SMERU

Working Paper

Asep Suryahadi

Daniel Suryadarma

Sudarno Sumarto

Economic Growth and Poverty Reduction in Indonesia: The Effects of Location and Sectoral Components of Growth

Revised, August 2006

For further information, please contact SMERU, Phone: 62-21-31936336; Fax: 62-21-31930850; E-mail: smeru@smeru.or.id; Web: www.smeru.or.id

Economic Growth and Poverty Reduction in Indonesia: The Effects of Location and Sectoral Components of Growth

Asep Suryahadi

Daniel Suryadarma

Sudarno Sumarto

SMERU Research Institute

Revised, August 2006

Suryahadi, Asep

Economic Growth and Poverty Reduction in Indonesia: The Effects of Location and Sectoral Components of Growth/Asep Suryahadi, Daniel Suryadarma, Sudarno Sumarto -- Rev. ed. -- Jakarta: SMERU Research Institute, 2006. --

ii, 23 p. ; 31 cm. -- (SMERU Working Paper, August 2006). --

ISBN 979-3872-25-X

1. Economic growth
2. Poverty alleviation

I. Suryadarma, Daniel
II. Sumarto, Sudarno

338.9/DDC 21

SMERU Research Institute, August 2006

TABLE OF CONTENTS

Economic Growth and Poverty Reduction in Indonesia: The Effects of Location and Sectoral Components of Growth

Asep Suryahadi, Daniel Suryadarma, Sudarno Sumarto

SMERU Research Institute

Revised, August 2006

ABSTRACT

This study extends the literature on the relationship between economic growth and poverty reduction by differentiating growth and poverty into their sectoral compositions and locations. We find that growth in the rural services sector reduces poverty in all sectors and locations. However, in terms of elasticity of poverty, urban services growth has the largest for all sectors except urban agriculture. We also find that rural agriculture growth strongly reduces poverty in the rural agriculture sector, the largest contributor to poverty in Indonesia. This implies that the most effective way to accelerate poverty reduction is by focusing on rural agriculture and urban services growth. In the long run, however, the focus should be shifted to achieving robust overall growth in the services sector.

Keywords: economic growth, poverty, urban, rural, Indonesia.

JEL Classifications: I32, O18, O49.

I. INTRODUCTION

The relationship between economic growth and poverty is one of the major themes of current development literature and thinking.[1] While most studies find that overall economic growth reduces overall poverty, policymakers need more detailed results to make decisions about the allocation of public resources and sources of funds to finance public expenditures (Sarris, 2001).

In trying to ascertain the kinds of growth that are most effective in reducing poverty and, hence, most beneficial for the poor, some studies have focused on the composition of economic growth. Studies that examine the effect of sectoral composition of economic growth on poverty generally divide a country's economy into three sectors: agriculture, industry, and services.

This paper refines the literature by dividing each of the three economic sectors into their locations: urban and rural. Therefore, there are six sectoral components of economic growth analyzed in this study: urban agriculture, urban industry, urban services, rural agriculture, rural industry, and rural services. In addition, given the uneven distribution of the poor between locations and sectors, we also disaggregate poverty into the six combinations of locations and sectors.

The rest of the paper is organized as follows. Chapter II reviews the main literature on sectoral economic growth and its impact on poverty. Chapter III describes the sources of data analyzed in this study. Chapter IV discusses the sectoral profile of the Indonesian economy. Chapter V calculates the trends and sectoral profile of poverty in Indonesia. Chapter VI assesses the impact of sectoral composition of economic growth on poverty. Chapter VII draws conclusions from the findings of this study.

[1]Srinivasan (2001) and Quibria (2002) provide literature review of most of the studies. Dollar and Kraay (2002) is a widely quoted paper on this issue.

II. SECTORAL GROWTH AND ITS IMPACT ON POVERTY

Among those arguing that the sectoral composition of economic growth influences its potential to reduce poverty, most conclude that agriculture is the sector to focus on in order to rapidly reduce poverty. Since, in most poor countries, the majority of the poor live in rural areas and are employed in agriculture, it seems logical that the growth of agriculture is more important for poverty reduction than the growth of industry or services. Mellor (1976, 1999) is one of the staunchest supporters of the importance of agricultural growth. He argues that since agriculture employs the majority of the population in developing countries, increasing agricultural output would boost the economy and, hence, reduce poverty. Furthermore, he states that the marked slowing of poverty reduction in Asia and increasing poverty in Africa are the result of neglect of agriculture by both governments and foreign aid institutions.

Similarly, Kimenyi (2002) argues that many studies in developing countries have found that agricultural growth has contributed the most to poverty reduction, especially in countries whose labor force is largely engaged in agriculture. He describes two channels where growth in agriculture can spur large poverty reduction. The first is through the production linkage between agriculture and industry. Agriculture provides inputs to the industry as well as to other sectors that use the outputs of industry. Thus, the growth in agriculture will create more jobs and higher income both within the agricultural sector itself as well as in other sectors. The second channel is through the consumption linkage, where increases in income of agricultural households will increase demand for non-agricultural sector products and services, inducing the growth in those sectors.

Using Indian national time-series data spanning the period from 1951 to 1991, Ravallion and Datt (1996) find that 85% of the reduction in poverty in India for that period was due to agricultural growth. Meanwhile, Datt and Ravallion (1998) analyze panel state-level data from 1957 to 1991 and find that agricultural technology growth, measured by output per acre; initial agricultural infrastructure, measured by initial irrigation rate; and human resource conditions, measured by female literacy rate and infant mortality rate; are the main determinants of success in reducing rural poverty.[2]

Contrary to the findings described above is the result of studies done by Quizon and Binswanger (1986, 1989). Using a partial equilibrium multi-market model for India, they show that the agricultural growth effects of the Green Revolution did not benefit the rural poor. Hence, they argue that the main way to help the poor is to raise non-agricultural incomes. Sarris (2001), however, criticizes their analysis since they only consider agricultural incomes and did not take into account spillover effects to non-agricultural incomes. It is quite plausible that initial rises in agricultural incomes help increase non-agricultural incomes, which eventually reduce poverty.

