INTERNATIONAL
Poverty Centre

United Nations Development Programme

Working Paper number 31 October, 2006

Working Paper

GLOBAL ESTIMATES OF PRO-POOR GROWTH

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Print ISSN: 1812-108X

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ABSTRACT

The main objective of the present paper is to present a cross-country analysis of pro-poor growth in 80 countries in 237 growth spells during the period 1984-2001. To achieve this objective, the paper proposes a new measure of pro-poor growth that captures gains and losses of growth rates due to changes in the distribution of consumption. The gains imply pro-poor growth, while the losses imply anti-poor growth. The statistical test carried out in the paper shows that regional location of countries has a significant association with the pro-poorness of growth. The paper also attempts to test for the association between growth patterns and certain variables that the literature has identified as significant determinants of growth and inequality. Out of many variables, the paper focuses on four, namely, inflation, the share of agriculture in GDP, openness to trade, and the rule of law.

Keywords: Pro-poor growth, growth, poverty, global estimates.

JEL Classification: O40, I32, D31, O53, O57

* We are grateful to Peter Townsend and Dag Ehrenpreis for their helpful comments and suggestions.
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1 INTRODUCTION

In this study, we present a cross-country analysis of pro-poor growth in 80 countries in 237 growth spells during the period 1984-2001. Pro-poor growth is defined as growth that benefits the poor proportionally more than the non-poor. When there is a negative growth rate, growth is defined as pro-poor if the loss from the growth is proportionally less for the poor than for the non-poor. Consistent with this definition of pro-poor growth, we identify whether growth has been pro-poor (or anti-poor) for the 80 countries selected for our study. The study includes all low- and middle-income countries.

The paper proposes a new measure of pro-poor growth that captures gains or losses of the growth rate due to changes in the distribution of consumption. The gains imply pro-poor growth, while the losses imply anti-poor growth. The proposed index can be made operational by utilizing the group data on income distribution, which are now readily available on the website of the World Bank.

The statistical test carried out in the paper shows that the regional location of countries has a significant association with the pro-poorness of growth. Furthermore, the paper attempts to test for the association between growth patterns and a few variables. Out of many variables, the paper focuses on four, namely, inflation, the share of agriculture in GDP, openness to trade, and the rule of law. The paper finds that lower (higher) rates of inflation have a significant relationship with pro-poor (anti-poor) growth. Thus, high inflation may be regarded as detrimental to achieving pro-poor growth. However, we do not find any significant association between other policy variables such as the share of agriculture in GDP, openness to trade, or the rule of law, with the pro-poorness of growth.

The study also finds that in 44.7% of growth spells, per capita growth is negative. What are the factors that lead to positive or negative growth rates? Our empirical results show that the variables – namely share of agriculture in GDP, openness to trade, and the rule of law – tend to have a significant association with when growth is negative or positive.

2 A NEW MEASURE OF PRO-POOR GROWTH

Suppose income x of an individual is a random variable with probability distribution function $F(x)$. Then, $x(p) = F^{-1}(p)$ is the income level at the pth percentile when individuals are arranged in ascending order of their income. The Lorenz curve, L(p), describes the percentage share of income (or expenditure) enjoyed by the bottom p×100 percent of the population and is given by

$$L(p) = \frac{1}{\mu}\int_0^p x(q)dq \qquad (1)$$

where

$$\mu = \int_0^1 x(q)dq \qquad (2)$$

μ being the mean income of society. The Lorenz curve lies in a unit square and satisfies the following properties (Kakwani, 1980): (i) L(p) = 0 when p = 0; (ii) L(p) = 1 when p = 1; (iii) $\frac{dL(p)}{dp} = \frac{x(p)}{\mu} > 0$ and $\frac{d^2L(p)}{dp^2} > 0$; (iv) L(p) $\leq$ p for all p in the range 0 $\leq$ p $\leq$ 1. When L(p) = p, we have a perfectly equal distribution of income.

Following Kakwani and Pernia (2000), economic growth may be called pro-poor if the poor enjoy the benefits of growth proportionally more than the non-poor. In this scenario, inequality declines concurrently during the course of growth. A change in the Lorenz curve indicates whether inequality is increasing or decreasing with economic growth. Thus, growth is unambiguously pro-poor if the entire Lorenz curve shifts upward, $\Delta L(p) \geq 0$ for all *p*.

$\mu L(p)$ is called the generalized Lorenz curve. When the entire generalized Lorenz curve shifts upward, we can argue that the new distribution has second-order dominance over the old distribution. In this respect, the generalized Lorenz curve may also be called the second order dominance curve. Atkinson (1987) has provided a useful link between second-order dominance and changes in poverty. To show this linkage, let us consider a general class of additive poverty measures:

$$\theta = \int_0^z P(z,x) f(x) dx \tag{3}$$

where *f(x)* is the density function of income *x* and *z* is the poverty line and

$$\frac{\partial P}{\partial x} < 0 \text{ , } \frac{\partial^2 P}{\partial x^2} > 0 \text{ , and P(z, z) = 0} \tag{4}$$

where $P(z,x)$ is a homogenous function of degree zero in *z* and *x*.[1]

Using Atkinson's (1987) theorem concerning the relationship between second-order dominance and poverty reduction, we can show that if $\Delta(\mu L(p)) \geq 0$ for all p, then $\Delta\theta \leq 0$ for all poverty lines and the entire class of poverty measures given in (3). This indicates that when the entire generalized Lorenz curve shifts upward (downward), we can unambiguously say that poverty has decreased (increased). This result holds for the entire class of poverty measures and for all poverty lines.

