

Research Paper

# The Role of the Secondary Sector in Poverty Alleviation in Indonesia

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## ABSTRACT

The relationship between economic growth and poverty reduction, although well established, is heterogeneous. The heterogeneity stems not only from socio-economic factors but also from the structure of output growth. In Indonesia, the secondary sector seems to be less poverty-reducing than other sectors. This study examines the impact of sectoral growth on poverty in Indonesia, with particular attention to the disaggregated secondary sector, and also analyzes the relative sensitivities of poverty reduction to the labor-intensive and non-labor-intensive sectors. The empirical analysis uses provincial panel data on Indonesia for the period 2003–2018 and employs the pooled OLS method. The results show that sectoral growth has little effect on improving the condition of the poor in Indonesia. Nevertheless, this conclusion has a high potential to be inappropriate. Perhaps a better conclusion on the linkage between sectoral growth and poverty can be drawn if the characteristics of mining-driven and nonmining-driven provinces in Indonesia are taken into account. In nonmining-driven provinces, the secondary sector pales in comparison to services in alleviating poverty. Six-sector disaggregation of the economy (with or without controlling for the distributional effect through labor intensity) reveals that, within the secondary sector, the subsectors that significantly reduce poverty in nonmining-driven provinces are mining and construction. Mining-driven provinces, however, do not display a linkage between sectoral growth and poverty. The significant role of labor intensity in determining whether sectoral growth is pro-poor suggests that adopting policies that lean toward discouraging businesses from employing labor is inadvisable.

**Keywords:** poverty, sectoral growth, labor intensity, mining, nonmining

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## 1. Introduction

The focus of studies on growth and poverty emerges partly due to the failure of earlier development thinking, which was disillusioned by the trickle-down effect in that it is widely believed that expanding economic capacity will lead to an increase in the mean income of the population and eventually improve social welfare. In reality, promoting economic growth solely within a trickle-down framework is commonly accompanied by several problems, such as an increase in inequality because of partiality toward the highest-income earners, which in an extreme case could result in the complete opposite of what is expected, that is, a trickle up.

Nonetheless, although there are some arguments against the significance of economic growth in poverty reduction because of the possible rise in inequality (Fosu, 2017), there is general agreement that economic growth will bring about a decline in absolute poverty. Numerous studies give support to the significance of economic growth in reducing the percentage of poor people. Such studies have taken different approaches to this issue: using cross-country panel data analysis (Dollar, Kleineberg, & Kraay, 2016; Dollar & Kraay, 2002; Harmáček, Syrovátka, & Dušková, 2017) or using cross-regional panel data analysis (Ravallion & Datt, 1996; Suryahadi, Suryadarma, & Sumarto, 2009).

Still, there is heterogeneity on how significant the role of growth in poverty alleviation is, although there is a consensus on the relationship between growth and poverty, which is the factor of interest in several studies (Bourguignon, 2003; Ravallion & Chen, 1997). Many researchers have examined this phenomenon by utilizing socio-economic factors such as inequality (Bourguignon, 2003), literacy/education (Afzal, Sarwar, & Fatima, 2017; Datt & Ravallion, 2002), and migration rates (Murrugarra et al., 2011). Those factors have been shown to have a significant impact on the sensitivity of poverty alleviation to output growth. However, the source of heterogeneity on the role of growth in poverty reduction can also come from the structure of output growth itself. Hence production sectors are also a factor of interest in examining the effect of growth on poverty. In that regard, there is an ongoing discussion as to which sector is the main contributor to poverty alleviation. There is an ongoing debate over whether the expansion of a particular economic sector makes any significant contribution to the lot of the poor. Thus, studies on sectoral growth and poverty in a country—specifically, to distinguish the more pro-poor sectors from the less pro-poor sectors (Suryahadi et al., 2009)—is pivotal because the government needs to have more detailed information in order to utilize the most effective route to reducing poverty. This is related to decision-making by the government regarding the direction of development, policy, and allocation of public resources and funds. However, many agree that the effect of sectoral growth on the poor depends on the characteristics of the particular country under study. In other words, the conclusions gathered from previous research on sectoral growth and poverty in any specific country or from research that uses cross-country data cannot be immediately used to answer the same question regarding other countries.