Warr and Wang (1999) also find that the agricultural sector is not the sector with the largest impact on poverty. Using Taiwanese national time-series data, they find that, in this country, it is the growth of the industrial sector which has the largest impact on poverty. Contrastingly, Warr (2002) combines data from four Southeast Asian countries (Thailand, Indonesia, Malaysia and the Philippines) and finds that the growth of the services and agricultural sectors accounts for the largest reduction in poverty in these countries.

[2]Ravallion and Datt also discuss the issue in two other studies: Ravallion and Datt (1999) and Datt and Ravallion (2002).

Meanwhile, Hasan and Quibria (2004) use cross-country data and divide countries into four regions: East Asia, Latin America, South Asia, and Sub Saharan Africa. They find that agricultural growth is significant in reducing poverty in South Asia and Sub Saharan Africa, while industrial sector growth is the driver of poverty reduction in East Asia and, in Latin America, the growth in the services sector reduces poverty. Thus, they criticize Mellor and state that the contribution of each sector to poverty reduction is very much country specific. Moreover, they also state that policy and institutional differences between South Asia and East Asia are the main reasons why the industrial sector has a different impact on poverty in the regions.

There are also studies that argue for equal development of both agriculture and non-agriculture sectors. Foster and Rosenzweig (2005) use village and household panel data in India for the period of 1982-1999 to assess empirically the contributions of agricultural productivity improvements and rural factory expansion to rural income growth, poverty reduction and rural income inequality. In this study, they develop and test a simple general equilibrium model of farm and non-farm sectors in a rural economy. The key prediction of their model is that, while both agricultural development and capital mobility and openness increase rural incomes, the growth of a rural export-oriented manufacturing sector reduces both local and spatial income inequality relative to agriculturally-led growth.

Empirically, they find that the non-tradable non-farm sector is driven by local demand conditions and, hence, is positively influenced by the growth in agricultural productivity. On the other hand, the tradable non-farm sector, which consists of relatively small-scale factories, enters areas with relatively low wages and, hence, is negatively influenced by the growth in agricultural productivity. Both agricultural

technical change and factory employment growth increase rural incomes and wages, and, hence, reduce poverty. Consistent with the prediction of their model, they find that factory investment in a locality reduces both spatial wage inequality and local household income inequality, while agricultural technology improvements increase inequality.

III. DATA

The main data source for poverty calculations in Indonesia is the Consumption Module of Susenas (the National Socioeconomic Survey) collected by Statistics Indonesia (*Badan Pusat Statistik* or BPS). Susenas is a nationally representative household survey, which was started in 1976, covering all areas of the country. The Consumption Module of Susenas is conducted every three years, specifically, to collect information on very detailed consumption expenditures from around 65,000 households. The questionnaire in this module includes a total of 229 food and 110 non-food items. This study utilizes the Susenas data collected between 1984 and 2002.

This study also utilizes the data from Core Susenas, which is conducted every year in the month of February, to collect information on the basic socio-demographic characteristics of over 200,000 households and over 800,000 individuals. The sample of households in the Consumption Module of Susenas is a randomly selected subset of the 200,000 households in the Core Susenas sample of the same year.

In addition, this study also uses the data of Regional Gross Domestic Product (RGDP) and Regional Consumer Price Index (RCPI), both published by the BPS. In line with the Susenas data, the RGDP data covers the period from 1984 to 2002, with the value fixed at 1993 rupiah. On the other hand, the RCPI is used to deflate the poverty lines to ensure comparability across time.

Finally, this study uses the Sakernas (National Labor Force Survey) data to extract information on initial education levels, which is needed as a control variable in the estimations of the models used in this study. The Sakernas is an annual, nationally representative, repeated cross-section labor force survey that collects activity data of individuals in the sampled households, although the depth of its representativeness varies

by year. Every year, on average, the Sakernas has around 200,000 observations on individuals at and above 15 years of age. In this study we use the 1986 Sakernas data.

IV. THE PROFILE OF INDONESIAN ECONOMIC SECTORS

The Indonesian economy underwent a substantial structural change during the three decades of economic development starting in the 1970s, most notably the reduction in the importance of the agricultural sector in the Indonesian economy. Table 1 compares the composition of agricultural, industrial, and services sectors in Gross Domestic Product (GDP) and its share in employment from 1971 to 2003. The shares of the agricultural sector in both GDP and employment have declined throughout the period. However, it appears that the reduction in agricultural GDP share has been much faster than its employment share. This is apparent from the declining ratio of its GDP to employment ratio from 0.67 in 1971 to 0.33 in 2003.

Table 1. GDP and Employment Composition by Sector in Indonesia, 1971-2003 (%)

Year	Agriculture			Industry			Services		
	GDP Share	Employment Share	Ratio	GDP Share	Employment Share	Ratio	GDP Share	Employment Share	Ratio
1971	45	67	0.67	20	9	2.22	35	24	1.46
1980	25	55	0.45	43	13	3.31	32	32	1.00
1990	22	50	0.44	39	17	2.29	39	33	1.18
1995	17	44	0.40	42	18	2.33	41	38	1.08
2000	16	44	0.36	40	14	2.86	45	42	1.07
2003	15	46	0.33	39	13	3.00	46	41	1.12

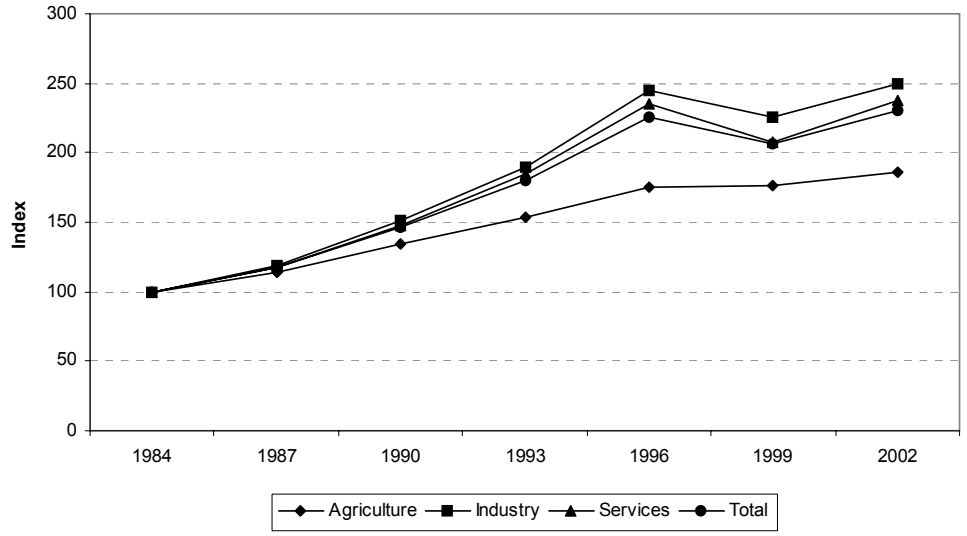
Source: BPS, *Statistics Indonesia*, and Sakernas (various years).

