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**Poverty Equivalent Growth Rate:
With Applications to Korea and Thailand**

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**Poverty Equivalent Growth Rate:
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Abstract: This paper looks into the interrelationship between economic growth, inequality and poverty. Through the idea of pro-poor growth, this study examines to what extent the poor benefit from economic growth. This paper develops an index of pro-poor growth called ‘poverty equivalent growth rate’, which takes account of both the magnitude of growth and the benefits of growth the poor receive. It is shown that the proportional reduction in poverty is a monotonically increasing function of the poverty equivalent growth rate. It is argued, therefore, that to achieve a rapid reduction in poverty, the poverty equivalent growth rate should be maximized rather than the growth rate itself. The methodology developed in the paper is applied to analyze the impact of growth on poverty reduction in Korea and Thailand. Our results indicate that Korean economic growth has been more pro-poor relative to Thailand.

1: Introduction

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The relationship between economic growth and poverty has been studied extensively yet has remained much debate. The literature of cross-country growth studies suggests that growth has a strong and positive correlation with poverty reduction. This result is consistent with the trickle down theory that some fraction of total benefits of economic growth will always trickle down to the poor.

In terms of the relation between growth and poverty, a recent study by Dollar and Kraay (2000) has attracted enormous attention. Using the cross-country regressions with a sample of 80 countries over four decades, they have arrived at the conclusion that a positive economic growth benefits the poor to the same extent that benefits the whole economy. Along with many obvious limitations,¹ their conclusions emerging from these cross-country regressions can only depict the average picture of cross-country experiences. Individual country experience on the relation between growth and poverty cannot be captured using this cross-country regression methodology. Collier and Gunning (1999) argue that the findings from household-level analysis differ from those of the cross-country literature. It seems that cross-country analysis alone is unlikely to solve the growth-poverty issue (Brock and Durlauf 2000, Bourguignon 2000, Deininger and Okidi 2001).

¹ Kakwani, Prakash and Son (2002) provide an extensive discussion of 'Growth is Good for the poor'.

Ravallion (2001) also calls for a more microeconomic approach to the analysis of growth and poverty. Using household survey data in a sample of 50 developing countries over the period of 120 spells, he estimates that a 1 percent growth results in a 2.5 percent reduction in the incidence of poverty on average. In that paper, he also touches upon inequality that impinges on the growth-poverty relation. He finds that of those countries experiencing an increase in living standards in his sample, the annual reduction in poverty is much larger for countries where inequality is falling. Similarly, Knowles (2001) finds a significant negative effect of inequality on growth. In addition, there has been growing literature on growth and the determinants of the cross-country and intertemporal variation in income inequality, which include Lundberg and Squire (2000), Spilimbergo et. al. (1999), Barro (1999), Leaner et. al. (1999), Gallup, Radelet and Warner (1998), and Li, Squire and Zou (1998). Overall, the growth-poverty relation is complex and is also related to the level and changes in inequality. Pro-poor growth is about the interrelation between growth, inequality and poverty, which has remained much debated.

As Kakwani and Pernia (2000) point out that pro-poor growth requires a strategy that is deliberately biased in favor of the poor so that the poor benefit proportionally more than the rich. Such an outcome would rapidly reduce the incidence of poverty. The trickle-down development, which was the dominant thinking in the 1950s and 1960s, also reduces poverty but the rate of poverty reduction may be much slower. It is the slowness of poverty reduction that has generated interest in the concept of “pro-poor

growth". It is now being realized that neither growth itself nor growth-enhancing policies are likely to result in a rapid reduction in poverty. Pro-poor growth raises a call for enhancing growth that also delivers proportionally greater benefits to the poor than to the rich.

The poverty reduction depends on two factors. The first factor is the magnitude of economic growth rate; the larger the growth rate, the greater the poverty reduction. The second factor is the distribution of benefits of growth; if the benefits of growth go more to the poor than to the non-poor, then the poverty reduction will be larger. This implies that the policy of maximizing growth alone will not necessarily lead to a maximum reduction in poverty. In this paper, we develop the idea of "poverty equivalent growth rate" (PEGR), which takes into account not only the magnitude of growth but also how much benefits the poor receive from growth. It is demonstrated that the proportional reduction in poverty is a monotonically increasing function of the PEGR; the larger the PEGR, the greater the proportional reduction in poverty. Thus, the maximization of PEGR will lead to a maximum reduction in poverty.

The Republic of Korea (henceforth Korea) and Thailand have been the two tiger countries in the East Asia. Both of them achieved very impressive economic growth rates over a long period of time. It is of obvious interest to know whether their growth has been pro-poor or pro-rich. To answer this question, we applied the methodology developed in this paper to these two countries.

2: Poverty as a measure of absolute deprivation

Poverty can be conceptualized in terms of absolute deprivation suffered by the population. A person suffers from absolute deprivation if he or she cannot enjoy the society's minimum standard of living to which everyone should be entitled. Suppose income x of an individual is a random variable with distribution function given by $F(x)$.² Let z denote the poverty line, which measures the society's minimum standard of living. A person suffers absolute deprivation if his or her income is less than z . If his or her income is greater than or equal to z , we say that he or she does not suffer any deprivation. $H = F(z)$ is the proportion of individuals who suffer absolute deprivation because their income is below the society's minimum standard of living. H , thus, measures the incidence of poverty in the society and is called the headcount ratio.

