things being equal poverty lines depend positively on per capita consumption (Ravallion, Dutt, v.d. Walle, 1991). This has to be accounted for in empirical analyses of the poverty - income relationship. The same holds for the influence of the Gini coefficient that had been neglected in Sautter/Schinke (1995). Further, simultaneity problems may occur when the Gini coefficient and the poverty line are used to explain poverty.

Generally, the idea behind cross section analyses of developing countries is that for a representative country they reflect the development of certain variables implying that in the course of economic development an individual hypothetical country passes through the developmental stages characteristic for the countries observed in the analyses. As results from time series analyses for individual countries usually deviate from those of a cross section of countries, it seems necessary to investigate the poverty-income relationship in a time series context as well. For this reason an analysis of a single country's experience over a period of more than 20 years is analysed in this paper. The country chosen is Costa Rica. Besides data availability and familiarity with this country its particular orientation towards social objectives was responsible for choosing it as a case study.

By Latin American standards Costa Rica has a rather low Gini coefficient during the period for which reliable data are available.*3* Further, its headcount index was exceptionally low relative to its level of income (Morley, 1994; Lustig, 1995). Despite these good initial conditions Costa Rica experienced a serious increase in poverty during the period of economic recession which comprise the years from 1980 to 1985 while later on poverty declined when growth resumed. In fact, this country's headcount index seems to show the cyclical pattern that de Janvry/Sadoulet (1996) found in their study. It was therefore interesting to analyse this case to see whether this seemingly cyclical pattern could be observed as well as the result of a multiple regression analysis.

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3 Using the data from Deininger/Squire (1996) Costa Rica's average Gini coefficient was 46 during the last four decades.

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2. The Model

To gain insight into the poverty - income relationship the following model is used. Basically, it consists of three equations. In the first of them it is assumed that the measure of poverty - the headcount index (HCI_{it}) - is a function of per capita income (PCY_{it}), the growth rate of GDP per capita ($PCYGROW_{it}$) the poverty line (Z_{it}), and the Gini coefficient ($GINI_{it}$) of country i (which is Costa Rica in this case) in period t

$$(1)\ HCI_{it} = H(PCY_{it}, PCYGROW_{it}, GINI_{it}) \text{ or}$$

or

$$(1')\ HCI_{it} = H'(PCY_{it}, PCYGROW_{it}, Z_{it})$$

where $H_{PCY} < 0$; $H_{PCYGROW} < 0$; $H_Z > 0$ and $H_{GINI} > 0$

It is necessary to distinguish between both equations (1) and (1') as in HCI=H''(PCY_{it}, Z_{it}, $DISTRIBUTION_{it}$) which is a combination of both when $PCYGROW_{it}$ is excluded and a comprehensive measure of the distribution of income ($DISTRIBUTION_{it}$) substitutes for $GINI_{it}$, the headcount index would result by definition. This is shown in graph 1 which will be explained later in this section. The expected signs in equations (1) and (1') are evident. At higher incomes per capita one should expect a lower level of poverty. Richer societies dispose of the means necessary to implement policy measures aimed at lowering poverty. The signs of the poverty line Z_{it} in (1) and of the Gini coefficient in (1') are expected to be positive as a rise of either will increase poverty. Finally, growth of GDP per capita ($PCYGROW_{it}$) may lower poverty, when the poor share growth accordingly. Therefore, one would expect that the growth variable has a negative sign. As de Janvry/Sadoulet (1996) demonstrated in Latin America growth occurring in different periods will not have the same poverty reducing effect. They showed that the elasticity of rural poverty with respect to income growth was different in the periods of early growth, recession and late growth. Compared with growth occurring after adjustment and reforms (the late growth period) growth before the crisis in Latin America was less efficient in reducing poverty while during the years of recession negative growth led to an increase in poverty. Using dummy variables of growth rates for the different periods where the dummy equals the growth rate of per capita income in the respective period and is zero otherwise one should expect negative signs for all sub-periods (early growth, recession *4*, and late growth). If late growth is more efficient than early growth in reducing poverty, the coefficient of the late growth dummy should exceed that of early growth in absolute terms.