On the other hand, the share of industrial GDP doubled between 1971 and 1980, and has stayed relatively constant ever since. The 100% increase between 1971 and 1980, however, was not followed by a similarly large increase in share of employment in the sector, which only increased from 9% to 13%. This is the era of capital intensive industrial expansion mentioned earlier. The GDP to employment ratio in the industrial

sector fluctuated more than that in the other two sectors. The decline in the ratio during the 1990s was caused by the shift from import substitution to export-oriented industries, which are relatively more labor intensive. Finally, the shares of GDP and employment in the services sector have been constantly increasing since 1980. With similar increases in both areas, the GDP to employment ratio has changed relatively little.

In terms of the pattern of sectoral economic growth in Indonesia during the period under analysis, Figure 1 shows the indices of total as well as the sectoral real GDP in Indonesia from 1984 to 2002, with the figures for 1984 normalized to 100. The figure shows that during the pre-crisis period between 1984 and 1996, the total real GDP were almost twice larger. In terms of sectoral growth, the figure indicates that the real GDP growth of the industrial sector was the fastest. By 1996, the real GDP of this sector was almost two and a half times its size in 1984, followed closely by the services sector. Meanwhile, the real GDP of the agricultural sector grew slower than the total real GDP. The real GDP of this sector in 1996 was around 1.75 times its size in 1984.

Figure 1. Index of Real GDP by Sector (1984=100)

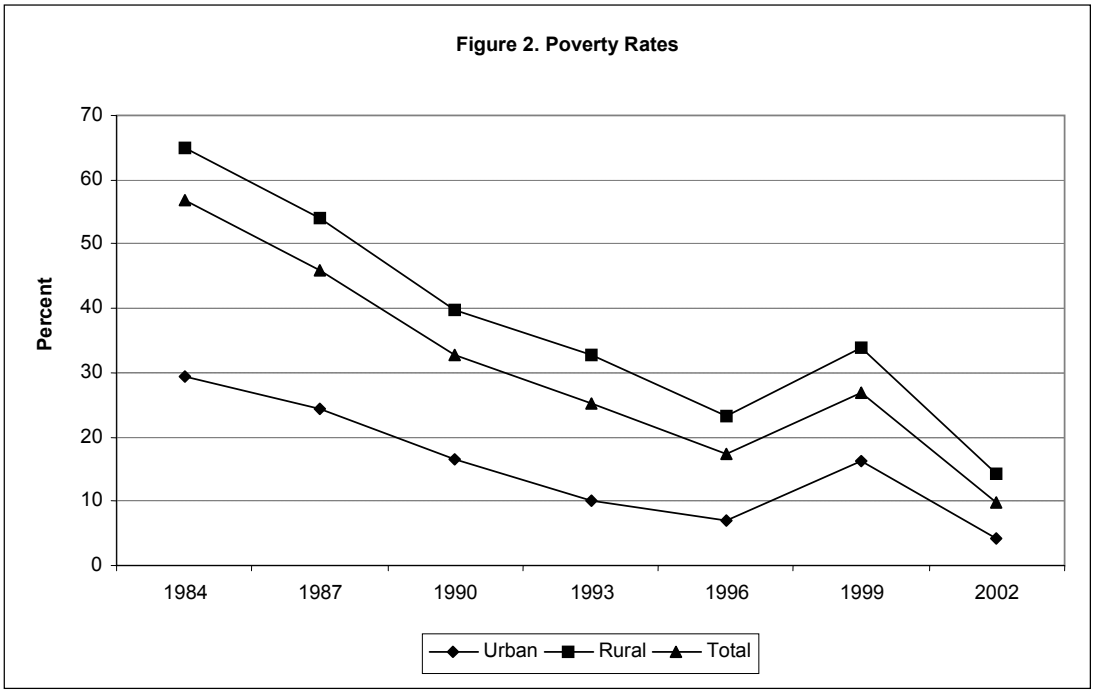


During the crisis, however, the agricultural sector was the only sector that still recorded positive growth, while the other two sectors as well as the total GDP decreased. In 1998, when the real output shrank from the level in the previous year by an unprecedented magnitude of 9.2% in the industrial sector and 19% in the services sector, the output of the agriculture sector fell only slightly, by 0.7%. In the following year, the agricultural sector led the recovery by growing positively at 2.1%, helped by the industrial sector which grew by 1.4%, while the services sector was still in negative growth territory. By 2002, the industrial and services sectors had rebounded, reaching a level slightly higher than their 1996 levels, while the agricultural sector continued its trend of relatively lower growth.

V. POVERTY TRENDS AND SECTORAL PROFILE OF POVERTY

A. POVERTY TRENDS

To calculate poverty rates, we use region-specific poverty lines developed by Pradhan et al (2001), which use the same basket of goods for every region and whose differences only reflect price differences across regions. To ensure comparability across time, we deflate the poverty lines using deflators calculated by Suryahadi, Sumarto, and Pritchett (2003). Hence, the poverty estimates calculated from these lines are consistent across regions and across time.



The poverty rates are shown in Figure 2. There was clearly a sharp reduction in both urban and rural poverty in Indonesia between 1984 and 1996. Despite the continuously growing population, the total poverty rate dropped from 56.7% in 1984 to 17.4% in 1996, a reduction of 39.3 percentage points in a twelve-year period. During the same period, urban

poverty fell by 22.2 percentage points from 29.3% in 1984 to 7.1% in 1996, while rural poverty fell by 41.8 percentage points from 65.1% in 1984 to 23.3% in 1996.

However, the economic crisis has evidently reversed the course of poverty reduction of the previous decade. Poverty in both urban and rural areas increased again between 1996 and 1999. The total poverty rate in 1999 was 27.0%, while urban and rural poverty rates were 16.3% and 33.9% respectively. In fact, reflecting the severity of the crisis, each of these poverty rates, particularly the urban poverty level, is even higher than the respective 1993 levels. This implies that in terms of poverty rates, the time lost due to the crisis is more than six years.

