Interrelationship between Growth, Inequality, and Poverty: The Asian Experience

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This paper examines the relationships between economic growth, income distribution, and poverty for 17 Asian countries for the period 1981–2001. It deals with two distinct but related issues. First, it investigates how much growth is required to offset the adverse effect of an increase in inequality on poverty. This trade-off between inequality and growth is quantified using a tool called the "inequality-growth trade-off index." The trade-off index measures how much growth in mean income or expenditure will be required to offset a 1 percent increase in inequality, with poverty remaining unchanged. This is an *ex ante* analysis based only on one period household survey. Second, the paper looks into the issue of pro-poor growth. This is an *ex post* analysis concerned with whether the growth process in a country has been pro-poor or anti-poor. Pro-poor growth is defined as growth that benefits the poor proportionally more than the nonpoor. By using a measure called the "poverty equivalent growth rate", which is a composite index of a level of growth rate and the distribution of benefits of growth, the paper examines both (i) how growth in mean income or expenditure has fared in Asia, and (ii) how the benefits of growth are distributed between the poor and the nonpoor.

I. INTRODUCTION

Recent years have seen a renewed emphasis on poverty reduction as the central goal of development policy and development cooperation. The Millennium Development Goals, agreed by world leaders in 2000, have put poverty reduction at the center of the development agenda. The first goal is directly concerned with halving absolute income poverty, but many of the other goals are also essentially about poverty reduction in a wider sense.

While sustained high growth can significantly reduce absolute income poverty, only a few countries—particularly in East, Southeast, and more recently South Asia—have enjoyed such growth levels. In many others, growth has been slow, highly volatile, or even negative for sustained periods of time leading to little progress in poverty reduction. Even in many high-growth countries, growth has been associated with rising inequality (which can retard the impact of growth on poverty) so that the poverty impact of growth has been slower than it could

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have been. As a consequence, the impact of inequality on poverty reduction has received renewed attention given that poverty reduction will be slower in countries that experience rising inequality, as well as in countries with high initial inequality. Conversely, reducing inequality would directly abate poverty, increase the poverty impact of growth, and might even increase growth itself (and thus further accelerate poverty reduction; see Klasen 2004).

To accelerate poverty reduction, it is thus crucial to devise strategies of "pro-poor growth."[1] There is a substantial amount of debate about what exactly constitutes pro-poor growth and how it can be measured (Ravallion and Chen 2003, Kakwani and Pernia 2000, Klasen 2004). This study adopts a definition proposed by Kakwani and Pernia, which defines growth as pro-poor if it benefits the poor proportionally more than the nonpoor. When there is a negative growth rate, growth is defined as pro-poor if the loss from growth is proportionally less for the poor than for the nonpoor. Under this definition, a pro-poor growth scenario will reduce poverty more rapidly than an antipoor growth scenario.

The pattern of growth is determined by its linkage with changes in poverty and inequality. This study examines this issue using a cross-country analysis of 17 Asian countries for the period 1981–2001. It deals with two distinct but related issues. First, the study investigates how much growth is required to offset the adverse effect of an increase in inequality on poverty. This trade-off between inequality and growth is quantified using a tool called the "inequality-growth trade-off index (IGTI)." This trade-off index measures how much growth in mean income or expenditure will be required to offset a 1 percent increase in inequality, with poverty remaining unchanged. This is an *ex ante* analysis based only on one period household survey. Second, the paper looks into the issue of pro-poor growth. This is an *ex post* analysis concerned with whether the growth process in a country has been pro-poor or antipoor. For this purpose, a measure called the "poverty equivalent growth rate (PEGR)" is used, which is a composite index of a level of growth rate and the distribution of benefits of growth. Using the PEGR, this paper studies how the benefits of growth have been distributed between the poor and the nonpoor over a time period.

The study is organized as follows. Section II provides a brief discussion on the trade-off between inequality and growth and discusses empirical results based on the methodology presented in the Appendix. Section III explains what is meant by poverty equivalent growth rate (see the Appendix for more methodological details on this concept) Section IV provides a discussion of the empirical results. For empirical studies, group data on income distribution, which

[1] Son (2007) provides a review of the current approaches to defining and measuring pro-poor growth. For this purpose, five approaches that have been most commonly used in recent years are selected. In the study, methodological and empirical issues related to these approaches are presented to analyze each approach's relative strengths and weaknesses in defining and measuring pro-poor growth. Empirical illustrations are made using a common data set to carry out comparative studies of the five methods.

are now readily available on the website of the World Bank, are used. Section V presents the major findings of the study.

II. ANALYZING INEQUALITY–GROWTH TRADE-OFF IN ASIAN COUNTRIES

The relation between growth and inequality has been dealt with by a number of studies. The growth–inequality debate can be traced back to Kuznets' hypothesis. In his 1955 article, Simon Kuznets found an inverted-U pattern between per capita income and inequality across countries: as per capita income rises, inequality first worsens and then improves. This pattern was presumed to be driven mainly by a structural change that shifted labor from a poor and less productive traditional sector, to a more productive and differentiated modern sector. Kuznets' hypothesis had been supported by a number of studies, but has been challenged by recent development literature on growth and distribution. For instance, Deininger and Squire (1996) conducted a comprehensive test of the hypothesis using higher-quality data containing 682 observations on the Gini index for 108 countries and found that there was no evidence of an inverted-U curve for individual countries.

A. Inequality–Growth Trade-Off

How much growth would be required to offset the adverse effect of an increase in inequality on poverty? To quantify this trade-off, a tool called inequality–growth trade-off index (IGTI) proposed by Kakwani (1993) is used here. IGTI is defined as minus times the ratio of the poverty elasticity of inequality to the poverty elasticity of growth. While the former captures the impact of changes in Gini on poverty, the latter measures the impact of changes in mean income (or expenditure) on poverty. Thus, the trade-off index indicates how much growth in mean income (or expenditure) will be required to offset a 1 percent increase in inequality, with poverty remaining unchanged. For instance, if the IGTI is equal to 3.0, this implies that a 1 percent increase in the Gini index will require a growth rate of 3 percent to offset the adverse effect of the inequality increase. Alternatively, if a 1 percent fall in the Gini index stems from following pro-poor policies, then this strategy is equivalent to achieving an additional 3 percent in growth rate. Overall, this suggests that the larger the IGTI, the greater will be the benefits from following a pro-poor strategy that would reduce inequality. Hence, the magnitude of the IGTI can be indicative of the growth or development strategy that a country might consider following.[2] For a

[2]See the Appendix for a detailed discussion on the inequality–growth trade-off index.

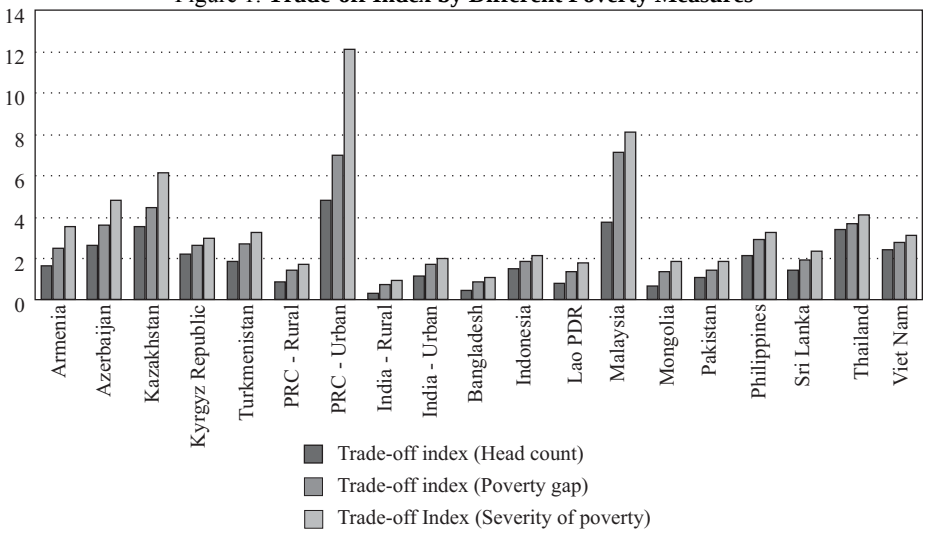
country where the trade-off index is small, say less than 1, its policy focus should be on enhancing growth to achieve poverty reduction.