From the definition of the Lorenz curve, we can always write:

$$L(p) = \frac{\mu_p p}{\mu} \tag{5}$$

which is the share of income of the bottom p percent of the population and where μ_p given by

$$\mu_p = \frac{1}{p} \int_0^p x(q) dq \tag{6}$$

is the mean income of the bottom p percent of the population. On taking the logarithm of both sides, (5) becomes

$$Ln(\mu_p) = Ln(\mu L(p)) - Ln(p) \tag{7}$$

Taking the first difference in (7) gives

$$g(p) = \Delta Ln(\mu L(p)) \tag{8}$$

where

$$g(\mathrm{p}) = \Delta Ln(\mu_p)$$

is the growth rate of the mean income of the bottom p percent of the population when individuals are ranked by their per capita income (expenditure). $g(p)$, which is a function of p in range from 0 to 1, is called the poverty growth curve (Son, 2004). From the Atkinson theorem and (8), we can say that if $g(p) > 0$ ($g(p) < 0$) for all p, then poverty has decreased (increased) unambiguously between two periods. We can also say that as the poverty growth curve shifts upward (downward), the greater the poverty reduction (increase) will be. This suggests that the area under the poverty growth curve can be used as a measure of pro-poor growth. Thus, we propose a new index of the pro-poor growth rate as given by

$$\gamma^* = \int_0^1 g(p)dp = \int_0^1 \Delta \ln(\mu L(p))dp \tag{9}$$

which can also be written as

$$\gamma^* = \gamma - \Delta \ln(G^*) \tag{10}$$

where

$$\gamma = \Delta Ln(\mu)$$

is the growth rate of the mean income of the whole society and G* given by

$$\ln(G^*) = \int_0^1 [\ln(p) - \ln(L(p))]dp \tag{11}$$

is a new relative measure of inequality. The second term in (10) measures the rate of change in inequality. If the inequality measured by G^* decreases (increases) in a period, then the pro-poor growth rate will be greater (less) than the actual growth rate of the mean income. Thus, there will be a gain or a loss in growth rate due to changes in inequality. Growth will be pro-poor if there is a gain in growth rate and anti-poor if there is a loss in growth rate.

The proposed pro-poor growth rate can be easily calculated if we know the decile shares and mean income for any two periods. The World Bank's cross-country data provide this information and thus we can apply our proposed methodology to globally assess the pro-poorness of growth.[2] The empirical findings are discussed in the following section.

3 GLOBAL ESTIMATES OF PRO-POOR GROWTH

Table 1 presents the summary results for all low- and middle-income countries. Our results reveal that out of 237 growth spells, 106 (44.7%) had negative growth rates and 131 (55.3%) had positive growth rates. Of 131 spells when growth rates were positive, growth was pro-poor in 55 (23.2%) cases and anti-poor in 76 (32.1%) cases. In 53 out of 106 spells of negative growth rates, the poor suffered proportionally a greater decline in their consumption compared to the non-poor. For a rapid reduction in poverty, a country needs to achieve positive growth rates that are pro-poor. According to our results, this does not seem to be happening globally.

TABLE 1

Pro-Poor Growth, summary results for 80 countries

	Positive Growth	Negative Growth	All Growth Spells
Pro-Poor	55 (23.2%)	53 (22.4%)	108 (45.6%)
Not pro-poor	76 (32.1%)	53 (22.4%)	129 (54.4%)
Total spells	131 (55.3%)	106 (44.7%)	237 (100%)

Source: Authors' calculations.

Table 2 presents the percentage of pro-poor growth spells for various country classifications.[3] Our results reveal that it is hard for a large number of countries to achieve a positive rate of economic growth. In East Europe and Central Asia (ECA), growth was positive only in 33.3 % of the total number of spells and positive as well as pro-poor only in 12.3% of the total number of spells. This could have happened because these countries were going through a transition period in the 1990s. In comparison, East Asia and the Pacific (EAP) could attain positive growth rates in 74.3% of the total number of spells, but growth was positive and pro-poor only in 17.1% of these spells. This finding suggests that in the EAP region, the reduction in poverty has occurred due mainly to high rates of actual growth, rather than due to pro-poor growth.

It is interesting to note that while the incidence of poverty is highest in low-income countries, in 20.8% of the total number of spells, growth rates in these countries were both positive and pro-poor. What is more, the Middle East and Northern Africa (MENA) was able to achieve positive and pro-poor growth in 35.7% of the total number of spells.

We have so far discussed pro-poor growth at the aggregate level. We now ask whether there is a significant association between groups of countries (by regions or by income levels) and growth patterns (positive vs. negative or pro-poor vs. anti-poor). Our approach to this question is to use bivariate tabular analysis (also known as crossbreaks). Bivariate tabular analysis is particularly useful in summarizing the intersections of independent and dependent variables and in understanding the relationship (if any) between those variables. Furthermore, to test statistical significance for bivariate tabular analysis, we have carried out a chi-square analysis. It is well known that chi-square analysis is used most frequently to test the statistical significance of results reported in bivariate tables. Any appropriately performed test of statistical significance lets us know the degree of confidence we can have in accepting or rejecting a hypothesis.

TABLE 2

Pro-Poor Growth, summary results by various country groupings

Country Groupings	*Positive growth*			*Negative growth*		
	Pro-poor	Anti-poor	Total	Pro-poor	Anti-poor	Total
Low-income countries	20.8	33.3	54.2	27.8	18.1	45.8
Low middle-income	26.7	31.4	58.1	19.0	22.9	41.9
Upper middle-income	21.7	35.0	56.7	21.7	21.7	43.3
Heavily-indebted countries	18.6	27.1	45.8	32.2	22.0	54.2
East Asia & Pacific (EAP)	17.1	57.1	74.3	17.1	8.6	25.7
East Europe & Central Asia (ECA)	12.3	21.1	33.3	21.1	45.6	66.7
Latin America & Caribbean (LAC)	30.4	29.1	59.5	24.1	16.5	40.5
Middle East and North Africa (MENA)	35.7	14.3	50.0	28.6	21.4	50.0
South Asia (SA)	29.4	52.9	82.4	11.8	5.9	17.6
Sub-Saharan Africa (SSA)	20.0	34.3	54.3	31.4	14.3	45.7
All countries	23.2	32.1	55.3	22.4	22.4	44.7

Note: Figures presented in the table are in percentages (%).

Source: Authors' calculations

Table 3 testifies to the strength of the relationship between countries, classified according to income group, and positive/negative or pro-poor/anti-poor growth. Our estimated chi-square shows that the relationship is very weak: chi-square values are statistically insignificant at the 0.05 or 0.10 level. Put another way, there is a weak relationship between countries, when grouped by their income levels, and growth. This is true for both positive vs. negative patterns and pro-poor vs. anti-poor patterns.