However, the recovery was quick. By 2002, the poverty rates in both urban and rural areas were the lowest since 1984. The national poverty rate was 9.8%; the urban poverty rate was 4.2%; and the rural poverty rate was 14.2%. In just three years, Indonesia had more than made up for the lost ground during the crisis. This also implies that the increase in poverty in 1999 due to the crisis was largely transient.

B. SECTORAL PROFILE OF POVERTY

Poverty in Indonesia is a phenomenon mainly found in rural areas, in particular in the agricultural sector. In urban areas poverty is mainly found in the informal sector. Table 2 shows the poverty rates and the contributions to the total poverty by main sector of occupation of household heads in 1984, 1996, 1999 and 2002. A comparison between the 1984 and 1996 sectoral profiles of poverty shows how it is affected by the growth; the 1996 and 1999 comparison shows how it is affected by the crisis; while the 1999 and 2002 comparison shows how it is affected by the recovery.

The table clearly shows that during the whole period between 1984 and 2002, in both urban and rural areas, the agricultural sector had always had the highest poverty incidence. In 1984, the poverty rate in the agricultural sector was 63.7%, much higher than the poverty rates of 47.2% and 36.6% in the industrial and services sectors respectively. The Disaggregation into urban and rural areas reveals a similar pattern.

In terms of contribution to the total poverty, 66.4% of the poor in 1984 had a livelihood in the agricultural sector. In rural areas, around 73% of all the poor were in the agricultural sector. In urban areas, however, because agricultural households made up only a small fraction of the total households, the poor in agricultural sector made up only 17.6% of all the poor. In urban areas, most of the poor were found in the services sector, which is where most urban informal workers are employed.

High economic growth between 1984 and 1996 obviously provided broad-based benefits for the poor. As a result, the poverty rate in the agricultural sector by 1996 was halved to 29.2%. However, it appears that poverty reduction in other sectors occurred even faster: the poverty rates in the industrial and services sectors in 1996 were only 12.6% and 8.7% respectively. As a result, despite the reduction in poverty incidence, the contribution of the agricultural sector to the total poverty increased to 68.6%. Similarly, in urban and rural areas the contribution of the agricultural sector to poverty increased to 25.1% and 76% respectively.

Table 2. Poverty Rate and Contribution to the Total Poverty by Main Sector of Employment in Indonesia, 1984-2002 (%)

Sector	Urban		Rural		Total	
	Poverty Rate	Contribution to Total Poverty	Poverty Rate	Contribution to Total Poverty	Poverty Rate	Contribution to Total Poverty
1984						
Agriculture	53.7	19.4	64.0	76.0	63.7	69.8
Industry	27.0	14.7	62.3	6.0	47.9	7.0
Services	23.1	65.9	49.9	18.0	36.7	23.2
1996						
Agriculture	20.7	25.1	29.9	76.0	29.2	68.6
Industry	7.1	13.2	18.1	5.7	12.6	6.8
Services	5.6	61.7	12.7	18.3	8.7	24.6
1999						
Agriculture	33.6	18.9	40.1	70.5	39.5	58.1
Industry	18.1	15.3	30.1	6.7	23.5	8.8
Services	14.1	65.9	23.5	22.7	17.8	33.1
2002						
Agriculture	11.7	33.1	17.5	76.5	16.7	68.2
Industry	3.3	20.4	10.1	8.8	5.9	11.0
Services	3.2	46.5	8.2	14.7	4.9	20.8

The economic crisis reversed the declining trend in poverty and this reversal occurred in all sectors, including agriculture. The poverty rate in the agricultural sector increased again to reach 39.5% in 1999. In accordance with the urban and modern sector's nature of the origin of the crisis, the proportionate increases in poverty in the industrial and services sectors were higher and the poverty rates in these sectors in 1999 reached 23.5% and 17.8% respectively. Consequently, the contribution of the agricultural sector to poverty declined to 58.1% for the total poverty and 18.9% and 70.5% for the urban and rural poverty respectively.

The conditions after the economic rebound mirror those in 1996 in terms of contribution to the total poverty. In 2002, agriculture contributed 68.2% to the total poverty, while industrial and services contributed 11% and 20.8% respectively. In urban areas, the contribution of agriculture increased to 33.1%; the industrial sector's contribution increased to 20.4%; while the services sector's contribution dipped to 46.5%. In terms of the poverty rate, however, all three sectors recorded lower poverty rates in national, urban, and rural areas, even compared to the previous peak of economic growth in 1996.

VI. IMPACT OF ECONOMIC GROWTH ON POVERTY

A. THE MODEL

Basically, the model to estimate the impact of economic growth on poverty can be defined as:

$$dP = \alpha + \beta \dot{y} + \varepsilon \qquad (1)$$

where P refers to the poverty rate; dP refers to the change in poverty rate; $\dot{y}$ represents the rate of economic growth; ε is the error term; and α and β are the parameters to be estimated. In particular, the parameter of interest is β, which is the growth elasticity of poverty. This elasticity shows the percentage point change in poverty rate due to one percent GDP growth.

Estimating equation (1) requires time-series data spanning a sufficiently long period. For example, Ravallion and Datt (1996) estimate various specifications and extensions of equation (1), but always forcing $\alpha = 0$ and having the growth variable measured in per capita term. However, the availability of long time-series data in developing countries is not the norm. To circumvent the dual problems of the unavailability of sufficiently long time-series national level data and the implausibility of pooling data across countries, we employ panel data with the province as the unit of observations. This is similar to Datt and Ravallion (1998) and Ravallion and Datt (1999) who estimate the model using the panel data of Indian states. However, this requires some adjustments in estimating the model, in particular to take into account the effect of migration across regions and the initial conditions of each province which may affect poverty change within each province.

The adjustments to take into account inter-provincial migration are necessary for the following reason. Suppose a province experienced high economic growth for a long period, but at the same time it attracted a large number of poor people from other provinces to migrate to this province. Or, on the other hand, suppose a province experienced a deep recession, which forced many of its poor people to migrate to other provinces in search of a better life. Thus, without controlling the effect of the inter-provincial migration, the data may suggest that economic growth has a positive correlation with poverty, implying that economic growth is associated with an increase in poverty.