B. Empirical Findings on IGTI for Selected Asian Countries

This subsection presents an analysis of the inequality–growth trade-off for 17 Asian countries for the period 1981 to 2001. The empirical estimates of the IGTI for individual countries are presented in Appendix Table 1. There are a few interesting findings that emerge from Appendix Table 1.

First, as depicted in Figure 1, the inequality–growth trade-off index rises monotonically as we move from the headcount ratio to the poverty gap ratio and further to the severity of poverty. For all countries, the trade-off index for the headcount ratio is smaller than the index for the poverty gap ratio, which is in turn smaller than the index for the severity of poverty. These findings thus suggest that if adopted, pro-poor policies would benefit the ultra-poor much more than the poor living closer to the poverty line.

Figure 1. **Trade-off Index by Different Poverty Measures**

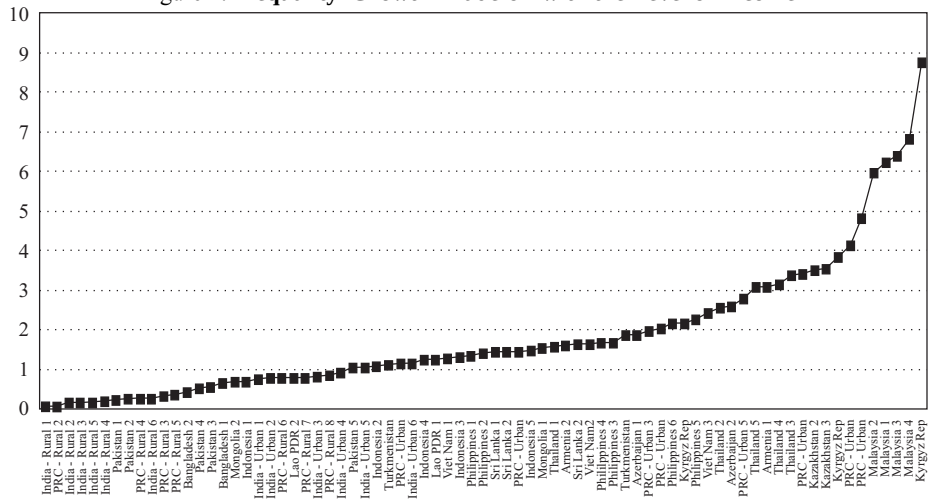


Note: This graph was drawn by taking the last survey period (1999 for some countries and 2001 for other countries) from Appendix Table 1.

Second, the IGTI increases monotonically with the level of income. As shown in Figure 2, the trade-off index is greater for a higher level of income. This indicates greater effectiveness of pro-poor policies in countries with higher incomes than in countries with lower incomes. As mean income rises, the poverty elasticity of inequality increases at a faster rate than the poverty elasticity of growth. Thus, poverty reduction could be in fact facilitated by pro-poor

strategies. At the same time, the results suggest that a relatively smaller growth rate would be required to offset a 1 percent increase in the Gini coefficient, to achieve the same proportional reduction in poverty, if a country's mean income were lower rather than higher.

Figure 2. **Inequality–Growth Trade-off with the Level of Income**



Note: All growth spells in the graph are arranged in ascending order of mean expenditure at 1993 PPP.

It is further interesting to compare the case of the People's Republic of China (PRC) and India. Table 1 presents the levels of mean expenditure and poverty estimates for the two economies for the period 1984 to 1999. From the table, it is clear that the PRC is far better off than India. In terms of growth, the PRC outpaced India with its per capita mean expenditure jumping by 75.7 percent from 1984 to 1999, compared to India's 20.1 percent. Growth was particularly strong in the PRC during 1990 to 1993. This could have been largely contributed by the government's economic reforms that resulted in rapid globalization and privatization of state-owned enterprises (Liu 2006).

A similar story emerges from poverty. Poverty statistics for all three measures are lower in the PRC than in India. More importantly, poverty reduction in the PRC has been much faster than in India. For instance, the headcount ratio fell by 84.7 and 33 percent, respectively, in the PRC and India over 16 years. Furthermore, ultra poverty declined even faster for both countries. Over the period, the severity of poverty fell by 127.1 and 79.7 percent for the PRC and India, respectively.

Table 1. **Monthly per Capita Expenditure and Poverty Estimates for the PRC and India**

Year	Mean Expenditure (at 1993 PPP)		Headcount Ratio		Poverty Gap Ratio		Severity of Poverty	
	PRC	India	PRC	India	PRC	India	PRC	India
1984	45.71	40.93	41.39	49.49	11.94	14.86	4.78	6.08
1987	57.05	43.59	28.70	45.88	8.24	12.52	3.33	4.68
1990	57.62	44.14	32.55	42.06	8.76	11.09	3.28	4.04
1993	68.60	45.40	27.70	42.13	7.17	10.81	2.62	3.87
1996	86.67	46.86	16.95	41.86	3.72	10.44	1.12	3.61
1999	97.41	50.05	17.75	35.60	4.18	8.45	1.34	2.74

PPP = purchasing power parity.
Note: Values are weighted averages of rural and urban areas where weights used are population shares.
Source: Author's calculations are based on information obtained from the Povcal database.

Furthermore, on a disaggregated level (by urban and rural areas), data for the PRC and India provide interesting insights. Table 2 presents poverty elasticities[3] of growth (of mean expenditure) and inequality as well as the IGTI. For both the PRC and India, growth in the urban sector had been stronger than that in the rural sector over the period 1984–2001. As pointed out earlier, growth performance is far more impressive in the PRC than in India for both urban and rural sectors.

The responsiveness of a 1 percent growth to changes in poverty differs between the two countries. This responsiveness is captured through the poverty elasticity of growth, which, under distribution-neutral growth, provides a magnitude of poverty reduction that would be expected from a 1 percent growth. This argument is indeed supported by the negative signs for the poverty elasticity of growth in Table 2. For the rural sector in the PRC and India, the poverty reduction in response to a 1 percent growth has been quite parallel. They differ substantially for the urban sector wherein poverty reduction in urban PRC is much greater compared to India's urban sector.

Table 2 also shows the proportional changes in poverty with respect to a 1 percent change in Gini, given by the poverty elasticity of inequality. As would be expected, a 1 percent increase in Gini leads to an increase in poverty, other factors held constant. This is substantiated by positive signs for the poverty elasticity of inequality in Table 2. For both the PRC and India, the poverty elasticity of inequality is much greater for the urban sector than the rural sector. Comparing the PRC with India, the former experienced a sharper increase in poverty than the latter, with a 1 percent increase in the Gini coefficient. This is true for both rural and urban sectors. In the urban sector, moreover, the difference in the poverty elasticity of inequality between the two countries is remarkable. Within the PRC, the poverty increase contributed by a 1 percent increase in

[3]See Appendix for a detailed discussion on poverty elasticities.

inequality escalated from the year 1993. Equivalently, the poverty reduction would have been extremely high if there had been a 1 percent decrease in inequality in the PRC, particularly in the urban sector.