The headcount ratio is a crude measure of poverty. It assumes that everyone whose income is below the poverty line suffers the same degree of deprivation. So it does not take account of the intensity of deprivation that is suffered by the poor. To take account of this intensity, we define the degree of absolute deprivation suffered by an individual with income x as

² Instead of income, one can use consumption to measure poverty. Consumption is more widely used than income. The methodology presented in this paper does not change when we replace income by consumption.

$$\begin{aligned}
 Dep(x) &= P(z,x) \quad \text{if } x < z \\
 &= 0 \quad \text{if } x \geq z
 \end{aligned} \tag{1}$$

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

$$\begin{aligned}
 \frac{\partial P(z, x)}{\partial x} &< 0 \\
 \frac{\partial^2 P(z, x)}{\partial x^2} &> 0
 \end{aligned}$$

which implies that the deprivation decreases monotonically with income at an increasing rate. The degree of poverty in the society may be measured by the average deprivation that is suffered by the society, which is given by

$$\theta = \int_0^z P(z, x) f(x) dx$$

(2)

where $f(x)$ is the probability density function of x . This is a general class of additive poverty measures.

Foster, Greer, and Thorbecke (1984) proposed a class of poverty measures that is obtained by substituting

$$P(z, x) = \left(\frac{z - x}{z} \right)^\alpha \tag{3}$$

in (2), where α is the parameter of inequality aversion. For $\alpha = 0, \theta = H$, that is, the headcount ratio. This measure gives equal weight to all poor irrespective of the intensity of their poverty. For $\alpha = 1$, each poor is

weighted by his or her distance from the poverty line relative to z . This measure is called the poverty gap ratio. For $\alpha = 2$, the weight given to each poor is proportional to the square of his or her income shortfall from the poverty line. This measure is called the severity of poverty ratio.

A large number of poverty measures that exist in the poverty literature can be shown to be particular members of the general class of additive poverty measures in (2). Among them, Watts (1968) poverty measure, which is directly related to Theil's (1967) inequality measure, has all the desirable properties of a poverty measure. This measure is given by

$$W = \int_0^z (Ln(z) - Ln(x))f(x)dx \quad (4)$$

which takes into account the severity of deprivation suffered by the poor.

3: Poverty Equivalent Growth rate

How does economic growth affect the poverty reduction? To answer this question, we need to measure the factors that contribute to poverty reduction. The poverty reduction largely depends on two factors. The first factor is the magnitude of economic growth rate: the larger the growth rate, the greater the reduction of poverty. Growth is generally accompanied by changes in inequality; an increase in inequality reduces the impact of growth on poverty reduction. To measure these two impacts, we differentiate equation (2) to obtain

$$\frac{d\theta}{\theta} = \frac{1}{\theta} \int_0^z \frac{\partial P}{\partial x} d(x) f(x) dx, \quad (5)$$

which follows from the assumption that $P(z, z) = 0$: if an individual's income is equal to the poverty line, then he or she does not suffer any deprivation.

Suppose $x(p)$ is the income level of population at the p th percentile. Equation (2) can be written as

$$dLn(\theta) = \frac{1}{\theta} \int_0^H \frac{\partial P}{\partial x} x(p) g(p) dp \quad (6)$$

where $g(p) = dLn(x(p))$ is the growth rate of income of people on the p th percentile.

Suppose $L(p)$ is the Lorenz function, which measures the share of total income enjoyed by the bottom p proportion of population when the individuals in the population are arranged in ascending order of their income. Following Kakwani (1980), we can write

$$x(p) = \mu L'(p) \quad (7)$$

where μ is the mean income of the society and $L'(p)$ is the first derivative of the Lorenz function. Taking logarithm of (7) and differentiating it, we obtain

$$dLn(x(p)) = dLn(\mu) + dLn(L'(p))$$

which immediately gives

$$g(p) = \gamma + dLn(L'(p)) \quad (8)$$

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where $\gamma = dLn(\mu)$ is the growth rate of the mean income. Next, substituting (8) into (6) gives

$$dLn(\theta) = \gamma\eta + \frac{1}{\theta} \int_0^H \frac{\partial P}{\partial x} x(p) dLn(L'(p)) dp \quad (9)$$

where

$$\eta = \frac{1}{\theta} \int_0^H \frac{\partial P}{\partial x} x(p) dp \quad (10)$$

is the growth elasticity of poverty derived by Kakwani (1993), which is the percentage change in poverty when there is a 1 percent growth in mean income of the society provided that the growth process does not change inequality (when everyone in the society receives the same proportional benefits of growth). This elasticity is always negative.

Dividing (9) by γ gives

$$\delta = \eta + \zeta \quad (11)$$

where

$$\delta = dLn(\theta) / \gamma$$

is the total poverty elasticity and

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$$\zeta = \frac{1}{\theta\gamma} \int_0^H \frac{\partial P}{\partial x} x(p) d\text{Ln}(L'(p)) dp \quad (12)$$

measures the inequality effect of poverty reduction. It tells us how poverty changes due to changes in inequality that accompany during the growth process. The growth is pro-poor (pro-rich) if the change in inequality that accompanies with growth reduces (increases) the total poverty. Thus, the growth is pro-poor (pro-rich) if the total elasticity of poverty is greater (less) than the growth elasticity of poverty.