With respect to the poverty line (Z_{it}) oH(PCY, GINI)

when an exogenously determined poverty line of say 31$ or 23$ (measured at purchasing power parities of 1985) is given and unique for all countries analyzed. As before, it is assumed that HPCY < 0 and HGINI > 0.

When the poverty line (Z) is income dependent, i.e. rising when income rises, Z may be defined as

$$(2)\ Z = Z(PCY, \Delta D)$$

ne should expect that its rise will increase the headcount index when the distribution is unchanged. Assuming the Z_{it} represents a well-defined minimum level of welfare, an increase in Z_{it} is inevitable as a rise in income per head and net capital inflows lead to an increase in the prices of nontradables, thus reducing the level of real income that reflects the poverty line. This is of particular importance when nontradables have a relatively high weight in

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4 A negative sign of the coefficient of the recession dummy implies an increase in poverty as, with the exception of one observation, growth rates were negative during the years of recession.

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the consumption basket of the poor and when the income elasticity of the price ratio of nontradables to tradables is positive and increases in the relevant income brackets.*5* There are two reasons why the price of nontradables increases vis-à-vis those of tradables. The first of them is seen in the lower productivity increases in the production of nontradables. In countries where labour productivity is low international competition assures that the wage rates in the tradables sector must be low. Usually, in this situation, wage rates in the nontradables sector are low as well even though between less developed and advanced countries productivity differs to a lesser extent in this sector. In the course of economic development it is expected that labour productivity predominantly increases in the tradables sector raising wage rates throughout the country while in the nontradables sector productivity increases at a slower rate. As a result of this process the prices of nontradable goods will increase relative to that of tradables.

Another reason why the prices of nontradables increase relatively to that of tradables is the net inflow of capital observed in many countries during the seventies and the eighties and then again in the case of the emerging countries during the nineties. When net capital inflows have their counterpart in net imports the result is a massive real appreciation of the capital importing country's currency implying once again serious increases in the relative price of nontradables (Schinke, 1995). Therefore, one might expect an increase in the poverty line when income per capita increases and/or when there are massive inflows of foreign capital (ΔD_{it}).

The converse holds for inequality. When the consumption basket that is representative of the demand of the poor differs strongly from that of the rich then with higher inequality, demand is increasingly directed to the goods demanded by the rich thus lowering the prices of goods in the poor's consumption basket. When this effect is accounted for in the poverty line one should expect a fall in Z_{it} when income distribution (measured by the Gini coefficient ($GINI_{it}$) worsens. Therefore, the poverty line function is given by

(2) $Z_{it} = Z(PCY_{it}, \Delta D_{it}, GINI_{it})$.

As explained above $Z_{pcy} > 0$, $Z\Delta_{D} > 0$, and $Z_{gini} < 0$ should hold.

Finally, the Gini coefficient has to be introduced into the system of equations. It is hypothesised that the development of the inflation rate (P'_{it}), the population growth rate (PGR_{it}), human capital (HC_{it}), income per capita (PCY_{it}), and the headcount index (HCI_{it}) are the main determinants of the income distribution, measured by the Gini coefficient ($GINI_{it}$):

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5 In Schinke (1995) the price ratio of tradables to nontradables is a function of per capita income (PCY) and net capital inflows (DD): (PT/PNT)i = a0+a1PCYi + a2DDi). Regression analysis of a cross section of countries had the following result: a0 = 3,95 a1 = -0,00064 a2 = - 6,60 where all coefficients were significant at the 1 per cent level. Note, that in this study the inverse of the price ratio is relevant. From this result it can be concluded that the elasticity of the price ratio of nontradables to tradables (PNT/PT) with respect to income is positive and increases progressively with income up to a maximum of about 6000$PPP1985. At higher incomes per capita this elasticity declines.