Table 2. **Poverty Elasticities and Inequality–Growth Trade-off Index for the PRC and India**

Year	Actual Growth Rate (per annum)		Poverty Elasticity of Growth		Poverty Elasticity of Inequality		Growth–Inequality Trade-off	
	PRC	India	PRC	India	PRC	India	PRC	India
				Rural				
1984	–	–	–1.56	–1.37	0.14	0.12	0.09	0.09
1987	6.73	2.67	–1.67	–1.63	0.56	0.29	0.33	0.18
1990	–1.47	0.07	–1.75	–1.76	0.49	0.32	0.28	0.18
1993	2.61	0.35	–1.88	–1.81	0.72	0.35	0.38	0.20
1996	8.89	–0.03	–2.37	–1.80	1.90	0.35	0.80	0.19
1999	0.14	2.64	–2.13	–2.01	1.73	0.59	0.81	0.29
2001	1.61	–	–2.12	–	1.85	–	0.87	–
				Urban				
1984			–4.89	–2.45	7.16	1.85	1.46	0.76
1987	6.45	0.61	–3.91	–2.19	7.78	1.73	1.99	0.79
1990	0.56	0.75	–4.03	–2.44	8.23	2.02	2.04	0.83
1993	7.31	1.71	–3.88	–2.56	10.82	2.37	2.79	0.93
1996	5.20	2.53	–3.92	–2.88	13.43	3.10	3.43	1.08
1999	5.07	1.18	–3.43	–2.54	14.26	2.92	4.15	1.15
2001	6.25		–3.70		17.91		4.84	

Note: Poverty elasticities are estimated for the headcount ratio based on the $1-a-day poverty line.
Source: Author's calculations.

Table 2 indicates further that the IGTI is greater for the PRC than India, irrespective of sectors. For both countries, the rural sector requires smaller growth rates to offset an increase in inequality to reduce a given level of poverty, compared to the urban sector. This suggests that the rural sector may adopt growth-enhancing policies. Such policies appear to be applicable for the Indian economy as a whole. For the PRC, however, a different policy needs to be recommended for the urban sector. As shown in the table, urban PRC has grown extremely faster, especially after 1993 when the economy underwent a rapid transformation to a market economy. The rapid growth has resulted in an equally impressive reduction in poverty. However, this impressive performance in growth would have been enhanced if there had been a reduction in income inequality in urban areas. The findings suggest that the urban sector in the PRC needs to focus on pro-poor policies that reduce inequality.

This subsection explores further the trade-off between growth and inequality across country groupings. Bivariate tabular analysis (also known as crossbreaks) is used, which is particularly useful in summarizing the intersections of independent and dependent variables and in understanding the relationship (if any) between those variables. Chi-square analysis is used to test the statistical significance of the results. It is well known that chi-square analysis is used more frequently to test the statistical significance of results reported in bivariate tables.

Table 3 tests the strength of the correlation between countries classified into three groups—Central Asia, PRC-India and Other Asian countries—and the IGTI greater or less than 2.[4] The estimated chi-square shows that the relationship is strong: chi-square value is statistically significant at both 0.05 and 0.10 levels. The result suggests that the inequality–growth trade-off index generally exceeds 2 in the growth spells included for Central Asia, whereas the index is mostly less than 2 for the other two groups. This implies that poverty reduction can be facilitated by pro-poor policies in Central Asia, but by growth-enhancing policies in the other two groups. However, this is not true for individual countries within the groups. As discussed earlier, for the PRC-India group, growth spells in the PRC urban sector had an IGTI way above 2. Similarly, for other Asian countries there are a number of countries that show relatively high values for the trade-off between growth and inequality, namely Malaysia and Thailand. For these countries, pro-poor policies that reduce inequality would be more effective in mitigating poverty.

Table 3. **Inequality-Growth Trade-off** (percent)

	Inequality–Growth Trade-off Index		
	Less than 2	**Greater than 2**	**Total**
Central Asia	5.1	9.0	14.1
PRC and India	29.5	6.4	35.9
Other Asian Countries	34.6	15.4	50.0
Total	69.2	30.8	100.0
Chi-Square (2) = **7.77**			

Note: Although figures presented in the table are in percentage, raw frequencies or number of growth spells have been used to compute chi-square. The degree of freedom is 2 in this tabular analysis. Critical values of χ^2 with 2 degrees of freedom are 5.99 and 4.61 for 5% and 10% level, respectively.
Source: Author's calculations.

Finally, another interesting finding that emerges from the IGTI is that the index increases steadily with the level of inequality. As seen from Table 4, 81.3 percent of total growth spells have a Gini index greater than 0.3; on the other hand, 56 percent of the growth spells have Gini ranging between 0.3 and 0.4, and

[4]For this study, countries are grouped into three. The grouping was largely controlled by the number of growth spells available for each group.

25.3 percent of the spells have Gini greater than 0.4. Statistical tests show that based on the results in Table 4, there is a highly significant positive relationship between the trade-off index and the level of inequality: the higher the inequality, the greater will be the growth rate required to compensate for the increase in inequality to achieve a given level of poverty reduction. Hence, it is valid to conclude that inequality-reducing pro-poor policies will be more effective in achieving poverty reduction when the level of inequality is high.

Table 4. **Inequality–Growth Trade-off by Inequality** (percent)

	Growth–Inequality Trade-off Index		
	Less than 2	**Greater than 2**	**Total**
Gini less than 30	13.3	5.3	18.7
Gini between 30–40	46.7	9.3	56.0
Gini greater than 40	8.0	17.3	25.3
Total	68.0	32.0	100.0
Chi-square (2) = **16.20**			

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

Source: Author's calculations.

III. POVERTY EQUIVALENT GROWTH RATE

Section II has focused on identifying the development strategy that a country could follow, i.e., whether it should focus on enhancing growth rates or reducing inequality. The analysis presented in the previous section was purely *ex ante*. In this section, an *ex post* analysis of growth pattern is presented. A new measure of pro-poor growth called the poverty equivalent growth rate, developed by Kakwani and Son (2008), is used for this purpose. It is the counter-factual growth rate that would have generated the same percentage change in poverty if the Lorenz curve had remained constant. Growth is declared "pro-poor" if the PEGR is greater than a benchmark. In this study, the benchmark is the actual growth rate in the mean income (or expenditure). This implies that there is a gain in the growth rate when growth is pro-poor, which benefits the poor proportionally more than the nonpoor.[5] If the PEGR is less than the actual growth rate, there is a loss of growth rate when growth is anti-poor, which benefits the nonpoor proportionally more than the poor.[6]

[5]This definition of pro-poor growth is also adopted in Kakwani and Pernia (2000). But the measure of pro-poor growth proposed by them (called the pro-poor index) focuses only on the distribution of benefits of growth between the poor and the nonpoor and, therefore, is not sufficient to determine any change in poverty.

[6]The difference between the PEGR and the benchmark growth rate (i.e., actual growth rate of mean income) captures gains or losses of the growth rate due to changes in the distribution of income. The gains imply pro-poor growth that will require lower rates of growth to achieve the same level of poverty reduction; the losses imply anti-poor growth that will require higher growth rates to achieve the same level of poverty reduction.

The PEGR can be calculated for any poverty measure. For the countries in this study, empirical results of PEGR are presented for the three most widely used poverty measures, namely headcount ratio, poverty gap ratio, and severity of poverty.[7]

As expected, the proportional reduction in poverty is a monotonically increasing function of the PEGR, wherein the larger the PEGR, the greater the proportional reduction in poverty. Thus, maximizing the PEGR implies a maximum reduction in poverty. This basic condition is not always satisfied by many measures of pro-poor growth proposed in the literature, including those of Kakwani and Pernia (2000) and Ravallion and Chen (2003).[8] Hence, the PEGR provides not only a necessary but also a sufficient condition for poverty reduction.

IV. PRO-POOR GROWTH IN ASIA

This section analyzes the pro-poor growth in 17 low- and middle-income Asian countries. The analysis is based on detailed estimates of pro-poor growth as shown by empirical estimates of the PEGR for individual countries in Appendix Tables A.2 and A.3. Aggregate results are presented in Tables 5 and 6.