Suppose that a country has a number of T provinces with the total population of N and a number of N^P poor people. Therefore, $N = N_1 + N_2 + ... + N_T$ and $N^P = N_1^P + N_2^P + ... + N_T^P$.

Meanwhile, the total poverty rate P is $$P = \frac{N^P}{N} = \frac{N_1^P + N_2^P + ... + N_T^P}{N} \quad (2)$$

and equals $$P = \frac{N_1}{N}\frac{N_1^P}{N_1} + \frac{N_2}{N}\frac{N_2^P}{N_2} + ... + \frac{N_T}{N}\frac{N_T^P}{N_T} = S_1P_1 + S_2P_2 + ... + S_TP_T \quad (3)$$

where S_j is the share of population in province j and P_j is the poverty rate in province j. Equation (3) simply says that the national poverty rate is the average of provincial poverty rates weighted by the population share of each province.

Similarly, the change in the national poverty rate can be caused by the changes in the provincial poverty rates. This totally differentiates equation (3):

$$dP = \left(S_1dP_1 + S_2dP_2 + ... + S_TdP_T\right) + \left(P_1dS_1 + P_2dS_2 + ... + P_TdS_T\right) \quad (4)$$

Equation (4) says that the change in the national poverty rate is due to the changes in the provincial poverty rates weighted by each province's population share and the

changes in the provincial population share weighted by each province's initial poverty rate. The terms in the second bracket identify the change in the national poverty rate due to the changes in the population shares across provinces, which may be due to the differences in the natural population growth as well as the inter-provincial migration, weighted by each province's initial poverty rate.

This rearranges equation (4):

$$dP = (S_1 dP_1 + P_1 dS_1) + (S_2 dP_2 + P_2 dS_2) + ... + (S_T dP_T + P_T dS_T) \quad (5)$$

Each bracket in equation (5) identifies the total contribution of each province to the change in the national poverty rate. Equation (5) suggests that in estimating equation (1) using the provincial panel data, it is necessary to control each province's population share and initial poverty rate.

In addition, Datt and Ravallion (1998), Ravallion and Datt (1999) and Son and Kakwani (2004) suggest that it is also necessary to control the effects of various initial conditions.[3] Therefore, the estimable model becomes:

$$dP_j = \alpha + \beta \dot{y}_j + \gamma dS_j + \delta P_j + \mu_m E_{mj} + \varepsilon \quad (6)$$

where dS_j is the change in population share in province *j* and E_{mj} is a vector of initial conditions in province *j*.

To test the hypothesis that the sectoral composition of economic growth affects poverty reduction, the total economic growth in each province is decomposed into the combination of its urban-rural location with its sectoral (agriculture, industry, services) components. Since $dY_j = dY_{Uj}^A + dY_{Uj}^I + dY_{Uj}^S + dY_{Rj}^A + dY_{Rj}^I + dY_{Rj}^S$, then:

[3]Ravallion and Datt (1999) find that initial conditions do not affect the elasticity of poverty to farm yields and development spending. However, the non-farm growth process is more pro-poor in Indian states with initially higher farm productivity, higher rural living standards relative to urban areas, and higher literacy.

$$\dot{y}_j = \frac{dY_j}{Y_j} = \frac{Y_{Uj}^A}{Y_j}\frac{dY_{Uj}^A}{Y_{Uj}^A} + \frac{Y_{Uj}^I}{Y_j}\frac{dY_{Uj}^I}{Y_{Uj}^I} + \frac{Y_{Uj}^S}{Y_j}\frac{dY_{Uj}^S}{Y_{Uj}^S} + \frac{Y_{Rj}^A}{Y_j}\frac{dY_{Rj}^A}{Y_{Rj}^A} + \frac{Y_{Rj}^I}{Y_j}\frac{dY_{Rj}^I}{Y_{Rj}^I} + \frac{Y_{Rj}^S}{Y_j}\frac{dY_{Rj}^S}{Y_{Rj}^S} \qquad (7a)$$

$$\dot{y}_j = H_{Uj}^A \dot{y}_{Uj}^A + H_{Uj}^I \dot{y}_{Uj}^I + H_{Uj}^S \dot{y}_{Uj}^S + H_{Rj}^A \dot{y}_{Rj}^A + H_{Rj}^I \dot{y}_{Rj}^I + H_{Rj}^S \dot{y}_{Rj}^S \qquad (7b)$$

where the superscript $k = \{A, I, S\}$ indexes the agricultural, industrial, and services sectors respectively, while the subscript $l = \{U, R\}$ indexes the urban and rural locations, hence, H_{lj}^k is the location and sectoral share of GDP.

Substituting equation (7b) into equation (6) results in the model of sectoral growth impact on poverty reduction:

$$\begin{aligned} dP_j = {} & \alpha + \beta_U^A\left(H_{Uj}^A \dot{y}_{Uj}^A\right) + \beta_U^I\left(H_{Uj}^I \dot{y}_{Uj}^I\right) + \beta_U^S\left(H_{Uj}^S \dot{y}_{Uj}^S\right) + \beta_R^A\left(H_{Rj}^A \dot{y}_{Rj}^A\right) \\ & + \beta_R^I\left(H_{Rj}^I \dot{y}_{Rj}^I\right) + \beta_R^S\left(H_{Rj}^S \dot{y}_{Rj}^S\right) + \gamma dS_j + \delta P_j + \mu_m E_{mj} + \varepsilon \end{aligned} \qquad (8)$$

If $\beta_U^A = \beta_U^I = \beta_U^S = \beta_R^A = \beta_R^I = \beta_R^S$, then equation (8) collapses to equation (6), suggesting that the location and sectoral compositions of economic growth do not influence its impact on poverty. Otherwise, they matter because each sectoral growth affects poverty differently. The advantage of this method is that the estimated elasticity encompasses all direct and indirect effects of growth on poverty, including income distributions and general equilibrium effects.