TABLE 3

Growth pattern and countries classified according to three income groups

Country classification	Positive growth	Negative growth	Total
Low-income countries	16.5	13.9	30.4
Low middle-income countries	25.7	18.6	44.3
Upper middle-income countries	14.3	11.0	25.3
All countries	56.5	43.5	100.0
Chi-square (2) = **0.27**			
Country classification	**Pro-poor growth**	**Anti-poor growth**	**Total**
Low-income countries	14.8	15.6	30.4
Low middle-income countries	20.3	24.1	44.3
Upper middle-income countries	11.0	14.3	25.3
All countries	46.0	54.0	100.0
Chi-square (2) = **0.37**			

Note: Figures presented in the table are in percentage (%). Although figures presented in the table are in percentage, we used raw frequencies, or number of spells, to compute the chi-square. The degree of freedom is 2 in this tabular analysis. Critical values of χ^2 with 2 d.f. are 5.99 and 4.61 for the 5% and 10% levels, respectively.

Source: Authors' calculations

Similarly, we have performed a chi-square test to understand the relationship between patterns of growth and regional classifications. The results presented in Table 4 reveal that there is a highly significant relationship between positive or negative growth and countries when classified by regions. This conclusion is drawn based on the value of the chi-square, 22.02, which is highly statistically significant at both 5 and 10 percent. Hence, it is valid to conclude that during 1984 – 2001, while countries in EAP, LAC, and SA had experienced a higher proportion of spells with positive growth than with negative growth, ECA countries in particular had had more spells with negative growth, rather than positive growth.

TABLE 4

Growth pattern and countries classified by six regions

Regional classification	Positive growth	Negative growth	Total
East Asia and Pacific	11.0	3.8	14.8
East Europe and Central Asia	8.0	16.0	24.1
Latin America and Caribbean	19.8	13.5	33.3
Middle East and North Africa	3.0	3.0	5.9
South Asia	5.9	1.3	7.2
Sub-Saharan Africa	8.0	6.8	14.8
All countries	55.7	44.3	100.0
Chi-square (5)	**22.02**		
Regional classification	**Pro-poor growth**	**Anti-poor growth**	**Total**
East Asia and Pacific	5.1	9.7	14.8
East Europe and Central Asia	8.0	16.0	24.1
Latin America and Caribbean	18.1	15.2	33.3
Middle East and North Africa	3.8	2.1	5.9
South Asia	3.0	4.2	7.2
Sub-Saharan Africa	7.6	7.2	14.8
All countries	45.6	54.4	100.0
Chi-square (5)	**10.33**		

Note: Figures presented in the table are in percentage (%). Although figures presented in the table are in percentage, we used raw frequencies, or number of spells, to compute the chi-square. The degree of freedom is 5 in this tabular analysis. Critical values of χ^2 with 5 d.f. are 11.07 and 9.24 for the 5% and 10% levels, respectively.

Source: Authors' calculations

Looking at the lower part of Table 4, we find a statistically significant relationship between regions and pro-poor or anti-poor growth. This can be said with statistical confidence based on the value of the chi-square, which is found to be highly statistically significant at the 5 percent level. It can be concluded, therefore, that pro-poor growth spells have been more prevalent among LAC countries, whereas anti-poor growth spells have been found proportionally more among countries in EAP and ECA. In the other regions, the difference in spells with pro-poor and anti-poor growth appears to be quite negligible.

It should be noted that detailed estimates of pro-poor growth are presented in Table A.1 of the Appendix. Aggregated results presented in Tables 1 and 2 were derived from Table A.1. Of the 80 countries and 237 spells in the sample, we have identified countries with extreme

losses and gains. Equation (10) shows that losses and gains refer to the losses and gains of growth rate resulting from changes in inequality. We have defined a spell with extreme loss as one showing a loss of growth rate of more than 10 percent per annum because of an increase in inequality over the spell. Similarly, a spell is defined as having an extreme gain if the gain of growth rate is greater than 10 percent per annum due to the reduction of inequality during the spell. Based on this, we have identified 9 countries as having extreme losses and 7 countries as having extreme gains. These are presented in Table 5. As shown in the table, these extreme cases have occurred in mainly three regions, namely ECA, LAC and SSA. By and large, the gains and losses for countries in these three regions show greater fluctuations compared to those in the other regions. In particular, the losses and gains for the EAP countries tend to be relatively more stable over the period, 1984-2001. Extreme volatility in gains and losses of growth rates can occur due to changes in inequality. This reflects a growth pattern that is not stable.

TABLE 5

Countries with extreme losses and gains

Countries	Losses / Gains (p.a.)	Spells	Regions
***Countries with growth spells* (*losses* < -10)**			
Estonia	-12.37	1987-1990	ECA
Kyrgyz Republic	-31.64	1990-1993	ECA
Moldova Republic	-10.01	1990-1993	ECA
Russian Federation	-21.90	1990-1993	ECA
Colombia	-12.27	1996-1999	LAC
Ecuador	-10.41	1990-1993	LAC
Paraguay	-19.32	1990-1993	LAC
Niger	-20.95	1993-1996	SSA
Zimbabwe	-10.84	1990-1993	SSA
***Countries with growth spells* (*gains* > +10)**			
Kyrgyz Republic	20.22	1996-1999	ECA
Uzbekistan	18.12	1996-1999	ECA
Colombia	16.69	1999-2001	LAC
Costa Rica	10.42	1984-1987	LAC
Costa Rica	13.56	1999-2001	LAC
Kenya	11.15	1993-1996	SSA
Senegal	11.81	1990-1993	SSA
Zambia	17.13	1990-1993	SSA

Source: Authors' calculations

4 WHAT DETERMINES PRO-POOR GROWTH?

So far, our discussion has been mainly on the estimates of the new pro-poor growth indicator. We now extend our discussion to look into determinants that are likely to have an impact on pro-poor growth. In this study, we focus on four variables. These are inflation, a share of agriculture in GDP, openness to trade, and the rule of law. Although there are certainly many other variables affecting a country's growth pattern (e.g. share of government consumption in

GDP, education and health indicators, etc.), extensive discussions on these other variables are beyond the scope of the current study or could be carried out in future research.