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(3) $GINI_{it} = G(P'_{it}, PGR_{it}, HC_{it}, PCY_{it}, HCI_{it})$

with $G_{P'} > 0$, $G_{PGR} > 0$, $G_{HC} > 0$, $G_{HCI} > 0$ $G_{PCY} <> 0$ $G_{PCYGROW} <> 0$.

Contrary to the conventional structuralist argument of inflation which assumes that a more unequal distribution of income will lead to higher inflation rates when monetary accommodation of shocks is necessary to avoid undesirable consequences for employment, in this study, it will be argued that the line of causation is primarily from inflation to distribution. High rates of inflation will affect different income groups in very different ways. In the urban sector, an increase in the inflation rate will usually hurt the lower more than the upper deciles of the income distribution as the latter do not depend so much on fixed wage incomes (usually property income is more important in the upper income groups), even when wage contracts are backward-indexed in the lower income groups or the rich dispose of the knowledge necessary to protect themselves against the hazards of inflation. Therefore, it is expected that the Gini coefficient - the measure of inequality that is used throughout in this paper - depends positively on the inflation rate.

The influence of population growth on the distribution of income deserves some explanations. Empirical studies have shown that, within families, the number of children varies inversely with the level of their parents' education. Usually, in LDCs, the better educated parents are, the smaller is the number of children they have. Thus, promoting education, especially that of mothers, is regarded as an efficient tool to decrease the population growth rates. Therefore, low income families that are usually less well educated tend to have more children than families in the upper income range. However, nourishing more members in low income families tends to worsen income distribution. This process is the stronger the higher the population growth rate is. Therefore, one would expect that the Gini coefficient depends positively on the population growth rate.

Incomes are finally the result of the ownership of productive factors like labour, land, and physical as well as human capital. Where human capital is scarce, i.e. where unskilled labour is abundant relative to the stock of physical capital the majority of the population will earn low wage incomes and where property of land and both, physical and human capital, is highly concentrated, a small part of the population will get relatively high incomes from their ownership of productive factors. Therefore, in the long run, the distribution of physical wealth and human capital will determine the distribution of income. In the absence of revolutionary upheavals and revolts that may lead to major changes in the distribution of assets, changes in the wealth distribution will result mainly from the development of human capital.*6* This leads one to expect that in those stages of economic development that are relevant for this

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6 In this context the importance of human capital is to be seen in the fact that by now this factor dominates the discussion of the Kuznets hypothesis. In one line of arguments capital markets imperfections lead to different levels of human capital formation and thus to a wage rate differentiation that is overcome in the process of economic development (Banerji/Newman, 1993; Aghion/Bolton, 1994; Perotti, 1993). Another line stresses the importance of differences in human capital endowment in the early phases of economic development that are necessary to initiate a process of economic growth (Galor/Tsiddon, 1996).

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study the sign of the human capital variable is positive.*7* In the empirical analysis that follows, the

human capital variable has been dropped as variables that capture the stock of human capital are bound to vary more between countries than within a country at different points in time. In time series analyses therefore one would not expect significance of this variable.

The pattern of distribution at different stages of development was a much debated subject since the appearance of Kuznets' paper in 1955. Using the scarce distributional data available at that time, his hypothesis was that income distribution worsens in the early phase of economic development while at higher stages of development income inequality tends to decline. Allowing for this hypothesis would request to introduce an income variable in equation (3). Since 1955 an impressive number of empirical studies have been published that tested his thesis of an inverted "u". While earlier research work seems to give support to the Kuznets thesis (Ahluwalia, 1976; Lindert/Williamson, 1985; Adelman/Robinson, 1989), the more recent publications seem to point to the opposite direction (Anand/Kanbur, 1993; Fields, 1989; Fields/Jacubson, 1993). In view of the yet unresolved question of whether a relationship between distribution and per capita income exists the income variable has been included in the empirical analysis.