We may now introduce the idea of poverty equivalent growth rate (PEGR). It is the growth rate γ^* that will result in the same level of poverty reduction as the present growth rate γ if the growth process had not been accompanied by any change in inequality (when everyone in the society had received the same proportional benefits of growth). The actual proportional rate of poverty reduction is given by $\delta\gamma$, where δ is the total poverty elasticity. If the growth were distribution neutral (when inequality had not changed), then the growth rate γ^* would achieve a proportional reduction in poverty equal to $\eta\gamma^*$, which should be equal to $\delta\gamma$. Thus, the PEGR denoted by γ^* will be given by

$$\gamma^* = (\delta / \eta) \gamma = \phi \gamma \quad (13)$$

where $\phi = \delta / \eta$ is the pro-poor index, which was developed by Kakwani and Pernia (2000). This equation implies that growth is pro-poor (pro-rich) if γ^* is greater (less) than γ . If γ^* lies between 0 and γ , the growth is accompanied by an increasing inequality but poverty still reduces. This situation may be characterized as trickle-down process when the poor receive proportionally less benefits of growth than the non-poor.

However, it is also possible that a positive economic growth increases poverty, in which case γ^* is negative. This can happen when inequality increases so much that the beneficial impact of growth is more than the offset by the adverse impact of rising inequality. Bhagwati (1988) calls this “immiserizing” growth. He gives a scenario where the more affluent farmers adopt new seeds and raise grain production that results in lower prices. By contrast, the marginal farmers who cannot adopt the new technology find their stagnant output yielding even less income. Thus, the green revolution may immiserize the poor. This situation may be rare, however, because in the long run the marginal farmers may also catch up

with the new techniques. The more common case is where the poor farmers also benefit from economic growth but to a much smaller extent than the better-off ones.

The proposed PEGR controls for how equitable growth rate is. Furthermore, it can be seen that the proportional reduction in poverty is an increasing function of γ^* : the larger is γ^* , the greater will be the proportional reduction in poverty. Thus maximizing γ^* will be equivalent to maximizing the total proportional reduction in poverty. This suggests that the performance of a country should be judged on the basis of poverty equivalent growth rate and not by growth rate alone.

To make our message clearer, suppose a country's total poverty elasticity is $2/3$ of the growth elasticity of poverty. Then from (13), we note that the country's actual growth rate of 9 percent is equal to the poverty equivalent growth rate of only 6 percent. Thus, the effective growth rate for poverty reduction is 3 percent lower than the actual growth rate because the country is not following pro-poor policies. On the other hand, if the total poverty elasticity is supposedly 20 percent higher than the growth elasticity of poverty, then the country's actual growth rate of 9 percent will be equal to the poverty equivalent growth rate of 10.8 percent. This indicates that the growth is pro-poor because the effective growth rate for poverty reduction is 1.8 percent higher than the actual growth rate.

In view of (6) and (10), (13) can be written as

$$\gamma^* = \frac{\int_0^H \frac{\partial P}{\partial x} x(p) g(p) dp}{\int_0^H \frac{\partial P}{\partial x} x(p) dp} \quad (14)$$

which shows that the PEGR is the weighted average of the growth rates of income at each percentile point with the weight depending on the poverty measure used. So γ^* can be computed for any poverty measures. For Foster, Greer and Thorbecke's class of poverty measures, it is given by

$$\gamma_\alpha^* = \frac{\int_0^H \left(\frac{z - x(p)}{z}\right)^{\alpha-1} x(p) g(p) dp}{\int_0^H \left(\frac{z - x(p)}{z}\right)^{\alpha-1} x(p) dp} \quad (15)$$

for $\alpha \geq 1$. When $\alpha = 1$, we get PEGR for the poverty gap ratio as

$$\gamma_1^* = \frac{\int_0^H x(p) g(p) dp}{\int_0^H x(p) dp}$$

which shows that the growth rate of each poor receives the weight that is proportional to the person's income. This suggests that γ_1^* is completely insensitive to the distribution of income among the poor.

The PEGR for Watts measure is obtained by substituting $P(z,x)=Ln(z)-Ln(x)$ in (14) as

$$\gamma_w^* = \frac{1}{H} \int_0^H g(p) dp \quad (16)$$

which in fact is the pro-poor growth index proposed by Ravallion and Chen (2002). They derived their index by a different methodology, which is consistent with only Watts poverty measure. We have provided a general methodology encompassing all the additive separable poverty measures.

4: Why does the extent of poverty reduction vary across countries?

The cross-country evidence suggests that countries can vary widely in poverty reduction for the same growth rates. What do these differences explain? We demonstrate in this section that the poverty elasticity, which determines the extent of poverty reduction, is highly sensitive to the country's initial levels of economic development and income inequality. The poverty elasticity estimated from cross-country regressions can give a quite misleading picture of an individual country's capability to reduce poverty.

To calculate the total poverty elasticity, we need to compute the second term in the right hand side of (9), which measures the impact of change in inequality as measured by the Lorenz curve on the change in poverty. The Lorenz curve can shift in infinite ways. Kakwani (1993) makes a simple assumption that the entire Lorenz curve shifts according to the following formula:

$$L^*(p) = L(p) - \lambda[p - L(p)]$$

where λ is the proportional change in the Gini index, which on differentiating once gives

$$dLn(L'(p)) = -\lambda \frac{1 - L'(p)}{L'(p)} = -\lambda \frac{\mu - x(p)}{x(p)}$$

where use has been made of equation (7). Substituting this equation in (9) gives

$$dLn(\theta) = \gamma\eta + \lambda\varepsilon \quad (17)$$

where

$$\varepsilon = \frac{\partial \theta}{\partial G} \frac{G}{\theta} = \frac{1}{\theta} \int_0^H \frac{\partial P}{\partial x} (x(p) - \mu) dp$$

which is the elasticity of poverty index θ with respect to the Gini index as derived earlier by Kakwani (1993). Dividing (17) by γ gives

$$\delta = \eta + k\varepsilon \quad (18)$$

where

$$k = \frac{dG/G}{d\mu/\mu}$$

is the percentage change in the Gini index when there is a growth rate of 1 percent in the mean income.