4.1 INFLATION

In recent years, policy makers have placed increased emphasis on price stability. Monetary policy has been geared increasingly toward the achievement of low and stable inflation. It is commonly viewed that price stability is a worthy policy objective because of costs incurred from inflation. It is also perceived that when inflation is high and unpredictable, businesses and households are thought to perform poorly.

There have been a lot of theoretical studies on the costs of inflation. For instance, a study by Briault (1995) provides a good review of this subject. However, as far as empirical findings are concerned, the case has not been decisively proven. While some argue that inflation is harmful for growth (Barro, 2001; Fisher, 1995; Dollar and Kraay, 2000), others have found that inflation does not really matter (Agenor, 2002; Epaulard, 2003; Pasha and Palanivel, 2004). It is therefore important to carry out additional empirical studies to explore the relationship between inflation and the economic performance or patterns of economic growth.

In this study, the inflation rate refers to the annual growth rate over each spell of a consumer price index. We have computed annual inflation rates from consumer price indicies available from the 2004 World Development Indicator.[4] We have then classified annual inflation rates in three ranges; high (over 20 percent per annum), medium (between 10 and 20 percent per annum), and low (up to 10 percent per annum). Table 6 provides information about the percentage of spells that belong to each of the three inflationary ranges by positive vs. negative growth and by pro-poor vs. anti-poor growth.

TABLE 6

Inflation and growth

Inflation rate	Positive growth	Negative growth	Total
Low (<10%)	22.6	26.1	48.7
Medium (10-20%)	13.7	13.7	27.4
High (> 20%)	9.4	14.5	23.9
All	45.7	54.3	100.0
Chi-square (2)	**1.43**		
Inflation rate	**Pro-poor growth**	**Anti-poor growth**	**Total**
Low (<10%)	31.2	17.5	48.7
Medium (10-20%)	16.7	10.7	27.4
High (> 20%)	8.1	15.8	23.9
All	56.0	44.0	100.0
Chi-square (2)	**14.69**		

Note: Figures presented in the table are in percentages (%). Although figures presented in the table are in percentages, we used raw frequencies, or number of spells, to compute the chi-square. The degree of freedom is 2 in this tabular analysis. Critical values of χ^2 with 2 d.f. are 5.99 and 4.61 for the 5% and 10% levels, respectively.

Source: Authors' calculations

The results presented in the table indicate that while there is an insignificant relationship between inflation and positive/negative growth, there is a significant relationship between inflation and pro-poor/anti-poor growth. This is suggested by the estimated chi-square values, which are 1.43 and 14.69. The latter value is highly statistically significant at both the 5 and 10 percent levels. Thus, it is reasonable to conclude that a lower level of inflation is associated with pro-poor growth, and that a higher level of inflation is related to anti-poor growth. This finding is in line with studies by Dollar and Kraay (2000), Barro (2001) and Fisher (1993). However, our result does not support the findings of studies by Epaulard (2003) and Agenor (2002), which suggest that inflation does not really matter for growth. This line of argument may be supported if we look at the relationship between inflation and positive or negative growth. Unfortunately, in this study, the statistical inference is not strong enough to draw a concrete conclusion as to whether positive or negative growth is associated with low- or high-inflation experiences.

4.2 SHARE OF AGRICULTURE IN GDP

The production structure of the economy in terms of the importance of traditional sectors is often regarded as a potential determinant of growth patterns (Chenery and Ahluwalia, 1974). As such, we have tested this relationship by including the share of agriculture in total GDP as a determinant of the pattern of growth in our analysis. The data for the share of agriculture in GDP have been obtained from the 2004 World Development Indicator.[5] We have separated the share of agriculture in GDP for the whole sample into five ranges, as shown in Table 7.

TABLE 7

Share of agriculture and growth, positive vs. negative growth

Share of agriculture (% of GDP)	Positive growth	Negative growth	Total
Less than 10%	11.0	14.5	25.6
10 - 20 %	17.6	13.2	30.8
20 - 30 %	17.2	8.8	26.0
30 - 40 %	7.0	5.7	12.8
More than 40%	2.6	2.2	4.8
All	55.5	44.5	100.0
Chi-square (4) =	**6.38**		
Share of agriculture (% of GDP)	**Pro-Poor growth**	**Anti-Poor growth**	**Total**
Less than 10%	10.1	15.4	25.6
10 - 20 %	13.7	17.2	30.8
20 - 30 %	11.5	14.5	26.0
30 - 40 %	6.6	6.2	12.8
More than 40%	3.1	1.8	4.8
All	44.9	55.1	100.0
Chi-square (4) =	**2.78**		

Note: Figures presented in the table are in percentage (%). Although figures presented in the table are in percentages, we used raw frequencies, or number of spells, to compute the chi-square. The degree of freedom is 4 in this tabular analysis. Critical values of χ^2 with 4 d.f. are 9.49 and 7.78 for the 5% and 10% levels, respectively.

Source: Authors' calculations.

Strictly speaking, we find an insignificant relationship between the share of agriculture in total GDP and positive growth. This is indicated by the value of chi-square of 6.38, which is not significant at 5 percent but is nearly significant at 10 percent. Hence, it is fair to say that there is a certain relation between the two variables. There appears to be a clear positive relationship between the two for the growth spells where the agricultural share of GDP ranges between 20-30 percent. For the other periods, there is no clear pattern emerging from the results. A similar analysis is carried out when growth is defined in terms of pro-poor and anti-poor growth. The results indicate that there is an insignificant association between the share of agriculture and pro-poor or anti-poor growth.

4.3 OPENNESS TO TRADE

It is often argued that globalization raises overall incomes in a country (Dollar and Kraay, 2000; Frankel and Romer, 1999). In this study, we have tested this argument by including an index of openness to international trade, as measured by exports plus imports relative to GDP. As shown in Table 8, we have classified openness to trade into three levels; low (less than 20 percent), medium (between 20 and 40 percent), and high (over 40 percent). While the upper part of the table tests for a significant relationship between the level of openness to trade and positive/negative growth, the lower part is to find the relation of the level of trade openness with pro-poor/anti-poor growth.