The last variable in (3) is the headcount index (HCI_{it}). It has been introduced into the equation as it is by no means clear how the causality between poverty and distribution runs. The questions are still unresolved whether the poor lack income because the distribution is so skewed against them or whether the distribution is unequal because there are so many poor. In view of this insecurity the headcount index was included in equation (3) to explain the Gini coefficient.

Graph 1 is an illustration of this model where it has been assumed that the line of causation between poverty and distribution runs from the Gini coefficient to the headcount index. In this graph the horizontal axis at the bottom and the top horizontal axis measure per capita consumption and per capita income respectively while the vertical axis on the left and that on the right measure the value of the poverty line and the population percentages living below the poverty line (which is equivalent to the headcount index). Central to the reasoning of the model is the consumption dependent poverty line function $Z_t = Z(PCC_t)$. When income rises so does per capita consumption and the poverty line. The exact shape of this line is taken from the estimate in Ravallion/Dutt/van de Walle (1991).*8* When mean consumption is about

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7 Recently, the debate on the causes of inequality in Latin America gained a stimulus from Londoños (1996) finding of a significant lack of human capital in Latin American countries compared with countries of a comparable stage of economic development in the rest of the world. He attributed the - by all international standards - extraordinarily skewed income distribution of this subcontinent to this lack of human capital. His findings were based on a cross section analysis of developing countries regressing the degree of education on income per capita. Comparing fitted with actual educational values he found a systematic negative divergence of Latin American countries. However, this result may be seriously biased because of a simultaneity bias in his regression. Education may explain income as much as it is explained by it. One should therefore expect that the disturbance term is measured incorrectly.

8 The regression result in Ravallion/Dutt/v.d. Walle (1991, p. 348) is Log Zi = 3,077 + 0,00334PCCi -0,0000011PCCi2 where PCCi and Zi are measured in Dollars adjusted for purchasing power parities of 1985. Although this estimate results from a cross section of 33 developing countries their result will be used as being representative for a time series of a hypothetical country that exhibits the peculiarities of the Brazilian distribution of income.

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268 $ per person per month measured in purchasing power parity adjusted dollars of 1985 ($PPP1985 for short) (which is the case at PCC_1), the value of the poverty line is a little less than 50 $PPP1985 per head and month. Mirroring this poverty line level on the top horizontal axis a vertical line reflecting this poverty line (re-scaled according to the top horizontal axis) will intersect the first of the cumulated distribution functions (0) of individual incomes at A. The vertical distance of this point with the bottom horizontal axis measures the headcount index prevailing in this situation. Assuming that per capita consumption grows at a constant rate (which is 30 per cent in graph 1) PCC(1), PCC(2), and PCC(3) are the respective per capita consumption levels in periods 1 to 3. It is further assumed that individual incomes grow at the same rate generating the cumulative distribution functions (1) to (3). The points of intersection of the mirrored vertical poverty lines in periods (1) to (3) with the respective distribution functions of the same periods reflect the development of the headcount index. Line AA' is the locus of these points of intersection. It is interesting to see that this line is u-shaped indicating first a decline and then an increase in the headcount index when incomes grow. As the graph is drawn, a minimum of the headcount index is attained at a per capita consumption of about 410 $PPP1985 per month. The reason why this happens is that at higher levels of per capita consumption the elasticity of the poverty line function with respect to mean consumption exceeds one; the percentage increase in the poverty line exceeds that of per capita consumption. However, the increasing part of line AA' is irrelevant for the purpose of this paper as countries that exhibit a monthly consumption of 410 $PPP1985 already belong to the group of industrial countries. Therefore, for LDCs only the declining part of line AA' is relevant showing that under ceteris paribus conditions of a constant income distribution rising incomes lead to lower headcount indexes even if the poverty line rises with income in a way that lies behind the observable increases of this line in 33 countries.