Table 5 summarizes the estimates of pro-poor growth based on a $1-a-day poverty line. The results reveal that out of 59 growth spells, 17 (28.8 percent) had negative growth rates and 42 (71.2 percent) had positive growth rates. Of the 42 spells when growth rates were positive, there were an equal number of cases when growth was pro-poor and anti-poor, i.e., 21 cases (or 35.6 percent of the 59 growth spells). In seven out of the 17 growth spells of negative growth rates, the poor proportionally suffered a greater decline in their income compared to the nonpoor. Thus, growth processes in Asia have generally been favorable to the poor. The findings suggest further that poverty reduction in Asia has been generally contributed by positive growth and facilitated by the pro-poor growth pattern. Note that these findings are true for the case where pro-poor growth is defined in terms of the headcount ratio.

The story changes, however, when pro-poor growth is calculated using the poverty gap ratio and severity of poverty measure. Results show that growth processes in Asia have not been favorable to the extremely poor who live far below the $1-a-day poverty line. On the whole, while growth in Asia has been generally positive, it has benefited mostly the poor clustered around the poverty

[7] A detailed discussion on the PEGR is provided in the Appendix.

[8] This paper shows that Ravallion and Chen's (2003) measure satisfies monotonicity under highly restricted conditions.

threshold, but not the very poor. The same conclusion emerges when calculations are based on the $2-a-day poverty line (see Table 6).[9]

Table 5. **Pro-Poor Growth, Summary Results for 17 Asian Countries**
(based on the $1-a-day poverty line)

	Positive Growth	Negative Growth	All Growth Spells
Based on the headcount ratio			
Pro-poor	21 (35.6%)	10 (16.9%)	31 (52.5%)
Not pro-poor	21 (35.6%)	7 (11.9%)	28 (47.5%)
Total spells	42 (71.2%)	17 (28.8%)	59 (100%)
Based on the poverty gap ratio			
Pro-poor	13 (22.0%)	13 (22.0%)	26 (44.1%)
Not pro-poor	29 (49.2%)	4 (6.8%)	33 (55.9%)
Total spells	42 (71.2%)	17 (28.8%)	59 (100%)
Based on the severity of poverty			
Pro-poor	15 (25.4%)	11 (18.6%)	26 (44.1%)
Not pro-poor	27 (45.8%)	6 (10.2%)	33 (55.9%)
Total spells	42 (28.8%)	17 (28.8%)	59 (100%)

Source: Author's calculations based on Appendix Table A.2.

Table 6. **Pro-poor Growth, Summary Results for 17 Asian countries**
(based on the $2-a-day poverty line)

	Positive Growth	Negative Growth	All Growth Spells
Based on the headcount ratio			
Pro-poor	26 (44.1%)	7 (11.9%)	33 (55.9%)
Not pro-poor	16 (27.1%)	10 (16.9%)	26 (44.1%)
Total spells	42 (71.2%)	17 (28.8%)	59 (100%)
Based on the poverty gap ratio			
Pro-poor	13 (22.0%)	5 (8.5%)	18 (30.5%)
Not pro-poor	29 (49.2%)	12 (20.3%)	41 (69.5%)
Total spells	42 (71.2%)	17 (28.8%)	59 (100%)
Based on the severity of poverty			
Pro-poor	13 (22.0%)	8 (13.6%)	21 (35.6%)
Not pro-poor	29 (49.2%)	9 (15.3%)	38 (64.4%)
Total spells	42 (71.2%)	17 (28.8%)	59 (100%)

Source: Author's calculations based on Appendix Table A.3.

[9]These conclusions are drawn based on *ex post* analysis. On the other hand, the results emerging from Section II are based on *ex ante* analysis. The two are different issues while they are related. Nevertheless, issues relating to who benefits from growth appear to be more complex in practice. Whether growth benefits proportionally more (or less) the ultra-poor or the poor near the poverty line seems to differ across countries, depending upon policies adopted by a country. Policy tools targeting the ultra-poor would be different from those aimed at helping the poor near the poverty line.

Based further on the detailed estimates of pro-poor growth in Appendix Tables A.2 and A.3, countries with extreme losses and gains are identified (see Table 7). Losses and gains of growth rate are those resulting from anti-poor and pro-poor growth patterns. A growth spell with extreme loss is one showing a loss of growth rate of more than 5 percent per annum because of the anti-poor growth pattern over the growth spell. Similarly, a spell is defined as having an extreme gain if the gain of growth rate is greater than 5 percent per annum due to the pro-poor growth pattern between the growth spell.

Table 7 shows two countries in Central Asia (Kazakhstan and Kyrgyz Republic) as having extreme gains in the 1990s.[10] Although their growth performance was not impressive as they were in the transition period from socialist to market economy, the patterns of growth occurred in a way that benefited the poor proportionally more than the nonpoor. In the case of Armenia, the gains of growth were even much greater for the very poor during 1996–1999: gains of growth rate at 6.41 percent based on the severity of poverty, is far greater than 2.57 percent based on the headcount ratio.

The same table shows that three growth spells in the PRC rural sector have been identified as having extreme gains of growth rate that stemmed from the pro-poor growth pattern over the spells. Two growth spells occurred in the 1980s and the other in the mid-1990s. The former spells could have resulted from economic reforms launched since 1978, while the latter spell could have been due mainly to the opening up of the PRC market to the global economy since 1992. More interestingly, the gains of growth rate have fallen over the period. This drop may not be due to the lack of income growth, but due to rising income inequality. The PRC used to be a rather egalitarian society in both the urban and rural sectors before economic reforms (Yao et al. 2004). Since the reforms, inequality increased almost continuously over time.

Has fast growth accompanied more rapid increases in inequality in the PRC? This does not appear to be true. For the PRC rural sector, the periods of falling inequality (1981–1987 and 1993–1996) had the highest growth in average rural household income (Appendix Table A.2). Nevertheless, as discussed in Subsection II-B, poverty reduction in the PRC would have proceeded much faster if inequality had not increased, given the same level of growth.

In addition, there is an uneven growth between the poor and the very poor in the PRC rural sector. This is based on the observation that while extremely high gains are recorded for the headcount ratio, losses are estimated for both the poverty gap ratio and severity of poverty. This suggests that the very poor in the PRC rural sector may have been left behind in the benefits of economic growth over the period. This can be also observed in the case of Pakistan.

[10] Armenia (1996–1999) could be also included as having extreme gains if we consider these gains in terms of the poverty gap ratio (6.04) and the severity of poverty ratio (6.41). Armenia was not included here because its gains of growth rate were only 2.57 for the headcount index.

Table 7. **Countries with Extreme Losses and Gains**

Countries	Growth Spells	Gains (+)/losses (-) of Growth Rate (per annum)			Change in Gini (percentage points)
		Headcount	Poverty Gap	Severity	
Countries with growth spells (gains > + 5)					
PRC - rural	1981–84	38.10	–0.57	–0.72	0.02
	1984–87	9.28	–0.60	–1.23	0.03
	1993–96	8.78	–0.51	–1.34	0.02
India - rural	1984–87	5.83	–0.38	–0.14	0.00
	1996–99	7.38	0.38	0.14	–0.00
Indonesia	1996–99	6.31	4.06	4.39	–0.06
Kazakhstan	1996–99	9.11	6.68	7.92	–0.02
Kyrgyz Republic	1993–99	20.59	19.29	22.67	–0.07
	1999–01	6.18	9.90	13.33	–0.09
Pakistan	1990–93	8.20	–0.73	–0.57	0.01
	1996–99	5.21	–1.34	–1.51	0.02
Countries with growth spells (Losses < - 5)					
PRC - urban	1987–90	–8.85	–7.89	–10.01	0.12
Lao PDR	1993–96	–12.25	–3.24	–4.48	0.07
Malaysia	1993–96	–10.22	–4.15	–4.89	0.01
Sri Lanka	1990–93	–6.29	–3.39	–3.70	0.04

Source: Author's calculations based on Appendix Table A.3 using the $2-a-day poverty line.