The total poverty elasticity δ , which determines the extent of country's poverty reduction, depends on three factors: growth elasticity poverty η , inequality elasticity of poverty ε and the inequality elasticity of growth k . Kakwani and Son (2002) have shown that η and ε depend on the country's initial levels of economic development and inequality. In particular, they demonstrate analytically that;

1. η is a decreasing function of initial level of mean income and an increasing function of initial level of inequality.
2. ε is an increasing function of initial level of mean income and a decreasing function of initial level of inequality.

k indicates whether the growth is accompanied by an increasing or decreasing inequality. We cannot say a priori what the sign and magnitude of k will be. However, Kuznets (1955) postulated that inequality worsens initially when economic development takes off and then improves in the mature stage of industrialization. This hypothesis is popularly known as "Inverted U-shaped pattern of income inequality"—inequality first increasing and then decreasing with economic development. The validity of this hypothesis has been questioned (Anand and Kanbur 1984). Utilizing much larger and high quality data, Deininger and Squire (1998) concluded that there exists no support for the Kuznets hypothesis of inverted U-shaped curve. How k changes depends on the initial conditions and policies that each country follows.

Differentiating (18) with respect to μ gives

$$\frac{\partial \delta}{\partial \mu} = \frac{\partial \eta}{\partial \mu} + k \frac{\partial \varepsilon}{\partial \mu}$$

which in view of Kakwani and Son's results will always be negative when k is negative. If growth is pro-poor, the poverty elasticity decreases with the initial level of mean income: the higher the initial level of economic development, the larger the poverty reduction. Thus, at the mature stage of economic development when inequality is declining economic growth can lead to an increasing proportional reduction in poverty. However, if growth is not pro-poor, then we cannot say whether the magnitude of poverty reduction increases or decreases with growth.

Differentiating (18) with respect to the Gini index (G) gives

$$\frac{\partial \delta}{\partial G} = \frac{\partial \eta}{\partial G} + k \frac{\partial \varepsilon}{\partial G}$$

which in view of Kakwani and Son's results will always be positive when k is negative. If growth is pro-poor, the poverty elasticity increases with the initial level of inequality; the higher the initial level of inequality, the smaller the poverty reduction. If, however, growth is not pro-poor, we cannot say how the poverty elasticity changes with the initial level of inequality.

To get some sense of the magnitudes of elasticity, we computed the total poverty elasticity on the assumption that k is 0.5, suggesting that for every 1 percent increase in growth rate inequality increases by 0.5 percent. In the calculation of these estimates, we assumed that the income distribution

follows a two-parameter lognormal distribution. Table 1 presents the estimates of poverty elasticity for headcount ratio, poverty gap ratio and severity of poverty ratio. These estimates have been produced for alternative values of the Gini index and the mean income (which is expressed as the percentage of the poverty line).

It is evident that when growth is not pro-poor, the effectiveness of growth in reducing poverty is much reduced. Note that the poverty elasticity does not reduce monotonically with the initial level of mean income. It reduces until the mean income is 200 (expressed as a % of poverty line) and then starts increasing. Thus, growth does not reduce poverty at an increasing rate as is the case when growth is pro-poor. The absolute magnitude of elasticity becomes very small as the initial level of inequality becomes 40 percent or more. The elasticity becomes even positive when the initial Gini index is high.

The results in Table 1 show that total elasticity of poverty is highly sensitive to the initial levels of income and inequality. It is not surprising to

Table 1: Total poverty elasticity when growth is not pro-poor

Initial Mean income	Initial Gini index				
	20	30	40	50	60
	Head count ratio				
80	-1.1	-0.8	-0.6	-0.4	-0.2
100	-1.9	-1.1	-0.7	-0.4	-0.2

150	-3.1	-1.4	-0.8	-0.4	-0.2
200	-3.5	-1.5	-0.7	-0.3	-0.1
250	-3.4	-1.4	-0.6	-0.2	0.0
300	-3.0	-1.2	-0.5	-0.1	0.1
Poverty gap ratio					
80	-1.9	-1.1	-0.7	-0.3	-0.1
100	-2.5	-1.3	-0.7	-0.3	-0.0
150	-3.3	-1.5	-0.7	-0.2	0.1
200	-3.4	-1.4	-0.5	-0.1	0.2
250	-3.2	-1.2	-0.4	0.1	0.4
300	-2.7	-0.9	-0.2	0.3	0.5
Severity of poverty					
80	-2.3	-1.3	-0.7	-0.3	0.0
100	-2.8	-1.4	-0.7	-0.2	0.1
150	-3.4	-1.4	-0.5	-0.0	0.3
200	-3.3	-1.2	-0.3	0.2	0.5
250	-2.9	-0.9	-0.1	0.4	0.7
300	-2.3	-0.6	0.2	0.6	0.9

find, thus, that different countries have vastly different rates of poverty reduction with the same growth rate because they are at different levels of economic development and have different levels of initial inequality. More importantly, they follow different policies to reduce poverty. The cross-country regressions give only the average elasticity that conceals considerable variation across countries and, therefore, may not be very useful. What is required is the detailed country case studies that reveal the

nature of growth (whether growth is pro-poor or pro-rich) and how growth can be made pro-poor so that we can achieve a rapid reduction in poverty.