One of the earliest studies of the impact of growth on the poor which incorporate a sectoral point of view is by Lipton and Ravallion (1993), which focused on analyzing poverty and poverty-reduction policies in developing countries. The authors of that study emphasize that poverty exists predominantly in rural areas and that migration becomes the preferred choice for the poor to seek a better life. However, despite cities offer relatively higher income, rural workers face a high probability of not being absorbed by urban sectors because of low demand for such workers and incompatibility of skills. The migrants are thus in danger of becoming urban poor, while the aggregate poverty might not improve. Hence governments of developing countries, and informal sectors in urban areas that are the destination of urban migration, are advised to remove bias against people from rural sectors. Support for agricultural development should be one of the top priorities, followed by improvements in human and physical infrastructure.

Although the study by Lipton and Ravallion (1993) does not focus on directly disaggregating economic sectors to observe the impact on poverty, it reasserts the importance of rural sectors, particularly agriculture, in poverty alleviation. In contrast to Lipton and Ravallion's study, which examines only the direct effect of growth within a single sector through income generation, subsequent research by Thorbecke and Jung (1996) tried to address the effect of the interrelation of economic activities. By developing a multiplier decomposition technique similar to that used in a social accounting matrix, they examine the effects of output growth in different sectors on poverty reduction through the changes in income of different household groups. Their system also investigates the linkages and mechanisms that connect initial stimulation in one sector to the final effect, directly and indirectly, on the poor. In a case study of Indonesia, it was found that the agriculture and service sectors surpass the industrial sector at

reducing poverty (Thorbecke & Jung, 1996). The same technique was applied to South Africa by Khan (1999). The result was slightly different from the result for Indonesia: it was concluded that the agriculture, mining, and service sectors have the greatest impact on poverty alleviation in South Africa. Both studies propose the possibility of low distributional effects in manufacturing sectors as the cause of the low level of poverty alleviation. Thorbecke and Jung (1996) further argued that this occurs because of factor endowments of poor households, that is, unskilled labor, which are not compensated at a level that is concomitant with the demand in manufacturing sectors. However, no subsequent effort was made to support this argument.

Some studies are reluctant to focus on rural-sector growth in reducing poverty, even though most developing countries may have the highest poverty level in rural areas because of the rural sector not being pro-growth. For example, the driving force of poverty alleviation in India was indeed rural-sector growth (Ravallion & Datt, 1996). A similar conclusion was drawn in a case study of China, where the most important productivity in terms of poverty reduction comes from agriculture rather than from industry or the service sector (Ravallion & Chen, 2007). Bhattacharyya and Resosudarmo (2015) took a different approach to the linkage between growth and poverty. They considered the impact of mining and nonmining growth in Indonesia and found an asymmetric result for the two types of economic activities: mining and overall growth per capita appear not to affect poverty, while nonmining growth is significant at reducing poverty. Another result from their research is that the primary and tertiary sectors were found to significantly poverty reducing at the national scale and within urban and rural areas. A more recent study concludes that compared to an equal amount of productivity growth in the industry or the service sector, productivity growth in agriculture generally has the highest impact on poverty reduction. In other words, raising sectoral output by increasing productivity to the same extent will yield heterogeneous effects on the poor, with the increase in agricultural productivity being the dominant source (Ivanic & Martin, 2018). This conclusion suggests that improvements in technology and investment in the agriculture sector, together with formulation of efficient policies, are the keys to poverty reduction.

The result of many empirical studies on sectoral growth that advocate agriculture as the main driver of poverty reduction leads to the notion of agricultural fundamentalism (Hasan & Quibria, 2004). Nevertheless, despite being backed by numerous empirical data, this fundamentalism is not without criticism. The main rationale of the criticism is that agricultural growth suffers from constraints of supply and demand. Development in agriculture can be attributed to two main factors: mechanical advances that boost labor productivity, and discoveries in biological and chemical technology associated with growth in land productivity. However, the spatial dimension and seasonal characteristics of crop production inevitably halt the growth in mechanical technology in agriculture. In addition, biological and chemical technology in agriculture eventually faces critical physiological constraints, such as the ratio of grain to straw and increases in the productivity of animal feed, that prevent productivity from improving any further (Ruttan, 2002). Physiological constraints are also present on the demand side, as the population cannot consume more than its capacity. Hence, the remarkable growth of agricultural productivity in the past few decades may be difficult to maintain in the future.