Table 7 also presents four growth spells that are identified as having extreme losses. Extreme volatility in losses (or gains) of growth rates can occur due to changes in inequality. This reflects a growth pattern that is not stable. As shown in the table, all four growth spells with extreme losses have shown an increase in the Gini index over the spell. In theory, there is no monotonic relationship between gains (or losses) of growth rate and a fall (or rise) in the Gini index. Yet, the empirical results show that the growth spells with extreme losses coincide with a rise in the Gini coefficient over the growth spell. In particular, the Gini index showed a sharp increase in the PRC urban sector during the 1987–1990 period. At the same time, the benefits of the growth flew to the nonpoor proportionally more than the poor. The same can be said about the other countries with extreme losses, namely, Lao PDR, Malaysia, and Sri Lanka.

V. CONCLUSIONS

There are a number of valuable lessons that can be derived from taking this analytical approach to the current study on interrelationship between inequality, growth, and poverty in Asia. These are all relevant for analytical as well as policy perspectives.

First, to analyze the trade-off between inequality and growth, this study used an analytical tool called inequality–growth trade-off index. In addition, a measure of pro-poor growth—called the poverty equivalent growth rate—proposed by Kakwani and Son (2008) was also employed to study the distributional impact of growth. Although these two analytical tools were applied to cross-country data sets for 17 Asian countries, data quality was often a major concern. Hence, one should be cautious when applying these tools for cross-country analysis. Instead, it would be highly recommendable to use micro unit record household surveys for such analyses.

Corollary to the foregoing, it should be noted that while cross-country analysis is useful and has generated many insights, this approach tends to neglect country heterogeneity in the growth–inequality–poverty relationship and is empirically unable to generate robust determinants of pro-poor growth that are valid across the developing world. Therefore, policy recommendations emerging from cross-country analysis should not be prescribed for individual countries without analysis at a specific country level.

Third, some policy implications that emerge from the empirical analysis are as follows:

(i) Pro-poor policies that reduce inequality, if adopted, would benefit the ultra-poor much more than the poor living close to the poverty line.
(ii) The IGTI increases monotonically with the level of income. This indicates greater effectiveness of pro-poor policies in countries with higher incomes than in countries with lower incomes. Equivalently, growth-enhancing policies would be more effective for countries where mean income is low and the trade-off index is very small, say less than 1.
(iii) When the level of inequality is higher, the trade-off index will be greater. Where high inequality persists, inequality-reducing pro-poor policies would be more effective.

Finally, this study shows that the scope for future research in this area remains vast. It is true that the pro-poor growth debate has successfully stirred public awareness on the importance of redistributing the benefits of growth among the poor and the nonpoor. Until this stage, this debate has largely focused on income dimensions. Nonetheless, there are nonincome dimensions that are material and remain significant for human well-being. Hence, extending and linking the pro-poor growth analysis to nonincome dimensions of human well-being should be pursued as a research and policy agenda.

APPENDIX
METHODOLOGY

Inequality–Growth Trade-off Index

The Foster, Greer, and Thorbecke (1984) poverty measures are the mostly widely used in the poverty literature. These measures are given by

$$P_\alpha = \int_0^z \left(\frac{z-x}{z} \right)^\alpha f(x)dx \qquad (1)$$

where z is the poverty line, $f(x)$ is the density function individual income x, and α is the parameter of inequality aversion. When $\alpha = 0$, $P_\alpha = H$, which is the headcount ratio; when $\alpha = 1$, $P_\alpha = PG$, which is the poverty gap ratio; and when $\alpha = 2$, $P_\alpha = SP$, which is the severity of poverty measure and also called the gap-squared measure of poverty. This paper focuses only on these three measures because they capture all important aspects of poverty.

The degree of poverty depends on two factors: average income and income inequality. While an increase in average income reduces poverty, an increase in inequality increases poverty. The responsiveness of poverty to changes in mean income when inequality remains fixed can be measured by the poverty elasticity of growth. A poverty measure can always be written as

$$P = P(\mu\, L(p))$$

where μ is the mean income of the society and L(p) is the Lorenz curve measuring the relative income distribution. L(p) is the percentage of income that is enjoyed by the bottom $100 \times$ p percent of the population. The poverty elasticity of growth is defined as

$$\eta = \frac{\partial P}{\partial \mu} \frac{\mu}{P}$$

which is the percentage change in poverty in response to a growth rate of 1 percent, provided income inequality measured by the Lorenz curve does not change. This elasticity is always negative.

Kakwani (1993) derived the poverty elasticity of growth for the Foster, Greer, and Thorbecke poverty measures as

$$\eta_\alpha = -\frac{zf(z)}{H}, \text{ when } \alpha = 0$$

$$= -\frac{\alpha[P_{\alpha-1} - P_\alpha]}{P_\alpha}, \text{ when } \alpha \geq 1 \tag{2}$$

Substituting $\alpha = 1$ in (2) gives the poverty elasticity of growth for the poverty gap (PG) ratio as $-\frac{(H-PG)}{PG}$. Similarly, substituting $\alpha = 2$ in (2) gives this elasticity for the severity of poverty (SP) as $-\frac{2(PG-SP)}{SP}$.

Measuring the effect of inequality on poverty is a difficult task because inequality in distribution can change in infinite ways. It is not possible to establish a simple formula relating changes in aggregate measures of inequality such as the Gini index to changes in poverty. To explore the impact of inequality on poverty, a more precise shift in the Lorenz curve needs to be identified.

Kakwani (1993) made a simple assumption that the entire Lorenz curve shifts proportionally over the whole range. This gives the analytically tractable elasticity of poverty measures P_α with respect to the Gini index, denoted by ε_α which may be called the poverty elasticity of inequality:

$$\varepsilon_H = \frac{\partial P_\alpha}{\partial G}\frac{G}{P_\alpha} = \frac{(\mu - z)f(z)}{F(z)}, \text{ when } \alpha = 0$$

$$= \frac{\alpha}{zP_\alpha}\left[(\mu - z)P_{\alpha-1} + zP_\alpha\right], \text{ when } \alpha \geq 1 \tag{3}$$

which is the percentage change in poverty when the Gini index increases by 1 percent while mean income remains constant (when growth rate is zero). This elasticity should always be positive. Substituting $\alpha = 1$ in (3) gives the poverty elasticity of inequality for the poverty gap (PG) ratio as $\frac{[(\mu - z)H + zPG]}{zPG}$. And substituting $\alpha = 2$ in (3) gives this elasticity for the severity of poverty (SP) as $\frac{2[(\mu - z)PG + zSP]}{zSP}$.

The total proportional change in poverty can be expressed as:

$$\frac{dP_\alpha}{P_\alpha} = \eta_\alpha \frac{d\mu}{\mu} + \varepsilon_\alpha \frac{dG}{G} \tag{4}$$

where the first term in the right hand side measures the impact of growth on poverty and the second term captures the impact of changes in Gini on poverty. Equating the total proportional change in poverty to zero leads to the inequality–growth tradeoff index (IGTI) proposed by Kakwani (1993) as

$$IGTI = \frac{\partial \mu}{\partial G}\frac{G}{\mu} = -\frac{\varepsilon_\alpha}{\eta_\alpha} \tag{5}$$

The IGTI calculates the percentage of growth in mean income that is required to offset the increase in the Gini index by 1 percent. This suggests that with larger values of the growth–inequality tradeoff index, the benefits of adopting pro-poor policies that reduce inequality will be greater.