B. EMPIRICAL ESTIMATION

To estimate the model empirically, panel data with the province as the unit of observation is assembled from various data sources. The Susenas database is used to calculate the provincial level poverty measures, which are then merged with the real regional GDP (RGDP) database as well as with other data. The RGDP data is

disaggregated by sectors. However, there is no disaggregation by urban-rural location available. To disaggregate the sectoral RGDP data by urban-rural location, the provincial urban-rural share of the sectoral household expenditure data from the Susenas is applied to the sectoral RGDP data. Since the capital city of Jakarta, which is a whole province, consists only of urban areas, the data of this province is merged with the neighboring West Java province. Meanwhile, due to the unavailability of data for some years, the conflict-ridden provinces of Aceh, Maluku, and Papua are not included.[4] Appendix 1 shows the mean contribution of each sector-location to GDP at the national level between 1984 and 2002.

The dependent variable in the estimated model is the change in poverty rate. In addition to looking at the sectoral poverty in each location, we also look at urban and rural poverty as a whole. Meanwhile, the independent variables are the share-weighted sectoral GDP growth in urban and rural areas, as shown in equation (8), controlled by the change in population share, initial poverty rate, and two other initial condition variables: Gini ratio as a measure of inequality and share of labor force with at least nine years of education as a measure of human capital level. The estimation method used is the GLS for panel data, where the standard errors are corrected for heteroskedasticity across provinces. We assume that autocorrelation is not an issue since we do not use poverty or GDP levels in our estimation.

Table 3 presents the results of estimations of sectoral and overall poverty in rural areas. A precaution is warranted in interpreting the coefficients. The interpretation of the sectoral GDP growth is not straightforward as the independent variables in equation (8) are sectoral economic growth weighted by their GDP share. Hence, the coefficient

[4]The three provinces combined have a population share of around 3% of the total Indonesian population in 2004.

indicates the percentage point change in poverty rate from a sectoral economic growth equal to one percent times the inverse of the sector's GDP share.[5]

The results clearly indicate that the location and sectoral components of growth do impact poverty differently. This is evident from the coefficients of the six growth variables which are significantly different from each other in every estimation. Nevertheless, all significant coefficients are negative, indicating that in general economic growth is indeed an essential recipe for poverty reduction.

The first column of Table 3 shows that rural agricultural growth significantly reduces poverty in the rural agricultural sector. Given that this is the sector where most of the poor work, focusing on rural agricultural growth proves to be the best way to aid most of those currently living below the poverty line in Indonesia. Furthermore, rural services growth also has a negative and significant coefficient. In addition, the growth in urban industrial and services sectors also reduces rural agricultural poverty. Meanwhile, only two control variables have significant coefficients, population change and initial poverty rate.

Regarding poverty in the rural industrial sector, the results show that the growth in both rural and urban services and urban industry are significantly associated with the poverty reduction in this sector. It is interesting to note that the own-sector growth does not significantly reduce poverty in the sector. Similarly, agricultural growth anywhere is not associated with the poverty reduction in rural industry. Finally, among the control variables only the initial poverty rate has a significant coefficient.

Next, we look at rural services poverty. The growth in both urban and rural services sectors successfully reduce the poverty in the services sector. Meanwhile, the

[5]Suppose a sector made up 25% of the whole economy, then the coefficient would indicate the percentage point change in poverty rate due to the 1/0.25 or 4% of growth in that sector. Notice that 4% multiplied by 25% is equal to 1%.

only other significant growth variable is urban agriculture, and only the initial poverty rate is significant among the control variables.

Table 3. The Impact of Economic Growth on Sectoral Poverty in Rural Areas

Independent Variables	Agriculture (1)		Industry (2)		Services (3)		Overall Rural (4)	
	Coefficient	*z*-values	Coefficient	*z*-values	Coefficient	*z*-values	Coefficient	*z*-values
Urban								
Agricultural GDP Growth	0.071	0.27	0.669	1.73	-0.470 *	-2.27	-0.190	-0.83
Industrial GDP Growth	-0.176 **	-3.76	-0.129 *	-2.04	-0.043	-1.48	-0.099 **	-2.83
Services GDP Growth	-0.399 **	-3.49	-0.419 **	-3.19	-0.236 **	-3.20	-0.413 **	-4.52
Rural								
Agricultural GDP Growth	-0.600 *	-2.39	-0.212	-0.61	-0.061	-0.30	-0.445 *	-2.19
Industrial GDP Growth	-0.040	-0.32	-0.220	-1.43	-0.060	-0.64	-0.102	-0.89
Services GDP Growth	-0.475 **	-3.79	-0.559 **	-3.67	-0.528 **	-6.06	-0.555 **	-5.37
Change in population share	4.045 **	2.64	0.523	0.63	1.206	1.34	6.477 **	3.43
Initial poverty rate	-0.124 *	-2.10	-0.117 *	-2.02	-0.118 **	-2.82	-0.143 **	-2.72
Initial Gini ratio	0.007	0.03	-0.032	-0.13	-0.029	-0.40	-0.002	-0.01
Initial human capital	-0.239	-0.86	-0.073	-0.52	-0.013	-0.22	-0.264	-1.64
Constant	0.101	1.61	0.080	0.95	0.067	1.67	0.138 *	2.34
Number of observations	132		132		132		132	
Wald chi-square	71.89**		40.05**		71.84**		91.43**	
Log likelihood	120.85		82.63		166.77		140.88	

Note: ** = significant at 1 % level, * = significant at 5 % level.

The control variables are at the same level as the dependent variable.

The final column in Table 3 shows the results for the total rural poverty. Indeed, the growth in rural agriculture significantly reduces the overall poverty in rural areas. Similarly, rural services growth as well as the growth in urban industrial and services sectors significantly reduce rural poverty. Meanwhile, the two growth variables with insignificant coefficients, urban agriculture and rural industry, also have negative signs. Among the control variables, initial poverty rate has a significant negative effect on subsequent poverty reduction, while the effect of the change in population share is positive and significant, implying that higher population share is associated with an increase in poverty.

After looking at the sectoral poverty in rural areas, now we are going to look at Table 4 which shows the estimation results for the sectoral and overall poverty in urban areas. For urban agriculture, growth there together with the growth in urban industrial and rural services sectors significantly reduce poverty. Meanwhile, among the control variables, only the change in population share has a significant coefficient.

On the other hand, reducing poverty in the urban industrial sector requires growth in urban areas, where the growth in all three sectors has negative and significant coefficients, and, in addition, rural services growth also has a significant impact. Among the control variables only the population change and initial poverty rate are significant.

The results for poverty in urban services are similar to most estimation results, where the own-sector growth would significantly reduce poverty. Furthermore, the growth in urban industrial and rural services sectors is once again significant. Contrastingly, only the initial poverty rate has a significant coefficient, where the sign is also negative.