TABLE 8

Openness to trade and growth

Openness to trade	Positive growth	Negative growth	Total
Less than 20%	27.3	13.7	41.0
20-40 %	20.7	20.7	41.4
More than 40%	7.5	10.1	17.6
All	55.5	44.5	100.0
Chi-square (2) =	**8.58**		
	Pro-Poor growth	**Anti-Poor growth**	**Total**
Less than 20%	15.9	25.1	41.0
20-40 %	20.7	20.7	41.4
More than 40%	8.4	9.3	17.6
All	44.9	55.1	100.0
Chi-square (2) =	**2.54**		

Note: Figures presented in the table are in percentage (%). Although figures presented in the table are in percentages, we used raw frequencies, or number of spells, to compute the chi-square. The degree of freedom is 2 in this tabular analysis. Critical values of χ^2 with 2 d.f. are 5.99 and 4.61 for the 5% and 10% levels, respectively.

Source: Authors' calculations.

The results in Table 8 do not seem to support a presupposition that openness to trade is good for growth. Surprisingly, we find a low level of trade openness associated with a positive growth and a high level of trade openness with negative growth. There is no clear pattern at the medium level of openness to trade, 20-40 percent. The high chi-square value (8.58) confirms these findings. When openness to trade is restricted to a low level and investigated

by regions, we also find a significant inverse relationship between openness to trade and growth. This result is in contrast to the finding by Frankel and Romer (1999). A view in favor of globalization is not supported even if growth is defined in view of pro-poor and anti-poor growth. The low chi-square value suggests a statistically insignificant relationship between levels of openness to trade and pro-poor growth.

4.4 RULE OF LAW

Kaufmann, Kraay and Mastruzzi (2005) have developed various governance indicators for a number of countries. Among which, they include the rule of law. The present study has taken index values of the rule of law for the study countries. This indicator was initially on a -2.5 to +2.5 scale, with +2.5 the most favorable. The scale has been normalized to -1 to 1, with -1 indicating the worst maintenance of the rule of law and 1 the best. The general idea of these indices is to gauge the attractiveness of a country's investment climate by considering the effectiveness of law enforcement, the sanctity of contracts, and the state of other influences on the security of property rights (Kaufmann, Kraay and Mastruzzi, 2005).

When we tested for any association between the presence of the rule of law and growth, we found no statistical significance between the two. This result remains unchanged irrespective of the definitions of growth, positive vs. negative or pro-poor vs. anti-poor. Therefore, our study does not support a presumption that greater maintenance of the rule of law is favorable to growth.

TABLE 9

Rule of law and growth

Rule of law	Positive growth	Negative growth	Total
Strong (positive index)	37.1	31.7	68.8
Weak (negative index)	17.2	14.0	31.2
All	54.3	45.7	100.0
Chi-square (1) =	**0.02**		
Rule of law	**Pro-Poor growth**	**Anti-Poor growth**	**Total**
Strong (positive index)	32.6	36.2	68.8
Weak (negative index)	12.2	19.0	31.2
All	44.8	55.2	100.0
Chi-square (1) =	**1.30**		

Note: Figures presented in the table are in percentage (%). Although figures presented in the table are in percentages, we used raw frequencies, or number of spells, to compute the chi-square. The degree of freedom is 1 in this tabular analysis. Critical values of χ^2 with 1 d.f. are 3.84 and 2.71 for the 5% and 10% levels, respectively.

Source: Authors' calculations.

5 CONCLUSIONS

This paper has developed a new indicator that identifies whether economic growth is pro-poor or anti-poor. Pro-poor growth is defined as growth that benefits the poor proportionally more than the non-poor. The new indicator was developed based on a new measure of inequality that measures gains or losses of growth rate which would have resulted from changes in the

distribution of income or consumption. The proposed methodology has been applied to 80 countries and 237 growth spells, covering the period 1984-2001. The data utilized for this study came from the group data on income distribution, which were compiled by the World Bank, mainly from household surveys for a number of countries. From empirical studies, we found that of 237 growth spells, 106 (almost 45%) had a negative growth rate of per capita income. This means that the average standard of living declined in a large number of periods. Of 131 growth spells, when growth rates were positive, growth was pro-poor only in 55 (23.2%) cases and anti-poor in 76 (32.1%) cases. For a rapid reduction in global poverty, a large number of countries need to achieve positive growth rates that are pro-poor in a majority of growth spells. According to the results of this paper, this does not seem to be happening.

In addition, the paper investigated a few variables that are likely to affect growth patterns. Of many factors that can influence a country's growth pattern, we focused our discussion on four variables, namely, inflation, a share of agriculture in GDP, openness to trade, and the rule of law. The strength of the relationship between each of these variables and growth patterns (positive vs. negative growth and pro-poor vs. anti-poor growth) was statistically tested. Our major findings can be succinctly summarized as follows:

- A low inflation rate has a significant relationship with pro-poor growth.
- Other variables – including the share of agriculture in GDP, openness to trade, and the rule of law – tend to have a significant relationship when growth is defined in terms of positive and negative variation. However, our study found an insignificant association between each of these variables and pro-poor growth.

It should be noted, however, that these findings leave plenty of room for further work. Future research could be extended to other variables such as the share of government consumption in GDP and educational and health indicators.

It should also be noted that conclusions emerging from any cross-country analysis are never robust. They depict only the average picture. The individual country experiences may be quite different. Thus, the policies emerging from cross-country analysis should not be prescribed for individual countries without further analysis at the country level.