3. Empirical Results

In Costa Rica the pattern of the headcount index is characterised by several ups and downs in the period under analysis. Declining from 1970 to 1978 then having two maxima, one in 1983 and another in 1988 the Costa Rican headcount index does not show a clear pattern. This result holds for the index at the national level as well as those for rural and urban sectors. The emerging pattern can only partly be explained by the development of income per capita. There is a cyclical co-movement (however in opposite directions) of both the GDP per capita (PCY85) and the headcount index (HCI) until 1983. Later GDP per capita increases while the headcount index reaches another maximum in 1988.

Before explaining the regression results some remarks on the data and on some of the definitions of the variables are necessary. The basic data on the headcount index and poverty lines are taken from Tabatabai (1993). Data for GDP per capita, the inflation rate and other macroeconomic variables are from IMF International Financial Statistics (various issues) and from World Bank CD-ROMs (World Bank, 1995; World Bank, 1996). Deininger's high quality sample was used for data on the Gini coefficient (Deininger/Squire, 1996).

There were two major problems with these data. The first of them results from the fact that frequently several headcount indexes and poverty lines were available for the same year and there were some years without any of these data (1972-76, 1979). Therefore, these data cannot be considered as a genuine time series although some of the variables exhibited time series properties usually found in macroeconomic variables. Despite these problems it was decided not to take them into account as allowing for them would involve a loss of information.

The second issue of concern was the lack of a sufficient number of data for some variables. Although there were 56 observations in the whole sample, scarcity of reliable data for the Gini coefficient and the poverty line resulted in only 10 observations with data for both variables. To overcome this

scarcity it was decided to introduce a proxy variable for the Gini coefficient (GINIEST) created by regressing the Gini coefficient on some of the variables in the system. Using this equation gave estimated Gini coefficients (GINIEST) for the whole sample that could be used in further analyses of the income - poverty relationship.

The systems (1) and (3) or (1') and (2) have been estimated by two stages least squares (TSLS). The results are given in table 1. As explained in the last section the endogenous variables are the headcount index (LHCI), the poverty line (LZ) and the Gini coefficient (all variables in logs). Several specifications have been used to estimate the systems. Column (1) of table 1 shows what is called here to be the basic form of the system where both predetermined variables, the Gini coefficient (LGINIEST) and the poverty line (LZ) have been included. As explained in the last section one should expect biased results caused by a mis-specification of this regression equation. In this first estimate all variables included show the expected signs and are highly significant. When the distribution worsens or the poverty line rises this leads to an increase of the headcount index. Surprisingly high is the elasticity of poverty with respect to income per capita (- 4.19) although this value is in line with elasticities found for other countries (Sautter/Schinke, 1996). It is worth noting the negative value of the dummy for urban headcount indexes (DURBAN). The summary statistics of this regression are quite acceptable. What this regression tells is simply that higher incomes are associated with lower headcount indexes when all other influences are held constant.

As expected, an OLS estimate of this equation failed to pass Ramsey's RESET test. Dropping the Gini coefficient from the equation it passed this test (estimate no. 2' in table 1). It is worth noting a tremendous change in the coefficients of the income per capita between the first and the second estimate. In the latter income elasticity was only two thirds of the first estimation. This elasticity declined further when the poverty line was substituted for the proxy variable of the Gini coefficient (LGINIEST) in estimate no. 3. As this variable is already some kind of an instrumental variable the same equation has been re-estimated by OLS. The result is not reproduced here as it was similar to that of the respective TSLS procedure showing that OLS was an adequate procedure in this case.

The message of these first estimates is relatively simple and clear: When both predetermined variables (LZ and LGINIEST) were included in the regression both, theoretical reasoning and the result of the RESET test in the OLS estimates indicated a mis-specification. Dropping one of the predetermined variables the test was passed. With respect to the summary statistics, up to this stage of the estimation process, inclusion of the poverty line was clearly preferable to that of the Gini coefficient.