5: How can we calculate the Poverty Equivalent Growth Rate?

The previous section presented the ex-ante analysis of changes in poverty. We analyzed the change in poverty for many alternative scenarios. In that analysis, it was necessary to assume that the change in inequality takes place only by a constant proportional shift in the Lorenz curve at all points. As pointed out, the Lorenz curve can change in infinite number of ways and thus the ex-ante analysis of change in poverty is not possible under this general situation. However, we can make an ex-post analysis of changes in poverty if we have household surveys for at least two periods. This section presents a methodology to estimate the PEGR utilizing unit record data available for any two periods.

The general class of poverty measure θ given in (2) is fully characterized by the poverty line z , the mean income μ and the Lorenz curve $L(p)$. That is

$$\theta = \theta(z, \mu, L(p))$$

Suppose the income distributions in the initial and terminal years have mean incomes μ_1 and μ_2 with the Lorenz curves $L_1(p)$ and $L_2(p)$, respectively. An estimate of total poverty elasticity can be estimated by

$$\hat{\delta} = (Ln [\theta(z, \mu_2, L_2(p))] - Ln[\theta(z, \mu_1, L_1(p))]) / \hat{\gamma}$$

where $\hat{\gamma}$ is given by

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

which is an estimate of growth rate of mean income.

An estimate of PEGR is given by

$$\hat{\gamma}^* = (\hat{\delta} / \hat{\eta}) \hat{\gamma} \quad (19)$$

where $\hat{\eta}$ is an estimate of the growth elasticity of poverty, which should satisfy equation (11):

$$\hat{\delta} = \hat{\eta} + \hat{\zeta} \quad (20)$$

where $\hat{\zeta}$ is an estimate of the inequality effect of poverty reduction. Kakwani's (2000) poverty decomposition methodology can then be used to calculate $\hat{\eta}$ and $\hat{\zeta}$ by following formulae:

$$\hat{\eta} = \frac{1}{2} [\ln(\theta(z, \mu_2, L_1(p))) - \ln(\theta(z, \mu_1, L_1(p))) + \ln(\theta(z, \mu_2, L_2(p))) - \ln(\theta(z, \mu_1, L_2(p)))]$$

and

$$\hat{\zeta} = \frac{1}{2} [\ln(\theta(z, \mu_1, L_2(p))) - \ln(\theta(z, \mu_1, L_1(p))) + \ln(\theta(z, \mu_2, L_2(p))) - \ln(\theta(z, \mu_2, L_1(p)))]$$

which will always satisfy equation (20).³ This methodology can be used to estimate the PEGR for the entire class of poverty measures given in (2).

The proportional reduction in poverty is equal to $\hat{\delta} \hat{\gamma}$, which is equal to $\hat{\eta} \hat{\gamma}^*$ from (19). Since $\hat{\eta}$ is always negative (unless $\mu_1 = \mu_2$), the magnitude of poverty reduction will be a monotonically increasing function of $\hat{\gamma}^*$; the larger $\hat{\gamma}^*$, the greater percentage reduction in poverty between the two periods. Thus, maximizing $\hat{\gamma}^*$ will be equivalent to maximizing the percentage reduction in poverty.⁴

6: Data Sources and Concepts Used

The data for Korea come from its household survey called the Family Income and Expenditure Survey (FIES) conducted every year by the National Statistical Office in Korea. These household surveys are unit-recorded data, used for this study covering from 1990 to 1999. It has income and consumption components of more than 20,000 households in urban areas. We utilized the Minimum Cost of Living (MCL) basket developed in 1994 by the Korean Institute for Health and Social Affairs (KIHASA) as the poverty line. We modified this poverty line by taking into account different costs of living between Seoul and other cities. The

³ Datt and Ravallion (1992) also suggested this decomposition in Footnote 3 but they dismissed it saying that it is arbitrary. However, Kakwani (2000) justified this decomposition using an axiomatic approach.

⁴ In the Appendix, we have demonstrated that Ravallion and Chen (2003) estimate of pro-poor growth violates the basic requirement that the magnitude of poverty should be a monotonically increasing function of the pro-poor growth rate.

poverty line has been updated for other years using the separate consumer price indices for Seoul and other cities.

It must be emphasized that we have used Korean specific poverty line, which measures the minimum acceptable standard of living in Korea. Therefore, the incidence of poverty computed here cannot be compared with the incidence of poverty in other countries. Our main objective here is to analyze changes in poverty and how it has been affected by the economic growth in Korea.

The data source for Thailand comes from the Socio-Economic Surveys (SES) covering the period from 1988 to 1998. These SES data are unit record household surveys conducted every two years by the National Statistical Office in Thailand. The survey is nation-wide and covers all private, non-institutional households residing permanently in municipal, sanitary districts, and villages. However, it excludes part of the population living in transient hotels or rooming houses, boarding schools, military barracks, temples, hospitals, prisons and other such institutions. The SES contains information on more than 17,000 households on average between 1988 and 1998.

In estimating poverty, this paper uses the official poverty line developed for Thailand, which takes into account spatial price indices as well as individual needs that differ depending on household size and its composition.