Poverty Equivalent Growth Rate

Suppose μ is the mean income of the society and γ is the actual growth rate of μ, then we can write $\gamma = dLn(\mu)$. The total poverty elasticity is defined as the proportional change in poverty (measured by P_α) divided by the growth rate of mean income γ:

$$\delta_\alpha = dLn(P_\alpha)/\gamma$$

which measures the responsiveness of poverty measure P_α with respect to the growth rate of mean income. Following Kakwani and Son (2008), total poverty elasticity can be written as the sum of the two components:

$$\delta_\alpha = \eta_\alpha + \zeta_\alpha$$

where η_α is the poverty elasticity of growth as defined in (2) and ζ_α measures the inequality effect of poverty reduction. This shows how poverty changes due to changes in inequality that accompany the growth process. The growth is pro-poor (anti-poor) if the change in inequality that accompanies growth reduces (increases) total poverty.[11] That is to say, the growth is pro-poor (anti-poor) if the total elasticity of poverty is greater (less) than the growth elasticity of poverty.

Kakwani and Pernia (2000) developed the idea of a pro-poor growth index defined as the ratio of the total poverty elasticity to the growth elasticity of poverty:

$$\varphi_\alpha = \frac{\delta_\alpha}{\eta_\alpha}$$

From this, a growth process is said to be pro-poor (anti-poor) if φ_α is greater (less) than 1. In addition, a growth process is defined as distribution-neutral if $\varphi_\alpha = 1$.

[11] Many studies measure the pro-poorness of growth by changes in the Gini index. The Gini index is not an appropriate measure of inequality to measure pro-poor growth because there is no monotonic relationship between changes in the Gini index and poverty reduction. With mean income remaining the same, an increase or a decrease in the Gini index can still leave poverty unchanged; similarly, an increase or a decrease in the Gini index can lead to a reduction or an increase in poverty. Thus, a change in the Gini index cannot always tell us whether or not growth is pro-poor. ζ defined in (10) has a direct relationship with changes in poverty. It is derived from that part of the Lorenz curve that directly affects the poor.

However, this index φ_α merely measures how the benefits of growth are distributed across the population. Nevertheless, a change in poverty depends on both growth rate in mean income and distribution of benefits of growth. Thus, Kakwani and Pernia's pro-poor growth index is not sufficient to determine any change in poverty.

To address this issue, Kakwani and Son (2008) introduced the idea of a poverty equivalent growth rate (PEGR). It is the growth rate $\gamma^*\alpha$ that would result in the same proportional reduction in poverty as the present growth rate γ if the growth process did not accompany any change in inequality (i.e., when everyone in society received the same proportional benefits of growth). The actual proportional reduction in poverty is given by $\delta_\alpha\gamma$, where δ_α is the total poverty elasticity. If growth were distribution-neutral (i.e., inequality did not change), then the growth rate $\gamma^*\alpha$ would achieve a proportional reduction in poverty equal to $\eta_\alpha\gamma^*\alpha$, which should be equivalent to $\delta_\alpha\gamma$. Thus, the PEGR denoted for poverty measures P_α by $\gamma^*\alpha$ is given by

$$\gamma^*{}_\alpha = (\delta_\alpha / \eta_\alpha)\gamma = \varphi_\alpha\ \gamma \tag{6}$$

which can also be written as

$$\gamma^*{}_\alpha = \gamma + (\varphi_\alpha - 1)\gamma$$

The PEGR measured by $\gamma^*\alpha$ is the effective growth rate of poverty reduction. The second term on the right hand side of this equation gives a gain (loss) in growth rate when growth is pro-poor (anti-poor).

The PEGR can be estimated if there is household income and expenditure survey for two periods. Suppose μ_1 and μ_2 are the mean incomes in the periods 1 and 2, respectively, then the growth rate in mean income between the two periods can be estimated as

$$\hat{\gamma} = Ln\,(\mu_2) - Ln\,(\mu_1) \tag{7}$$

The total poverty elasticity can similarly be estimated as

$$\hat{\delta} = \left(Ln\left[P_{\alpha 2}\right] - Ln\left[P_{\alpha 1}\right]\right) / \hat{\gamma} \tag{8}$$

where $P_{\alpha 1}$ and $P_{\alpha 2}$ are the poverty measures estimated for periods 1 and 2, respectively.

The poverty elasticity of growth can be estimated for any period using equation (2) given above. In order to satisfy the monotonicity of proportional

reduction in poverty and the PEGR, the poverty elasticity of growth for each period needs to be utilized. It can be easily shown that the monotonicity requirement will be satisfied if the poverty elasticity of growth is estimated as

$$\hat{\eta}_{\alpha} = (\hat{\eta}_{\alpha 1} + \hat{\eta}_{\alpha 2})/2 \tag{9}$$

where $\hat{\eta}_{\alpha 1}$ and $\hat{\eta}_{\alpha 2}$ are the estimates of poverty elasticity of growth in periods 1 and 2, respectively. Using (7), (8) and (9) into (6) gives a consistent estimate of the PEGR as

$$\hat{\gamma}^{*}{}_{\alpha} = (\hat{\delta}_{\alpha} / \hat{\eta}_{\alpha})\hat{\gamma}$$

APPENDIX TABLES

Appendix Table A.1. **Growth–Inequality Trade-Off Index**
(based on the $1-a-day poverty line)

Country	Survey Period	Mean Expenditures at 1993 PPP	Growth–Inequality Trade-off Index		
			Headcount Ratio	Poverty Gap Ratio	Severity of Poverty
Central Asia					
Armenia	1996	134.58	3.11	4.26	5.41
	1999	85.78	1.62	2.53	3.53
Azerbaijan	1996	94.41	1.88	2.77	3.67
	1999	118.68	2.62	3.62	4.79
Kazakhstan	1996	147.7	3.51	4.44	5.56
	1999	149.15	3.56	4.45	6.16
Kyrgyz Republic	1993	319.67	8.76	15.51	20.94
	1999	158.84	3.85	5.44	8.70
	2001	104.57	2.19	2.61	2.99
Turkmenistan	1993	69.91	1.14	1.87	2.27
	1996	93.83	1.87	2.71	3.28
PRC and India					
PRC - rural	1981	26.28	0.00	0.25	0.48
	1984	35.69	0.09	0.53	0.82
	1987	43.68	0.33	0.87	1.24
	1990	41.8	0.28	0.75	1.04
	1993	45.2	0.38	0.86	1.17
	1996	59.02	0.80	1.31	1.57
	1999	59.27	0.81	1.37	1.65
	2001	61.21	0.87	1.45	1.74
PRC - urban	1981	70.38	1.15	1.70	3.01
	1984	80.68	1.46	2.18	4.34
	1987	97.89	1.99	3.27	7.97
	1990	99.54	2.04	3.10	6.17

continued next page.

Appendix Table A.1. *continued.*

	1993	123.96	2.79	4.17	7.71
	1996	144.9	3.43	5.05	8.74
	1999	168.71	4.15	6.41	13.43
	2001	191.16	4.84	7.03	12.14
India - rural	1984	35.68	0.09	0.58	0.87
	1987	38.66	0.18	0.64	0.92
	1990	38.74	0.18	0.62	0.87
	1993	39.15	0.20	0.62	0.88
	1996	39.11	0.19	0.61	0.84
	1999	42.33	0.29	0.71	0.93
India - urban	1984	57.49	0.76	1.28	1.65
	1987	58.55	0.79	1.33	1.60
	1990	59.89	0.83	1.38	1.76
	1993	63.04	0.93	1.45	1.79
	1996	68.01	1.08	1.61	2.00
	1999	70.46	1.15	1.70	1.97
Other Asia					
Bangladesh	1996	54.96	0.68	1.12	1.42
	1999	47.2	0.44	0.86	1.08
Indonesia	1987	55.67	0.70	1.17	1.40
	1993	68.54	1.09	1.48	1.64
	1996	76.07	1.32	1.75	2.01
	1999	74.21	1.27	1.65	2.02
	2001	81.84	1.50	1.84	2.12
Lao PDR	1993	74.44	1.27	1.59	1.96
	1996	59.19	0.81	1.39	1.82
Malaysia	1984	236.9	6.24	8.09	10.13
	1987	228.54	5.98	7.13	8.13
	1990	242.73	6.41	7.80	10.12
	1993	257.04	6.85	7.48	--
	1996	209.8	3.74	7.13	8.15
Mongolia	1996	84.15	1.57	2.24	2.71
	1999	55.57	0.70	1.40	1.88
Pakistan	1987	41.05	0.25	0.79	1.11
	1990	41.66	0.27	0.83	1.17
	1993	51.48	0.57	1.10	1.44
	1996	50.84	0.55	0.99	1.30
	1999	65.21	1.06	1.45	1.87
Philippines	1984	77.72	1.37	2.06	2.39
	1987	79.83	1.44	2.08	2.36

continued next page.