At this stage it would be worthwhile to test for the influence of economic growth on poverty. As mentioned above several studies have found a cyclical pattern of the headcount index, declining during periods of growth and rising during recession. When distinguishing between early and late growth, some found that their poverty reducing effect was stronger in later than in earlier growth.

To test for the overall effect of growth, the growth rate of income per capita was included in the equation and the regressions were re-run. Estimate no. 4 shows that when the growth rate was included the results were similar to that of estimate no. 2. However, although being highly significant at the two per cent level, the growth variable did not show the expected sign. According to this estimate, when the Gini coefficient was excluded, growth led to higher poverty levels. The opposite resulted in estimate no. 5. Substituting LGINIEST for LZ the coefficient of the growth rate showed the expected sign but was significant only at the ten per cent level.

In the next step the growth rate for the whole sample was replaced by dummy variables for growth in early (DGEG), recessionary (DGR), and late (DGLG) growth episodes. In nearly the same manner, per capita income was split into two dummies, one for both growth periods (DLPCY85) assuming that the income level has the same influence in both periods of growth and the other for the recession period. In all these cases the dummy variables were built in the same manner, assuming the value of

the respective variable they replace in the periods to which they belong and being zero otherwise. The result of this TSLS regression is shown in column 6. All the dummies for growth periods (DGEG, and DGLG) show the expected sign and are significant at the one or five percent level. The coefficient of the growth variable of the recession period (DGR) has the expected sign but is insignificant. The values of these coefficients are fairly different which seems not to contradict the hypothesis of a cyclical movement of the headcount index. Further, as the coefficient of the late growth variable is smaller in absolute terms than that of early growth, late growth seems to be less efficient in reducing poverty than early growth. This result is clearly inconsistent with that found by de Janvry/Sadoulet (1996). However, when drawing these conclusions one must be careful as the early and late growth coefficients are statistically significantly different from the (insignificant) recession growth dummy but both coefficients of early and late growth are insignificantly different from each other. The same holds for the income level dummies. Both have the expected sign and are significant at the one percent level but are not significantly different from one another.

Evidently, this result is puzzling and only a tentative interpretation can be given here. When growth occurs it may not be neutral with respect to the distribution of income. As the Mexican example demonstrates, the growth process that set in after adjustment, led to extremely high income growth rates of the tenth decile and to shrinking incomes of the lower deciles (Banco Nacional de México, 1994). The result of this was a worsening of the income distribution. When taken in isolation this distribution-worsening effect of growth leads to an increase in the headcount index. However, when this effect is controlled by including the distribution variable in the regression equation, the Gini coefficient takes up the poverty worsening effect while the growth rate can demonstrate its poverty reducing effect.

Despite the unexpected signs of the growth variables in columns nos. 4 and 7, these estimates are preferable to those in columns 5 and 6, as the former have passed the Jarque-Bera test. Failing to pass this test implies that a basic assumption of regression analysis is violated. In view of this result it is difficult not to reject the hypothesis of a counter-cyclical pattern of the headcount index as growth tended to increase poverty in growth and recession periods. Only the explanation given above whereby exclusion of the distribution variable is responsible for the negative effects of growth can be used in favour of the cycle hypothesis. However, to test this explanation is beyond the scope of this paper. Further research needs to be done.

4. Concluding remarks

The policy conclusion that can be drawn from these estimates is that income levels matter for poverty reduction. Far less clear is the role of growth. Admittedly, the results leave room for influences that are not accounted for; the values of the R^2s can be seen as a proof of this. Further, the conclusions to be drawn from this result are only valid for the country under study: Costa Rica. Further research work needs to be done on the income-poverty relationship in other countries of different orientation towards social objectives, foreign trade, and growth.

Poverty has many facets. In this paper the discussion centred around that form of poverty whose main cause is the lack of income. Only when insufficient monetary incomes are responsible for poverty can additional income be a direct part of the solutions to the problem. However, other forms of poverty may profit from increases in income as well, but mostly in a rather indirect manner as higher income levels may provide the means necessary for a more poverty-oriented policy.