APPENDIX

A.1.: PRO-POOR GROWTH ESTIMATES FOR 80 COUNTRIES

Country	Spell	Actual growth rate	Effective growth rate	Gains (+)/Losses (-) of growth rates	Pro-Poor/ Anti-Poor
East Asia and Pacific					
China-Rural	1981				
	1984	10.20	9.14	-1.07	Anti-Poor
	1987	6.73	4.20	-2.54	Anti-Poor
	1990	-1.47	-0.44	1.03	Pro-Poor
	1993	2.61	2.64	0.04	Pro-Poor
	1996	8.89	5.08	-3.81	Anti-Poor
	1999	0.14	-1.19	-1.33	Anti-Poor
	2001	1.61	0.52	-1.09	Anti-Poor
China-Urban	1981				
	1984	4.55	0.57	-3.98	Anti-Poor
	1987	6.45	6.48	0.04	Pro-Poor
	1990	0.56	-5.28	-5.83	Anti-Poor
	1993	7.31	4.95	-2.37	Anti-Poor
	1996	5.20	4.78	-0.42	Anti-Poor
	1999	5.07	3.18	-1.89	Anti-Poor
	2001	6.25	4.18	-2.06	Anti-Poor
Indonesia	1987				
	1993	3.47	3.09	-0.37	Anti-Poor
	1996	3.47	1.41	-2.06	Anti-Poor
	1999	-0.83	2.83	3.65	Pro-Poor
	2001	4.89	1.45	-3.44	Anti-Poor
Lao PDR	1993				
	1996	-7.64	-12.31	-4.67	Anti-Poor
Malaysia	1984				
	1987	-1.20	0.16	1.35	Pro-Poor
	1990	2.01	2.95	0.94	Pro-Poor
	1993	1.91	0.17	-1.74	Anti-Poor
	1996	-16.79	-18.09	-1.31	Anti-Poor
Mongolia	1996				
	1999	-13.83	-11.47	2.36	Pro-Poor
Philippines	1984				
	1987	0.89	1.23	0.33	Pro-Poor
	1990	3.19	0.69	-2.51	Anti-Poor

►

Country	Spell	Actual growth rate	Effective growth rate	Gains (+)/Losses (-) of growth rates	Pro-Poor/ Anti-Poor
	1993	0.00	0.48	0.48	Pro-Poor
	1996	6.71	4.23	-2.48	Anti-Poor
	1999	-1.05	-1.03	0.02	Pro-Poor
Thailand	1987				
	1990	10.69	10.18	-0.51	Anti-Poor
	1996	3.52	3.81	0.29	Pro-Poor
	1999	-1.68	-1.94	-0.26	Anti-Poor
	2001	-1.09	-0.63	0.46	Pro-Poor
Vietnam	1993				
	1996	4.73	3.85	-0.88	Anti-Poor
	2001	5.24	4.50	-0.75	Anti-Poor
East Europe and Central Asia					
Albania	1996				
	1999	0.49	1.24	0.75	Pro-Poor
Armenia	1996				
	1999	-15.01	-10.35	4.66	Pro-Poor
Azerbaijan	1996				
	1999	7.63	8.39	0.76	Pro-Poor
Bulgaria	1990				
	1996	-12.57	-16.25	-3.68	Anti-Poor
	2001	-3.32	-3.22	0.10	Pro-Poor
Croatia	1987				
	1996	-3.06	-4.65	-1.59	Anti-Poor
	1999	-2.36	-2.61	-0.25	Anti-Poor
	2001	2.31	-1.17	-3.48	Anti-Poor
Czech Republic	1987				
	1993	-1.82	-3.53	-1.72	Anti-Poor
	2001	6.21	6.19	-0.02	Anti-Poor
Estonia	1987				
	1990	-3.60	-15.97	-12.37	Anti-Poor
	1996	-7.19	-4.42	2.77	Pro-Poor
	1999	4.30	0.22	-4.08	Anti-Poor
Georgia	1996				
	1999	-8.26	-8.76	-0.50	Anti-Poor
	2001	-4.33	-2.76	1.57	Pro-Poor
Hungary	1987				
	1990	-14.79	-17.75	-2.96	Anti-Poor
	1993	4.86	3.33	-1.53	Anti-Poor
	1996	-7.46	-6.21	1.24	Pro-Poor

►

Country	Spell	Actual growth rate	Effective growth rate	Gains (+)/Losses (-) of growth rates	Pro-Poor/ Anti-Poor
Kazakhstan	1987				
	1990	-26.58	-32.99	-6.41	Anti-Poor
	1996	-1.65	-2.75	-1.10	Anti-Poor
	1999	0.33	3.64	3.32	Pro-Poor
Kyrgyz Republic	1990				
	1993	-3.42	-35.06	-31.64	Anti-Poor
	1996	-28.46	-26.39	2.07	Pro-Poor
	1999	5.15	25.37	20.22	Pro-Poor
	2001	-20.90	-13.44	7.46	Pro-Poor
Latvia	1990				
	1993	-39.05	-41.65	-2.60	Anti-Poor
	1996	4.65	-1.19	-5.84	Anti-Poor
	1999	0.09	-0.87	-0.97	Anti-Poor
Lithuania	1987				
	1990	-30.50	-37.49	-6.99	Anti-Poor
	1999	8.77	8.39	-0.39	Anti-Poor
	2001	-3.11	-2.94	0.17	Pro-Poor
Moldova, Rep.	1990				
	1993	-23.32	-33.33	-10.01	Anti-Poor
	1996	-9.71	-8.19	1.53	Pro-Poor
	1999	-14.73	-19.53	-4.80	Anti-Poor
	2001	8.87	12.29	3.42	Pro-Poor
Poland	1984				
	1987	0.71	0.78	0.06	Pro-Poor
	1990	0.69	-0.27	-0.95	Anti-Poor
	1993	-8.14	-17.54	-9.39	Anti-Poor
	1996	16.25	21.81	5.56	Pro-Poor
	1999	-4.61	-4.93	-0.32	Anti-Poor
Romania	1990				
	1993	-38.24	-40.96	-2.73	Anti-Poor
	1996	19.85	17.83	-2.02	Anti-Poor
	1999	-13.33	-14.04	-0.70	Anti-Poor
Russian Federation	1990				
	1993	-13.31	-35.21	-21.90	Anti-Poor
	1996	-1.16	2.03	3.19	Pro-Poor
	1999	-8.57	-9.00	-0.44	Anti-Poor
Slovak Republic	1987				
	1990	10.08	9.65	-0.43	Anti-Poor
	1996	-9.19	-11.22	-2.03	Anti-Poor