The final estimation involves the total urban poverty. Again the effects of growth of services in both urban and rural areas and industrial growth in urban areas are significant in reducing urban poverty. Meanwhile, no control variables have any significant impact.

Looking at the two tables, rural services growth would significantly reduce poverty in all specifications. Meanwhile, urban services growth is also significant in all but one specification, as is the case with urban industrial growth. Finally, in most cases, the growth in a sector-location significantly reduces poverty within the sector, with the exception of rural industry.

Table 4. The Impact of Economic Growth on Sectoral Poverty in Urban Areas

Independent Variables	Agriculture		Industry		Services		Overall Urban	
	Coefficient	*z*-values	Coefficient	*z*-values	Coefficient	*z*-values	Coefficient	*z*-values
Urban								
Agricultural GDP Growth	-1.349 **	-2.88	-0.405 *	-2.18	0.039	0.25	0.058	0.32
Industrial GDP Growth	-0.205 *	-2.23	-0.174 **	-4.15	-0.076 **	-3.16	-0.106 **	-3.02
Services GDP Growth	-0.133	-0.99	-0.246 **	-3.15	-0.308 **	-4.99	-0.344 **	-4.75
Rural								
Agricultural GDP Growth	-0.073	-0.18	0.072	0.35	0.079	0.43	-0.017	-0.08
Industrial GDP Growth	-0.134	-0.77	0.107	1.3	0.037	0.76	0.012	0.17
Services GDP Growth	-0.746 **	-4.71	-0.487 **	-5.13	-0.287 **	-4.22	-0.294 **	-3.81
Change in population share	1.687 **	4.05	1.750 **	2.83	-1.668	-1.32	2.614	1.68
Initial poverty rate	-0.068	-1.10	-0.125 *	-2.43	-0.116 *	-2.32	-0.106	-1.86
Initial Gini ratio	-0.283	-1.75	0.022	0.21	0.057	0.45	0.043	0.30
Initial human capital	0.110	0.81	-0.073	-1.71	-0.023	-0.39	-0.026	-0.40
Constant	0.121 **	2.81	0.071 *	2.05	0.026	0.58	0.040	0.89
Number of observations	132		132		132		132	
Wald chi-square	62.91**		109.53**		58.78**		51.94**	
Log likelihood	73.98		145.18		198.41		176.83	

Note: ** = significant at 1 % level, * = significant at 5 % level.
The control variables are at the same level as the dependent variable.

C. GROWTH ELASTICITY OF POVERTY

Growth elasticity of poverty refers to the percentage point change in poverty rate due to one percent of economic growth. However, since our growth variables are weighted by the GDP share, the elasticity should be evaluated at the mean value of the GDP share. Table 5 shows the results of the calculations of growth elasticity of poverty based on the estimated coefficients in Tables 3 and 4 and the mean value of the sectoral GDP share shown in Appendix 1.

A one-percent growth in rural agriculture would reduce poverty by 0.09 percentage point in rural agriculture, in which most of the poor are located in Indonesia. Similarly, a one-percent growth in urban agriculture would reduce poverty in rural services and urban industry by 0.01 percentage point and in urban agriculture by 0.03 percentage point.

Meanwhile, a one-percent growth in urban services is associated with a reduction in poverty rate by 0.14 percentage point in rural agriculture, 0.15 in rural industry, 0.09 in rural services, 0.09 in urban industry, and 0.11 in urban services respectively. In comparison, a one-percent growth in rural services would reduce poverty rate by 0.07 percentage point in rural agriculture, 0.08 in rural industry, 0.08 in rural services, 0.11 in urban agriculture, 0.07 in urban industry, and 0.04 in urban services respectively. Finally, while rural industrial growth would not significantly reduce poverty at all, urban industrial growth would reduce poverty by 0.02 to 0.04 percentage point in all sectors except rural services.

The results show that while own-elasticity is mostly significant, the own-elasticity of agricultural and industrial sectors in both urban and rural areas is not the largest. Urban services growth has the highest elasticity for every sector-location where its coefficient is significant, clearly helped by its large mean GDP share of the economy.

However, urban industry, the sector with the second largest GDP share, has smaller elasticity compared to that of rural services. Meanwhile, rural industry has no significant elasticity anywhere.

Therefore, given the existence of strong linkages between growth in a sector-location and poverty in other sectors and locations, alleviating poverty in a specific sector-location does not always require economic growth in that particular sector-location. It is better to allocate resources to focus on the growth in the sector and location with the highest elasticity. Considering that most of the poor in Indonesia are working in the agricultural sector in rural areas, focusing on the growth in rural agricultural and urban services sectors will succeed in greatly reducing poverty in the country.

Table 5. The Impact of A One-Percent Growth on Percentage Point Change in Poverty Rate

Independent Variables	Mean GDP Share (%)	Growth Elasticity of Poverty					
		Rural			Urban		
Rural		Agriculture	Industry	Services	Agriculture	Industry	Services
Agricultural GDP Growth	15.4	-0.09 *	-0.03	-0.01	-0.01	0.01	0.01
Industrial GDP Growth	9.93	0.00	-0.02	-0.01	-0.01	0.01	0.00
Services GDP Growth	14.71	-0.07 **	-0.08 **	-0.08 **	-0.11 **	-0.07 **	-0.04 **
Urban							
Agricultural GDP Growth	1.95	0.00	0.01	-0.01 *	-0.03 **	-0.01 *	0.00
Industrial GDP Growth	21.32	-0.04 **	-0.03 *	-0.01	-0.04 **	-0.04 **	-0.02 **
Services GDP Growth	36.35	-0.14 **	-0.15 **	-0.09 **	-0.05	-0.09 **	-0.11 **

Note: ** = significant at 1 % level, * = significant at 5 % level.

VII. CONCLUSION

In this study we contribute to the literature on the relationship between economic growth and poverty reduction by using further disaggregated growth and poverty conditions. We ascertain that the location and sectoral components of growth do matter for the impact of economic growth on poverty reduction, implying that not all sectoral components of economic growth contribute equally to poverty reduction.