We use per capita welfare consumption as welfare measure in estimating poverty in Korea and Thailand. Per capita welfare consumption is expressed as the ratio of per capita total consumption to per capita poverty line (expressed in percentage).

7: Empirical Illustration: Korea and Thailand

Until the financial crisis in 1997, the Korean economy had been perceived as one of the fastest growing economies in the South East Asia. Its growth of per capita real GDP surpassed an annual rate of more than 5 percent during the period of 1990-97. Along with high economic growth, Korea is also known as the economy with relatively equal distribution of income and with full employment. Before 1997, inequality had declined gradually, while the rate of unemployment had been only 2-3 percent. This seemingly sound economic outlook was shattered by the financial crisis in 1997.

Our major objective in this section is to answer the questions: Is economic growth in Korea pro-poor?; If so, what is its degree?; How does Korea's experience compare with Thailand's in terms of the degree of pro-poorness? Based on consumption, we computed the three most widely used poverty measures: head count ratio, poverty gap ratio, and Foster-Greer-Thorbecke index.

As presented in Table 2, poverty declined sharply between 1990 and 1997. For instance, the percentage of poor dropped dramatically from 39.6 percent in 1990 to 8.6 percent in 1997. The crisis, however, pushed a

number of people down to poverty and led to 19 and 13.4 percent of poor in 1998 and 1999, respectively. Although the head count ratio improved substantially in 1999, it was far higher than its pre-crisis level.

Table 2: Poverty estimates for Korea

Year	Actual			Annual growth rate		
	Percentage of poor	Poverty gap ratio	Severity of Poverty	Percentage of poor	Poverty gap ratio	Severity of Poverty
1990	39.6	9.6	3.4	-	-	-
1991	31.3	7.1	2.4	-23.4	-30.5	-33.9
1992	24.5	5.4	1.8	-24.7	-27.9	-31.2
1993	20.5	4.2	1.3	-17.7	-25.0	-29.0
1994	16.5	3.2	1.0	-21.5	-25.5	-29.7
1995	12.7	2.4	0.7	-26.7	-29.8	-31.3
1996	9.6	1.8	0.5	-27.5	-30.0	-30.0
1997	8.6	1.6	0.5	-10.7	-11.2	-14.1
1998	19.0	4.2	1.5	78.8	97.2	115.3
1999	13.4	2.7	0.9	-34.7	-42.5	-50.1

It is noteworthy that the rate of reduction in poverty slowed down considerably during the 1996-97 period, when the percentage of poor reduced by only 10.7 percent compared to a reduction of 27.5 percent in the previous year. The same story emerges from the other two poverty measures. These results suggest that there did exist signs of forthcoming crisis one year earlier, which were not picked up in time.

Table 3 and Figure 1 present actual as well as poverty equivalent growth rates for Korea. Before the crisis, poverty equivalent growth rates were higher than actual growth rates for most of time period. In particular, the poverty equivalent growth rate of 9 percent in 1996-97 was far higher than the actual growth rate of 1.8 percent in the same period suggesting that the poor benefited proportionally much more than the rich, which resulted in a larger percentage reduction in poverty than what is indicated by the actual growth rate.

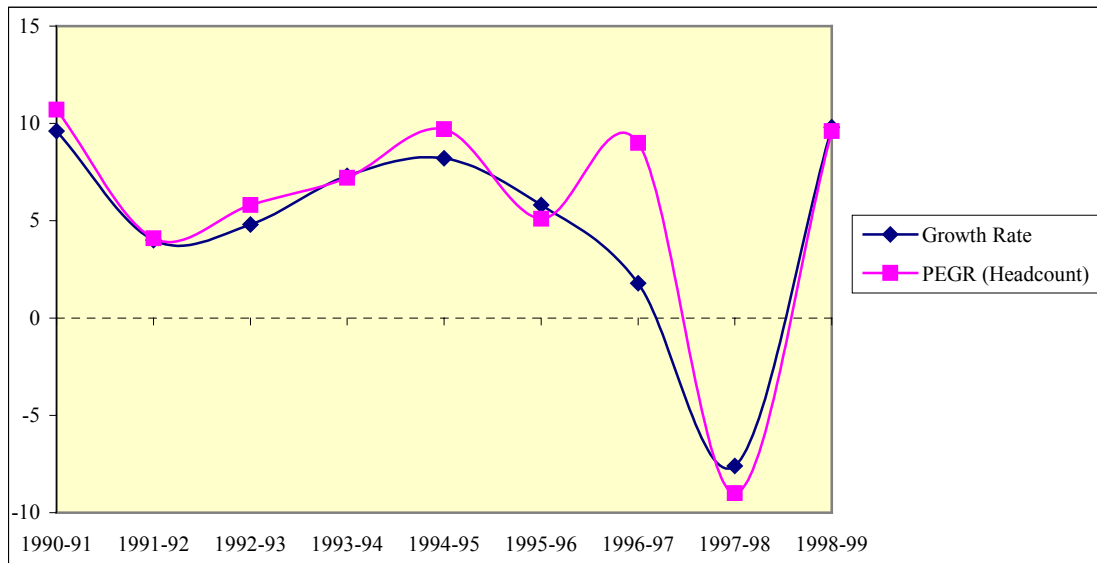
Table 3: Actual and Poverty Equivalent Growth Rates for Korea