Appendix Table A.1. *continued.*

	1990	87.86	1.68	2.41	2.74
	1996	107.45	2.28	3.05	3.40
	1999	104.13	2.18	2.95	3.30
Sri Lanka	1987	80.45	1.46	1.99	2.48
	1990	86.84	1.65	2.22	3.04
	1993	80.65	1.46	1.95	2.35
Thailand	1987	84.55	1.58	2.25	2.53
	1990	116.51	2.56	3.11	3.37
	1996	143.87	3.39	3.69	4.13
	1999	136.81	3.18	3.31	--
	2001	133.86	3.09	3.20	--
Viet Nam	1993	75.4	1.30	1.79	2.09
	1996	86.89	1.65	2.13	2.47
	2001	112.94	2.45	2.75	3.14

-- indicates a zero value for the severity of poverty.
Source: Author's calculations.

Appendix Table A.2. **Pro-Poor Growth Estimates for 17 Asian Countries**
(based on the $1-a-day poverty line)

Country	Growth Spell	Actual Growth Rate (per annum)	Poverty Equivalent Growth Rate			Gains(+)/Losses(-) of Growth Rates		
			Head-count	Poverty Gap	Severity	Head-count	Poverty Gap	Severity
Central Asia								
Armenia	1996							
	1999	–15.01	–9.39	–8.47	–10.36	5.62	6.54	4.65
Azerbaijan	1996							
	1999	7.63	6.07	7.08	7.64	–1.56	–0.54	0.02
Kazakhstan	1996							
	1999	0.33	6.16	7.17	7.73	5.84	6.84	7.41
Kyrgyz Republic	1993							
	1999	–11.66	18.19	21.48	27.81	29.84	33.14	39.46
	2001	–20.90	4.78	5.52	15.04	25.68	26.42	35.94
Turkmenistan	1993							
	1996	9.81	8.06	5.40	4.78	–1.75	–4.41	–5.03

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Appendix Table A.2. *continued.*

PRC and India								
PRC - rural	1981							
	1984	10.20	15.79	9.41	9.13	5.59	–0.80	–1.07
	1987	6.73	6.99	4.56	3.69	0.26	–2.17	–3.04
	1990	–1.47	–1.74	–1.15	–0.10	–0.27	0.32	1.37
	1993	2.61	3.07	2.00	1.87	0.46	–0.61	–0.74
	1996	8.89	9.70	6.42	6.63	0.81	–2.47	–2.26
	1999	0.14	–2.27	–1.50	–1.59	–2.41	–1.64	–1.73
	2001	1.61	0.30	0.20	0.12	–1.31	–1.41	–1.49
PRC - urban	1981							
	1984	4.55	7.62	10.43	16.52	3.07	5.88	11.97
	1987	6.45	5.86	8.90	13.74	–0.59	2.45	7.30
	1990	0.56	–14.31	–21.80	–41.99	–14.86	–22.36	–42.55
	1993	7.31	3.04	4.28	8.40	–4.27	–3.03	1.09
	1996	5.20	6.30	9.00	16.08	1.10	3.79	10.88
	1999	5.07	–2.19	–3.21	–9.73	–7.26	–8.28	–14.80
	2001	6.25	6.19	8.92	21.68	–0.05	2.68	15.43
India - rural	1984							
	1987	2.67	4.43	2.77	3.12	1.75	0.09	0.45
	1990	0.07	2.21	1.42	1.52	2.14	1.35	1.45
	1993	0.35	0.04	0.03	0.12	–0.31	–0.32	–0.23
	1996	–0.03	0.24	0.15	0.50	0.28	0.19	0.54
	1999	2.64	3.95	2.51	2.43	1.31	–0.13	–0.21
India - urban	1984							
	1987	0.61	–1.34	–0.93	–0.12	–1.95	–1.54	–0.73
	1990	0.75	2.09	1.46	0.53	1.34	0.71	–0.23
	1993	1.71	2.07	1.49	1.93	0.36	–0.22	0.22
	1996	2.53	1.98	1.43	1.25	–0.55	–1.10	–1.28
	1999	1.18	0.68	0.47	1.12	–0.50	–0.71	–0.06
Other Asia								
Bangladesh	1996							
	1999	–5.07	–3.88	–2.54	–2.05	1.20	2.53	3.03
Indonesia	1987							
	1993	3.47	5.86	3.00	3.08	2.40	–0.47	–0.38
	1996	3.47	2.35	1.37	0.62	–1.13	–2.11	–2.86
	1999	–0.83	5.39	4.29	3.30	6.22	5.11	4.12
	2001	4.89	1.23	1.01	2.61	–3.66	–3.88	–2.29

continued next page.

Appendix Table A.2. *continued.*

Lao PDR	1993							
	1996	–7.64	–17.54	–15.40	–18.23	–9.90	–7.76	–10.59
Malaysia	1984							
	1987	–1.20	5.80	5.73	8.18	7.00	6.93	9.37
	1990	2.01	3.60	3.72	1.83	1.59	1.71	–0.18
	1993	1.91	4.99	5.62	--	3.08	3.71	--
	1996	–6.77	–16.13	–16.46	--	-9.36	–9.69	--
Mongolia	1996							
	1999	–13.83	–14.60	–11.65	–12.53	–0.77	2.19	1.30
Pakistan	1987							
	1990	0.49	0.40	0.26	0.00	–0.09	–0.23	–0.49
	1993	7.06	9.90	6.81	7.15	2.85	–0.24	0.10
	1996	–0.42	3.88	2.77	3.18	4.29	3.19	3.60
	1999	8.30	8.16	6.79	6.61	–0.14	–1.51	–1.69
Philippines	1984							
	1987	0.89	2.21	1.29	1.53	1.31	0.39	0.63
	1990	3.19	–0.34	–0.19	–0.33	–3.54	–3.39	–3.53
	1996	3.35	3.07	1.71	1.57	–0.28	–1.64	–1.78
	1999	–1.05	–1.58	–0.86	–0.76	–0.53	0.18	0.29
Sri Lanka	1987							
	1990	2.55	6.06	5.89	5.19	3.51	3.34	2.64
	1993	–2.46	–6.46	–6.03	–4.46	–4.00	–3.57	–1.99
Thailand	1987							
	1990	10.69	12.84	7.29	7.06	2.15	–3.39	–3.63
	1996	3.52	5.53	3.56	4.05	2.02	0.05	0.53
	1999	–1.68	2.82	1.19	--	4.49	2.87	--
	2001	–1.09	0.90	0.26	--	1.99	1.35	--
Viet Nam	1993							
	1996	4.73	4.93	3.86	3.66	0.20	–0.87	–1.06
	2001	5.24	5.11	4.79	5.82	–0.14	–0.45	0.57

-- indicates that the severity of poverty is zero.

Note: Gains and losses were calculated by taking the difference between poverty equivalent growth rate and annual growth rate.

Source: Author's calculations.