In terms of urban-rural differences of a sector, we find that rural agricultural growth significantly reduces poverty only among those working in the rural agricultural sector, but not among those in the urban agricultural sector, and vice versa. Moreover, only the industrial growth in urban areas can significantly reduce poverty, while rural industrial growth has no significant impact on poverty. This shows that disaggregating sectors into their locations unearths information that would not have been revealed using aggregated sectoral data.

In terms of elasticity, growth in the services sector, both in urban and rural areas, has the highest elasticity of poverty in all sectors and locations. Between the two, we find that urban services growth has the higher elasticity in most cases, except among the urban poor working in agriculture where its elasticity is not significant.

Given our results, reducing poverty in Indonesia, where most of the poor are located in rural areas and working in the agricultural sector, requires accelerating growth in the rural agricultural sector and at the same time achieving robust growth in the urban services sector. In the long run, however, reducing poverty could be achieved more rapidly by turning the country into a services-based economy.

LIST OF REFERENCES

Bidani, Benu and Martin Ravallion (1993) 'A Regional Poverty Profile for Indonesia.' *Bulletin of Indonesian Economic Studies* 29, 37-68

Badan Pusat Statistik, *Statistik Indonesia*, various years

Chesher, Andrew (1998) 'Local Poverty Lines and Poverty Measures for Indonesia.' Report prepared for the World Bank, Department of Economics, University of Bristol

Datt, Gaurav and Martin Ravallion (1998) 'Why Have some Indian States Done Better than Others at Reducing Rural Poverty.' *Economica* 65, 17-38

Datt, Gaurav and Martin Ravallion (2002) 'Is India's Economic Growth Leaving the Poor Behind?' *Journal of Economic Perspectives* 16(3), 89-108

Dollar, David and Aart Kraay (2002) 'Growth is Good for the Poor.' *Journal of Economic Growth* 7, (3) 195-225

Foster, Andrew D. and Mark R. Rosenzweig (2005) 'Agricultural Development, Industrialization and Rural Inequality.' Mimeo, Brown University and Harvard University

Hasan, Rana and M.G. Quibria (2004) 'Industry Matters for Poverty: A Critique of Agricultural Fundamentalism.' *Kyklos* 57(2), 253-264

Kimenyi, Mwangi S. (2002) 'Agriculture, Economic Growth and Poverty Reduction.' KIPPRA Occasional Paper No. 3, Kenya Institute for Public Policy Research and Analysis, Nairobi

Mellor, John W. (1976) *The New Economics of Growth: A Strategy for India and the Developing World*, Ithaca, NY: Cornell University Press

Mellor, John W. (1999) 'Faster, More Equitable Growth – The Relation between Growth in Agriculture and Poverty Reduction.' Agricultural Policy Development Project Research Report No. 4, Abt Associates Inc., Cambridge, MA

Pradhan, Menno, Asep Suryahadi, Sudarno Sumarto, and Lant Pritchett (2001) 'Eating Like Which 'Joneses'? An Iterative Solution to the Choice of Poverty Line Reference Group.' *The Review of Income and Wealth* 47(4), 473-487

Quibria, M.G. (2002) 'Growth and Poverty: Lessons from the East Asian Miracle Revisited.' ADB Institute Research Paper 33, Asian Development Bank Institute, Tokyo

Quizon, J. and H. Binswanger (1986) 'Modeling the Impact of Agricultural Growth and Government Policy on Income Distribution in India.' *World Bank Economic Review* 1(1), 103-148

Quizon, J. and H. Binswanger (1989) 'What can Agriculture Do for the Poorest Rural Groups?' In *The Balance between Agriculture and Industry in Economic Development*, vol. 4 (Social Effects). I. Adelman and S. Lane (eds.) McMillan Press for the International Economic Association

Ravallion, Martin, and Gaurav Datt (1996) 'How Important to India's Poor Is the Sectoral Composition of Economic Growth?' *World Bank Economic Review* 10(1), 1-25

Ravallion, Martin, and Gaurav Datt (1999) 'When is Growth Pro-Poor? Evidence from the Diverse Experiences of India's States' Policy Research Working Paper No. 2263, World Bank, Washington, D.C.

Sarris, Alexander H. (2001) 'The Role of Agriculture in Economic Development and Poverty Reduction: An Empirical and Conceptual Foundation.' Paper prepared for the Rural Development Department of the World Bank, University of Athens, Athens

Son, Hyun H. and Nanak Kakwani (2004) 'Economic Growth and Poverty Reduction: Initial Conditions Matter.' Working Paper Number 2, International Poverty Centre, United Nations Development Programme, Brasilia

Srinivasan, T.N. (2001) 'Growth and Poverty Alleviation: Lessons from Development Experience.' ADB Institute Working Paper 17, Asian Development Bank Institute, Tokyo

Suryahadi, Asep, Sudarno Sumarto, and Lant Pritchett (2003) 'Evolution of Poverty during the Crisis in Indonesia.' *Asian Economic Journal* 17(3), 221-241

Warr, Peter G. and Wang Wen-Thuen (1999) 'Poverty, Inequality and Economic Growth in Taiwan.' In *The Political Economy of Development in Taiwan: Essays in Memory of John C. H. Fei*. Gustav Ranis and Hu Sheng-Cheng (eds.) London: Edward Elgar

Warr, Peter G. (2002) 'Poverty Incidence and Sectoral Growth: Evidence from Southeast Asia.' WIDER Discussion Paper No. 2002/20, United Nations University – World Institute for Development Economics Research, Helsinki

APPENDIX

Appendix 1.
Contribution to GDP by Each Sector and Location (%), 1984 – 2002

	URBAN				RURAL			
	Agriculture	Industry	Services	Total	Agriculture	Industry	Services	Total
1984	1.53	17.94	35.57	55.03	18.56	10.50	14.22	43.28
1987	1.32	17.90	33.75	52.70	18.30	11.36	16.24	45.90
1990	1.29	18.55	30.36	50.20	17.37	11.56	20.19	49.12
1993	2.08	21.52	37.97	61.57	15.26	9.51	13.67	38.44
1996	1.79	21.87	37.39	61.04	13.77	10.30	14.89	38.96
1999	2.12	21.40	35.76	59.28	15.02	11.06	14.65	40.72
2002	2.75	25.53	40.08	68.36	13.34	6.91	11.38	31.64
Mean	1.95	21.32	36.35	59.62	15.40	9.93	14.71	40.04

Note: Calculated at national level.