Year	Actual Growth Rate	Poverty Equivalent growth rate		
		Percentage Of poor	Poverty gap ratio	Severity of poverty ratio
1990-91	9.6	10.7	10.4	10.0
1991-92	4.0	4.1	3.7	3.6
1992-93	4.8	5.8	6.6	6.8
1993-94	7.3	7.2	7.3	7.5
1994-95	8.2	9.7	9.5	8.9
1995-96	5.8	5.1	5.0	4.6
1996-97	1.8	9.0	8.3	9.6
1997-98	-7.6	-9.0	-10.0	-10.9
1998-99	9.8	9.6	10.5	11.5

After the crisis, actual growth rates have become higher than poverty equivalent growth rates. This implies that the poor have been more adversely affected by the crisis, and that even if there was a positive growth in 1998-99, its benefits did not go to the poor proportionally more than to

the non-poor. If we measure poverty by the poverty gap ratio and severity of poverty index, we find that the poverty equivalent growth rate in 1998-99 is higher than the actual growth rate, which suggests that the ultra-poor benefited more than the poor. This could have happened because in response to the economic crisis, the Korean government introduced many welfare programs including public works program and temporary livelihood protection, which might have helped the ultra poor more than the poor or the non-poor.

Figure 1: Actual and poverty equivalent growth rates of headcount ratio



Unlike Korea, economic growth in Thailand has not been pro-poor. As seen from Table 4, the actual growth rate of per capita welfare (which is the per capita income adjusted for household needs) was 9.06 percent during 1988-90, whereas the poverty equivalent growth rate for the head-

count ratio was 5.5 percent. This suggests that 3.56 percent of growth rate was lost because the full benefits of growth did not go to the poor. Similarly, 3.19 percent growth rate was lost during 1990-92. Thus, we conclude that growth was not pro-poor during 1988-90 and 1990-92. However, growth became pro-poor during 1992-94 and 1994-96, when the poverty equivalent growth rates were higher than the actual growth rates.

Due to the financial crisis, growth in Thailand became negative for the time during 1996-98 and 1998-2000. The per capita welfare declined at annual rates of 1 and 0.85 percent during 1996-98 and 1998-2000, respectively. The poor suffered even more during the crisis as is indicated by the poverty equivalent growth rates, which for head-count ratio are calculated to be -2.7 and -2.3 during 1996-98 and 1998-2000, respectively. The poverty equivalent growth rate for the severity of poverty is -4.4 during 1998-2000, which implies that the ultra poor were even more adversely affected by the crisis than the poor. If we look at the overall period from 1988 to 2000, we find that growth in Thailand has not been pro-poor.

On the whole, both Korea and Thailand had high economic growth in the 1990s before the crisis. Nevertheless, the Korean economic growth generated proportionally more benefits to the poor than to the non-poor, whereas the Thai economic growth benefited the non-poor proportionately more than the poor.

Table 4: Actual and poverty equivalent growth rates for Thailand

Year	Actual	<u>Poverty Equivalent Growth Rate</u>
		29

	Growth rate	Headcount ratio	Poverty gap ratio	Severity of poverty ratio
1988-90	9.06	5.5	5.9	6.1
1990-92	7.49	4.3	3.4	3.0
1992-94	7.65	8.8	8.7	8.8
1994-96	5.75	7.4	7.2	7.2
1996-98	-1.00	-2.7	-2.5	-2.5
1998-00	-0.85	-2.3	-3.8	-4.4
1988-2000	4.68	3.6	3.3	3.1

Figure 2: Actual and poverty equivalent growth rates

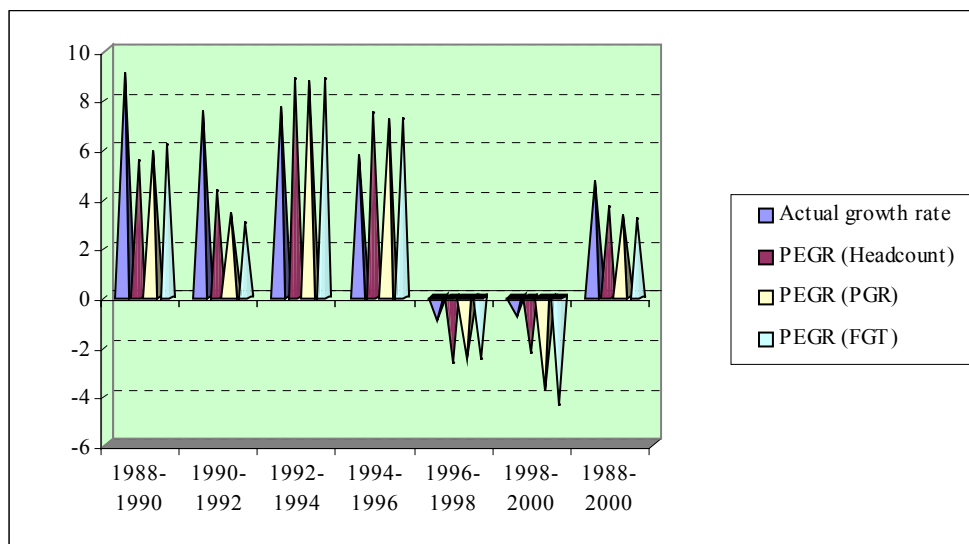
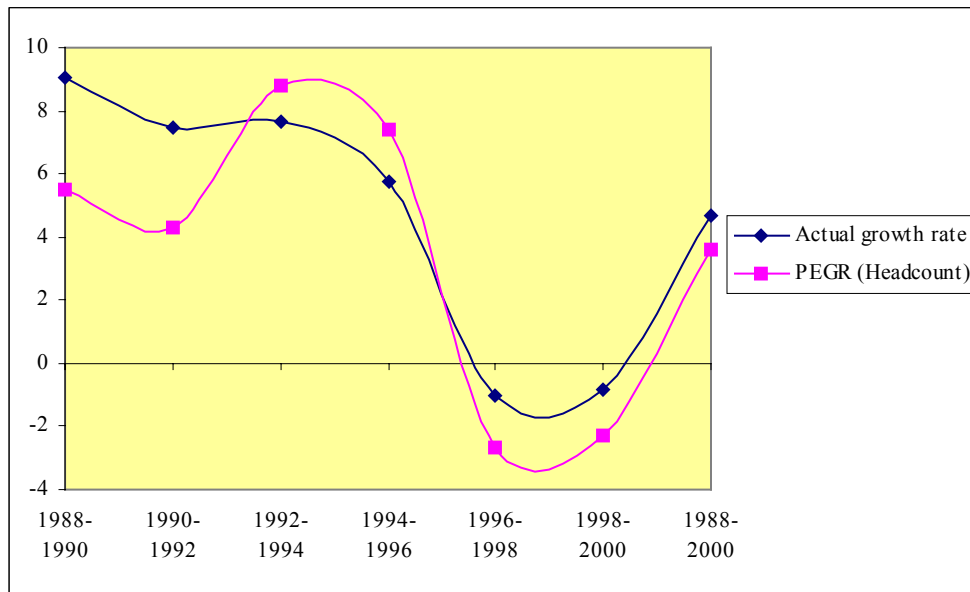