Appendix Table A.3. **Pro-Poor Growth Estimates for 17 Asian Countries**
(based on the $2-a-day poverty line)

Country	Growth Spell	Actual Growth Rate (per annum)	Poverty Equivalent Growth Rate			Gains(+)/Losses(-) of Growth Rates		
			Headcount	Poverty Gap	Severity	Headcount	Poverty Gap	Severity
Central Asia								
Armenia	1996							
	1999	–15.01	–12.44	–8.98	–8.60	2.57	6.04	6.41
Azerbaijan	1996							
	1999	7.63	6.58	5.24	5.47	–1.04	–2.39	–2.15
Kazakhstan	1990							
	1996	–1.65	–5.14	–3.57	–3.95	–3.49	–1.91	–2.30
	1999	0.33	9.43	7.01	8.24	9.11	6.68	7.92
Kyrgyz Republic	1993							
	1999	–11.66	8.94	7.64	11.01	20.59	19.29	22.67
	2001	–20.90	–14.73	–11.00	–7.57	6.18	9.90	13.33
Turkmenistan	1993							
	1996	9.81	9.36	6.01	5.91	–0.45	–3.80	–3.90
PRC and India								
PRC - rural	1981							
	1984	10.20	48.31	9.63	9.48	38.10	–0.57	–0.72
	1987	6.73	16.01	6.13	5.50	9.28	–0.60	–1.23
	1990	–1.47	–6.16	–2.55	–2.02	–4.70	–1.08	–0.56
	1993	2.61	4.77	1.79	1.88	2.17	–0.81	–0.72
	1996	8.89	17.67	8.39	7.55	8.78	–0.51	–1.34
	1999	0.14	–1.51	–0.81	–1.08	–1.65	–0.95	–1.22
	2001	1.61	1.49	0.81	0.56	–0.12	–0.80	–1.05
PRC - urban	1981							
	1984	4.55	7.36	5.62	6.16	2.81	1.07	1.61
	1987	6.45	7.82	6.82	6.59	1.37	0.38	0.14
	1990	0.56	–8.29	–7.33	–9.45	–8.85	–7.89	–10.01
	1993	7.31	4.43	3.71	3.57	–2.89	–3.61	–3.75
	1996	5.20	5.29	4.59	5.09	0.09	–0.62	–0.11
	1999	5.07	1.27	1.14	0.30	–3.80	–3.93	–4.77
	2001	6.25	2.78	2.55	3.49	–3.47	–3.70	–2.75
India - rural	1984							
	1987	2.67	8.50	2.29	2.53	5.83	–0.38	–0.14
	1990	0.07	3.93	1.11	1.23	3.86	1.04	1.16

continued next page.

Appendix Table A.3 *continued.*

	1993	0.35	–0.45	–0.13	–0.08	–0.80	–0.48	–0.43
	1996	–0.03	–0.65	–0.17	0.00	–0.62	–0.14	0.03
	1999	2.64	10.02	3.01	2.78	7.38	0.38	0.14
India - urban	1984							
	1987	0.61	–1.17	–0.62	–0.78	–1.78	–1.23	–1.38
	1990	0.75	3.11	1.67	1.70	2.35	0.92	0.94
	1993	1.71	2.59	1.44	1.46	0.88	–0.26	–0.24
	1996	2.53	1.94	1.09	1.03	–0.59	–1.44	–1.50
	1999	1.18	3.44	2.00	1.60	2.26	0.82	0.42
Other Asia								
Bangladesh	1996							
	1999	–5.07	–4.47	–1.78	–2.09	0.61	3.30	2.99
Indonesia	1987							
	1993	3.47	5.66	3.06	3.03	2.19	–0.40	–0.44
	1996	3.47	3.95	2.23	2.16	0.47	–1.25	–1.31
	1999	–0.83	5.48	3.23	3.57	6.31	4.06	4.39
	2001	4.89	1.42	0.85	0.79	–3.48	–4.05	–4.10
Lao PDR	1993							
	1996	–7.64	–19.89	–10.88	–12.12	–12.25	–3.24	–4.48
Malaysia	1984							
	1987	–1.20	1.72	1.28	2.10	2.92	2.48	3.30
	1990	2.01	5.31	3.90	4.05	3.31	1.89	2.04
	1993	1.91	-2.02	–1.43	–0.80	–3.93	–3.34	–2.71
	1996	–6.77	–16.99	–10.91	–11.66	–10.22	–4.15	–4.89
Mongolia	1996							
	1999	–13.83	–17.57	–11.62	–11.56	–3.74	2.22	2.27
Pakistan	1987							
	1990	0.49	2.31	0.80	0.58	1.82	0.31	0.09
	1993	7.06	15.25	6.32	6.49	8.20	–0.73	–0.57
	1996	–0.42	2.99	1.32	1.90	3.41	1.74	2.32
	1999	8.30	13.51	6.96	6.79	5.21	–1.34	–1.51
Philippines	1984							
	1987	0.89	1.57	0.94	1.01	0.68	0.05	0.12
	1990	3.19	1.12	0.68	0.31	–2.08	–2.52	–2.88
	1996	3.35	3.71	2.32	2.10	0.36	–1.03	–1.25
	1999	–1.05	–1.76	–1.11	–1.05	–0.71	–0.06	0.00
Sri Lanka	1987							
	1990	2.55	6.81	4.58	4.80	4.26	2.03	2.26
	1993	–2.46	–8.76	–5.85	–6.17	–6.29	–3.39	–3.70

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Appendix Table A.2. *continued.*

Thailand	1987							
	1990	10.69	14.62	8.48	8.32	3.93	–2.21	–2.37
	1996	3.52	7.95	4.62	4.57	4.44	1.11	1.06
	1999	–1.68	–3.79	–2.20	–2.18	–2.11	–0.53	–0.50
	2001	–1.09	–0.96	–0.54	–0.35	0.13	0.55	0.74
Viet Nam	1993							
	1996	4.73	8.36	5.06	5.27	3.63	0.33	0.54
	2001	5.24	6.63	3.95	3.83	1.39	–1.29	–1.41

Note: Gains and losses were calculated by taking the difference between poverty equivalent growth rate and annual growth rate.
Source: Author's calculations.

REFERENCES

Deininger, K., and L. Squire. 1996. "A New Data Set in Measuring Income Inequality." *The World Bank Economic Review* 10(3):565–91.

Foster, J., J. Greer, and E. Thorbecke. 1984. "A Class of Decomposable Poverty Measures." *Econometrica* 52(3):761–66.

Kakwani, N. 1993. "Poverty and Economic Growth with Application to Cote D'Ivoire." *Review of Income and Wealth* 39(2):121–39.

Kakwani, N. and E. Pernia. 2000. "What is Pro-poor Growth?" *Asian Development Review* 16(1):1–22.

Kakwani, N. and H. H. Son. 2008. "Poverty Equivalent Growth Rate." *Review of Income and Wealth*. Forthcoming.

Klasen, S. 2004. "In Search of the Holy Grail: How to Achieve Pro-poor Growth?" In B. Tungodden, N. Stern, and I. Kolstad, eds., *Towards Pro-Poor Policies: Aid, Institutions, and Globalization.* New York: Oxford University Press.

Kuznets, S. 1955. "Economic Growth and Income Inequality." *American Economic Review* 45:1–28.

Liu, H. 2006. "Changing Regional Rural Inequality in China 1980-2002." *Area* 38(4):377–89.

Ravallion, M., and S. Chen. 2003. "Measuring Pro-poor Growth." *Economics Letter*s 78:93–9.

Son, Hyun H. 2007. Pro-Poor Growth: Concepts and Measures. ERD Technical Note Series No. 22, Economics and Research Department, Asian Development Bank, Manila.

Yao, S., Z. Zhang, and L. Hanmer. 2004. "Growing Inequality and Poverty in China." *China Economic Review* 15:145–63.