►

Country	Spell	Actual growth rate	Effective growth rate	Gains (+)/Losses (-) of growth rates	Pro-Poor/ Anti-Poor
Slovenia	1987				
	1990	6.09	3.09	-3.00	Anti-Poor
	1996	-0.86	-1.76	-0.90	Anti-Poor
Turkmenistan	1990				
	1993	-19.50	-28.80	-9.31	Anti-Poor
	1996	9.81	6.66	-3.15	Anti-Poor
Ukraine	1987				
	1990	-22.67	-25.47	-2.80	Anti-Poor
	1996	-7.05	-9.47	-2.42	Anti-Poor
	1999	-7.31	-4.97	2.34	Pro-Poor
Uzbekistan	1987				
	1990	-19.06	-27.60	-8.54	Anti-Poor
	1996	-4.82	-11.86	-7.04	Anti-Poor
	1999	-14.27	3.84	18.12	Pro-Poor
Latin America and Caribbean					
Argentina	1987				
	1993	-8.14	-8.56	-0.42	Anti-Poor
	1996	0.68	-2.48	-3.16	Anti-Poor
	1999	-0.85	-10.03	-9.18	Anti-Poor
	2001	0.91	7.38	6.47	Pro-Poor
Bolivia	1987				
	1990	5.88	13.89	8.01	Pro-Poor
	1996	1.96	-7.37	-9.33	Anti-Poor
	2001	-4.42	3.88	8.30	Pro-Poor
Brazil	1981				
	1984	-5.12	-5.01	0.11	Pro-Poor
	1987	9.24	6.67	-2.57	Anti-Poor
	1990	-0.94	-2.70	-1.75	Anti-Poor
	1993	-5.50	-2.99	2.50	Pro-Poor
	1996	10.61	9.33	-1.27	Anti-Poor
	1999	9.05	5.70	-3.35	Anti-Poor
	2001	-1.40	2.50	3.90	Pro-Poor
Chile	1987				
	1990	-2.46	-1.74	0.72	Pro-Poor
	1993	1.45	2.27	0.82	Pro-Poor
	1996	17.58	15.21	-2.37	Anti-Poor
	1999	4.56	4.42	-0.14	Anti-Poor
	2001	-4.51	-4.05	0.46	Pro-Poor

►

Country	Spell	Actual growth rate	Effective growth rate	Gains (+)/Losses (-) of growth rates	Pro-Poor/ Anti-Poor
Colombia	1984				
	1987	1.08	7.16	6.07	Pro-Poor
	1990	2.96	3.49	0.53	Pro-Poor
	1993	-4.12	-6.80	-2.67	Anti-Poor
	1996	-1.13	-2.07	-0.94	Anti-Poor
	1999	-5.53	-17.79	-12.27	Anti-Poor
	2001	3.06	19.75	16.69	Pro-Poor
Costa Rica	1984				
	1987	2.05	12.47	10.42	Pro-Poor
	1990	13.69	6.29	-7.40	Anti-Poor
	1993	2.47	2.51	0.04	Pro-Poor
	1996	3.31	2.62	-0.68	Anti-Poor
	1999	7.37	-0.85	-8.22	Anti-Poor
	2001	-4.65	8.91	13.56	Pro-Poor
Dominican Republic	1987				
	1990	4.31	4.15	-0.16	Anti-Poor
	1993	8.85	8.95	0.10	Pro-Poor
	1996	2.95	3.55	0.61	Pro-Poor
	1999	15.64	18.26	2.62	Pro-Poor
Ecuador	1987				
	1990	-6.78	-6.27	0.51	Pro-Poor
	1993	-24.69	-35.10	-10.41	Anti-Poor
El Salvador	1990				
	1993	-8.50	-0.78	7.72	Pro-Poor
	1996	7.07	4.82	-2.24	Anti-Poor
	1999	6.50	6.38	-0.13	Anti-Poor
	2001	-11.88	-13.87	-1.98	Anti-Poor
Guatemala	1987				
	1990	12.89	8.84	-4.05	Anti-Poor
	1996	10.68	15.26	4.58	Pro-Poor
	1999	0.05	-6.55	-6.60	Anti-Poor
Guyana	1993				
	1996	23.49	26.09	2.60	Pro-Poor
Honduras	1987				
	1990	-1.49	-4.23	-2.74	Anti-Poor
	1993	12.78	14.94	2.15	Pro-Poor
	1996	-4.25	-2.17	2.08	Pro-Poor
	1999	5.16	-1.77	-6.93	Anti-Poor
	2001	5.69	11.91	6.22	Pro-Poor

►

Country	Spell	Actual growth rate	Effective growth rate	Gains (+)/Losses (-) of growth rates	Pro-Poor/ Anti-Poor
Jamaica	1987				
	1990	7.46	7.87	0.41	Pro-Poor
	1993	-11.82	-7.00	4.82	Pro-Poor
	1996	1.78	2.00	0.22	Pro-Poor
	1999	16.49	10.84	-5.65	Anti-Poor
	2001	-5.87	0.23	6.10	Pro-Poor
Mexico	1987				
	1990	2.06	-1.56	-3.62	Anti-Poor
	1996	8.65	8.69	0.05	Pro-Poor
	1999	2.75	0.66	-2.10	Anti-Poor
	2001	-3.16	-2.93	0.23	Pro-Poor
Nicaragua	1993				
	1996	-8.54	-3.71	4.83	Pro-Poor
	2001	3.47	4.28	0.81	Pro-Poor
Panama	1984				
	1987	-4.08	-7.82	-3.74	Anti-Poor
	1993	7.17	7.84	0.67	Pro-Poor
	1996	-4.88	-4.11	0.77	Pro-Poor
	1999	0.52	4.59	4.07	Pro-Poor
Paraguay	1990				
	1993	3.26	-16.07	-19.32	Anti-Poor
	1999	4.00	1.61	-2.40	Anti-Poor
	2001	5.36	13.98	8.62	Pro-Poor
Peru	1984				
	1987	7.02	9.52	2.51	Pro-Poor
	1993	-14.76	-16.66	-1.90	Anti-Poor
	1996	5.69	3.34	-2.35	Anti-Poor
	2001	-3.80	-6.29	-2.49	Anti-Poor
Trinidad and Tobago	1987				
	1990	-8.76	-8.10	0.66	Pro-Poor
Uruguay	1984				
	1987	10.60	12.20	1.60	Pro-Poor
Venezuela, RB	1981				
	1984	-1.78	-0.53	1.24	Pro-Poor
	1990	-0.77	3.53	4.30	Pro-Poor
	1993	-6.83	-5.93	0.91	Pro-Poor
	1996	-9.76	-18.06	-8.30	Anti-Poor
	1999	3.39	-4.60	-7.99	Anti-Poor