Figure 3: Actual Growth Rates and Poverty Equivalent Growth Rate of Head-count



8: Conclusion

Rapid and sustainable economic growth can play an important role in achieving a reduction in poverty. This paper suggests that economic growth is not sufficient but necessary to achieve the objective of poverty reduction. This paper conceptualized the idea of poverty equivalent growth rate, which takes into account not only the magnitude of growth but also how much benefits the poor receive from growth. The proportional reduction in poverty is monotonically related to the poverty equivalent growth rate. To achieve a rapid reduction in poverty, our focus should be on maximizing the poverty equivalent growth rate and not the growth rate itself. This suggests that governments should adopt a mixture of

growth enhancing and direct poverty alleviation policies so that we achieve a maximum reduction in poverty.

The paper also provides a methodology to compute the poverty equivalent growth rate utilizing household surveys in discrete periods. The application of the methodology to Korea and Thailand suggested that the Korean growth generated more benefits to the poor than to the non-poor, whereas the Thai economic growth benefited the non-poor proportionally more than the poor.

A clear message that has emerged from the economic crisis in Korea and Thailand was that there is much need for comprehensive social security schemes that provide adequate safety nets on a permanent basis to the people in desperate need. In most developing countries, some forms of informal safety nets provided by family members tend to play important roles. Although these informal safety nets can be effective under good economic conditions, they break down when there is widespread economic crisis. On top of that, along with increasing prosperity brought by rapid economic growth traditional family values tend to fade away, diminishing the effectiveness of informal safety nets. Therefore, setting up a permanent system that provides safety nets to the needy indeed requires governments to play their active roles.

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Appendix

In this appendix we demonstrate theoretically as well as with the help of an hypothetical example that Ravallion and Chen's (2003) estimate of pro-poor growth will violate their basic axiom1:

Axiom1: The measure should be consistent with the direction of change in poverty, in that a positive (negative) rate of pro-poor growth implies a reduction (increase) in poverty.

The violation of this axiom will imply that the magnitude of poverty reduction will not necessarily be a decreasing function of the pro-poor growth.

The estimate of Ravallion and Chen's (2003) is given by

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$$RC_t = \frac{\int_0^{H_{t-1}} \Delta \ln(x_{t-1}(p)) dp}{H_{t-1}} \quad (A.1)$$

where H_{t-1} is the head-count ratio in period $t-1$. The motivation of this index comes from their equation:

$$dW = -\int_0^H d \ln(x(p)) dp \quad (A2)$$

where W is the Watt's measure of poverty.

In order that Axiom1 is satisfied, $RC_t > 0$ (< 0) should always imply $\Delta W_t < 0$ (> 0), where

$$\Delta W_t = \int_0^{H_t} \ln(z/x_t(p)) dp - \int_0^{H_{t-1}} \ln(z/x_{t-1}(p)) dp$$

which will not always hold because equation A.2 does not imply equation A3 given by

$$\Delta W_t = -\int_0^{H_{t-1}} \Delta \ln(x(p)) dp \quad (A3)$$

Thus, Ravallion and Chen's (2003) estimate of pro-poor index will violate Axiom1, which implies that the magnitude of poverty reduction will not necessarily be a decreasing function of the pro-poor index.

Table A.1 presents a hypothetical example giving welfare levels of 20 persons. The poverty line is 100. It can be seen that the percentage of poor has decreased from 50 percent to 35 percent but the Watts measured has increased from 20.3 to 22.8. The Ravallion and Chen's index of pro-poor growth is computed to be 11.3 percent, which means that Ravallion and Chen's index violates their basic Axiom1. This means that maximization of Ravallion and Chen's index does not necessarily lead to maximization of poverty reduction. This property is always satisfied by our measures.

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