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Table 1

Results of Regression Analysis

Dependent Variable:	Log (HCI)							
Method:	TSLS	TSLS	OLS	TSLS	TSLS	TSLS	TSLS	TSLS
Estimate No.	1	2	2'	3	4	5	6	7
Variables:								
LPCY85	-4.19***	-2.67***	-2.02**	-2.08**	-2.77***	-2.13**		-1.95**
DLPCY85							2.98***	
DLPCY85R							3.01***	
LZ	0.56***	0.62***	0.55***		0.80***			0.85***
LGINIEST	3.29***			2.14*		2.25*	4.58***	
PCYGROW					7.15**	-2.80*		
DGEG							-20.60***	-.80
DGR							-2.10	22.78***
DGLG							-16.75**	-18.14*

DURBAN	-0.57***	-0.60***	-0.60***	-0.60***	-0.64***	-0.59***	-0.61***	-0.65***
C	33.39***	28.29***	21.59***	18.71**	27.92***	18.85**	19.93**	18.69*
obs.	23	23	26	53	23	53	53	23
R(adj)2	0.65	0.50	0.51	0.36	0.50	0.38	0.32	0.69
SE	0.26	0.31	0.30	0.35	0.28	0.34	0.36	0.25
MEAN	3.13	3.13	3.13	3.27	3.13	3.27	3.27	3.13
F	11.32	8.73	9.51	11.18	9.67	9.40	6.29	9.89
Prob.	0.0000	0.0008	0.0003	0.0000	0.0002	0.0000	0.0000	0.0001
Jarque-Bera	passed	passed	passed	passed	passed	failed	failed	passed
Instruments:								
LPCY85	yes	yes		yes	yes	yes		yes
INDTYPE	yes	yes		yes	yes	yes	yes	yes
LINFL	yes	yes		yes	yes	yes	yes	yes
PCYGROW	yes	yes		yes	yes	yes	yes	
POP	yes	yes		yes	yes	yes	yes	yes
DURBAN	yes	yes		yes	yes	yes	yes	yes
DRURAL								
GDP85	yes	yes		yes	yes	yes	yes	yes
DPCY85							yes	
DLPCY85R							yes	
DGEG							yes	
DGR							yes	
DGLG							yes	
CAD	yes	yes		yes	yes	yes	yes	yes

Table 1 (continued):

The variables used are:

LHCI Log of headcount index

LPCY85 Log of GDP per capita in Colones of 1985

DLPCY85 Income dummy, LGDP85 from 1970 – 78 and 1986 – 91, zero else

DLPCY85R Income dummy, LGDP85 from 1980 – 85, zero else

LZ Log of poverty line in Colones of 1985

LGINIEST Log of proxy variable for Gini coefficient

PCYGROW Growth rate of GDP per capita in Colones of 1985

DGEG Dummy for early growth, PCYGROW for 1970 – 78, zero else

DGR Dummy for recession, PCYGROW for 1980 – 85, zero else

DGLG Dummy for late growth, PCYGROW for 1986 – 91, zero else

DURBAN Dummy, 1 when headcount index for urban sector, zero else

C Intercept

Indtype Dummy, 1 when poverty index referred to households, zero else

LINFL Log of annual increase in the consumer price index

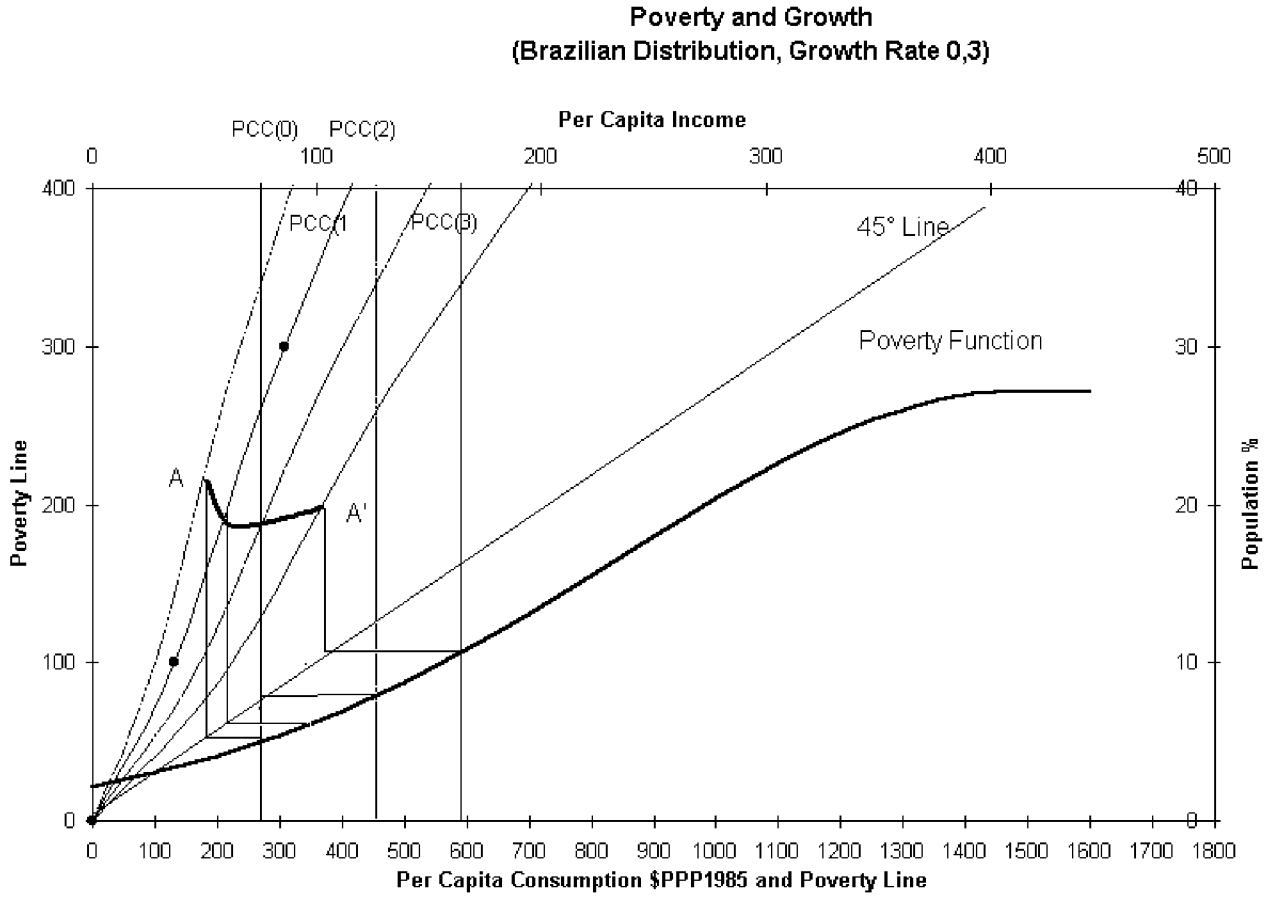
POP Population

CAD Current Account Deficit converted into Colones of 1985

- 45° line | cum.Distrib.(0) | kum.Vert.t(0) | cum.Distrib.(1) | kum.Vert.t(1) | cum.Distrib.(2) | kum.Vert.t(2) | cum.Dis

0	0	0	0	0	0	0	
2000	10	28,16666	10	36,61666	10	47,60166	
4000	30	65,75	30	85,475	30	111,1175	
6000	50	119,5	50	155,35	50	201,955	
8000	70	225,5	70	293,15	70	381,095	
10000	90	906,1666	90	1178,016	90	1531,421	

w(y)= 0,3



Facultad de Ciencias Económicas