►

Country	Spell	Actual growth rate	Effective growth rate	Gains (+)/Losses (-) of growth rates	Pro-Poor/ Anti-Poor
Middle East and North Africa					
Algeria	1990				
	2001	-0.83	-0.23	0.61	Pro-Poor
Egypt, Arab Rep.	1987				
	1990	2.22	2.31	0.09	Pro-Poor
	1993	-0.72	-1.69	-0.97	Anti-Poor
Iran, Islamic Rep.	1987				
	1990	-1.91	1.09	2.99	Pro-Poor
	1993	3.45	4.33	0.89	Pro-Poor
	1996	3.17	1.98	-1.19	Anti-Poor
Jordan	1987				
	1990	-6.41	-11.21	-4.80	Anti-Poor
	1993	-7.15	-2.05	5.10	Pro-Poor
Morocco	1984				
	1987	7.32	8.26	0.94	Pro-Poor
	1996	-1.02	-1.92	-0.90	Anti-Poor
Tunisia	1987				
	1990	3.27	5.00	1.73	Pro-Poor
	1999	1.80	0.88	-0.92	Anti-Poor
	2001	3.33	5.18	1.84	Pro-Poor
Yemen, Rep.	1993				
	1996	-25.87	-21.29	4.57	Pro-Poor
South Asia					
Bangladesh	1996				
	1999	-5.07	-4.44	0.63	Pro-Poor
India-Rural	1984				
	1987	2.67	2.98	0.31	Pro-Poor
	1990	0.07	1.31	1.24	Pro-Poor
	1993	0.35	-0.56	-0.91	Anti-Poor
	1996	-0.03	1.06	1.09	Pro-Poor
	1999	2.64	1.86	-0.78	Anti-Poor
India-Urban	1984				
	1987	0.61	-0.94	-1.55	Anti-Poor
	1990	0.75	1.55	0.79	Pro-Poor
	1993	1.71	0.77	-0.94	Anti-Poor
	1996	2.53	2.22	-0.31	Anti-Poor
	1999	1.18	0.70	-0.48	Anti-Poor

►

Country	Spell	Actual growth rate	Effective growth rate	Gains (+)/Losses (-) of growth rates	Pro-Poor/ Anti-Poor
Pakistan	1987				
	1990	0.49	0.22	-0.27	Anti-Poor
	1993	7.06	6.89	-0.17	Anti-Poor
	1996	8.16	12.86	4.70	Pro-Poor
	1999	0.92	-2.57	-3.49	Anti-Poor
Sri Lanka	1987				
	1990	2.55	4.19	1.65	Pro-Poor
	1993	-2.46	-5.29	-2.82	Anti-Poor
Sub-Saharan Africa					
Botswana	1987				
	1990	4.34	1.40	-2.94	Anti-Poor
Burkina Faso	1990				
	1996	2.61	4.46	1.84	Pro-Poor
Burundi	1993				
	1996	-0.80	-8.80	-8.00	Anti-Poor
Cameroon	1999				
	2001	13.59	14.64	1.06	Pro-Poor
Cote d'Ivoire	1984				
	1987	-3.60	-1.66	1.94	Pro-Poor
	1990	-11.52	-9.56	1.95	Pro-Poor
	1996	-3.25	-2.93	0.32	Pro-Poor
	2001	3.36	1.31	-2.04	Anti-Poor
Ethiopia	1987				
	1996	3.73	2.17	-1.56	Anti-Poor
	1999	-4.35	1.86	6.22	Pro-Poor
Ghana	1987				
	1990	15.28	17.11	1.83	Pro-Poor
	1993	-6.31	-6.22	0.09	Pro-Poor
	1996	-7.90	-13.27	-5.36	Anti-Poor
	1999	3.30	2.18	-1.12	Anti-Poor
Kenya	1993				
	1996	-4.01	7.14	11.15	Pro-Poor
Lesotho	1987				
	1990	-9.52	-12.15	-2.63	Anti-Poor
	1996	8.12	3.41	-4.71	Anti-Poor
Madagascar	1984				
	1987	7.58	6.58	-1.00	Anti-Poor
	1999	-2.41	-1.10	1.31	Pro-Poor
	2001	-3.22	-13.21	-9.99	Anti-Poor

►

Country	Spell	Actual growth rate	Effective growth rate	Gains (+)/Losses (-) of growth rates	Pro-Poor/ Anti-Poor
Mauritania	1987				
	1990	6.86	7.12	0.26	Pro-Poor
	1996	0.81	4.18	3.36	Pro-Poor
	1999	10.96	10.24	-0.72	Anti-Poor
Niger	1993				
	1996	-10.10	-31.06	-20.95	Anti-Poor
Nigeria	1984				
	1993	2.32	-0.87	-3.19	Anti-Poor
	1996	-2.31	-1.15	1.15	Pro-Poor
Senegal	1990				
	1993	3.89	15.70	11.81	Pro-Poor
South Africa	1993				
	1996	-2.86	1.40	4.26	Pro-Poor
	1999	0.80	-2.03	-2.83	Anti-Poor
Uganda	1990				
	1993	-1.02	-0.36	0.67	Pro-Poor
	1996	5.35	10.10	4.75	Anti-Poor
	1999	1.73	-2.44	-4.17	Anti-Poor
Zambia	1990				
	1993	-17.92	-0.79	17.13	Pro-Poor
	1996	2.69	8.74	6.05	Pro-Poor
	1999	8.35	3.23	-5.12	Anti-Poor
Zimbabwe	1990				
	1993	-5.10	-15.95	-10.84	Anti-Poor

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NOTES

1. The most widely used poverty measures are those of Foster, Greer and Thorbecke (1984), which are obtained from equation (3) when $P(z,x)=\left(\frac{z-x}{z}\right)^{\alpha}$, which satisfies all the conditions given in (4). When α=0, 1, and 2, we obtain the headcount ratio, the poverty gap ratio, and the severity of poverty measure, respectively.

2. We have used household survey data on average incomes and 10 points on the Lorenz curve for a large number of surveys, which were compiled by the World Bank. The data come from primary sources and are available at http://www.worldbank.org/research/povmonitor.

3. We have used the World Bank's country classification.

4. We were able to get the figures for consumer price indicies for all spells and countries except 4 spells and 2 countries.

5. We have compiled the data for the share of agriculture in GDP for 227 spells.

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