Poverty reduction requires that the poor be employed in a productive sector to ensure higher incomes (Karnani, 2011). This emphasizes the difficulty of relying on agriculture to reduce poverty because of productivity constraints on agriculture that lead to limits on its potential to grow. Growth in the secondary sector does not have such constraints, and thus it is more likely to be sustainable provided there is no significant distortion in its development process. Therefore, promoting the secondary sector is crucial, especially for long-run poverty reduction and welfare improvement, given its potential for productivity growth. East Asian economies, dubbed miracle economies, are the perfect example of how an industrial-driven economy can successfully maintain a high level of growth and rapidly reduce poverty rates. China, one of the miracle economies, managed to dramatically reduce its poverty rate from 41.6% in 1980 to 15.9% in 2004 (Lin & Yu, 2015) and became one of the world's largest economies through a striking structural change from being driven by agriculture to being oriented to the manufacture of goods for export and industrial upgrading. China attributes this success to the adoption of a comparative-advantage-following (CAF) strategy according to its factor endowments—i.e., abundant labor—starting in 1978. South Korea also managed to maintain high economic growth and reduce poverty. It became a leading example of a successful development strategy in prioritizing the secondary sector with the help of the implementation of skill-development policies (Ra & Shim, 2009).

The underlying message in the success of East Asian economies is that, ideally, the secondary sector should be more poverty-reducing than the primary sector. However, in many developing countries,

including Indonesia, the secondary sector appears to have the lowest elasticity with respect to poverty. Research by [Suryahadi et al. \(2009\)](#) found that in Indonesia, the growth of services in urban areas, followed by growth in the rural primary sector, dominates poverty reduction in rural areas. [Suryahadi et al. \(2012\)](#) argued that the inconsequential impact of industrial growth on poverty alleviation in Indonesia post the Asian Financial Crisis was due to its sustained poor performance in Indonesian economy in term of labor absorption. Despite several theories surrounding the reasons behind this finding, there have been few empirical studies that specifically aim to understand why the secondary sector is less poverty-reducing. The only notable effort to shed light on this phenomenon is the cross-country study by [Loayza and Raddatz \(2010\)](#). They employ a level of disaggregation in the secondary sector and incorporate labor intensity. In a sense, they took the premise proposed by [Thorbecke and Jung \(1996\)](#), and later by [Khan \(1999\)](#), of a low distributional effect of industry on poverty reduction, which is assumed to be caused by most of the poor being endowed with only unskilled labor, and developed a theoretical model that includes the impact of unskilled labor absorption in a given sector on the percentage of poor people. In their work, however, it is stated that labor intensity is heterogeneous between different sectors and also within a given sector in different regions/countries ([Loayza & Raddatz, 2010](#)). This emphasizes that the results of a cross-country study may not be representative of conditions in Indonesia.

Ideally, the government should be able to take advantage of the sizeable share of—and growth in—the secondary sector and use it in its mission to reduce poverty because the result may be much more impactful than to concentrate on the growth of the seemingly pro-poor but less pro-growth sectors such as agriculture. The problem arises when a pro-growth sector is suspected not to be pro-poor. Possible reasons for this phenomenon are that not all subsectors of the secondary sector are pro-poor and that not all subsectors of the secondary sector are not pro-poor. For that reason, it is important to be able to determine which subsectors have the most desirable impact on poverty alleviation. There is no previous published literature that specifically addresses this issue in the case of Indonesia. Moreover, as stated earlier, most studies of sectoral growth and poverty reduction divide growth into three major categories (primary, secondary, and tertiary), while research that incorporates a higher level of disaggregation in sectoral growth is rare, possibly because of insufficient availability of data.

This research investigates whether disaggregating the secondary sector into its four separate components will shed light on their effects on the poverty phenomenon while simultaneously taking into account the economic structure of Indonesia concerning mining-driven and nonmining-driven provinces in a way that incorporates the findings in [Bhattacharyya and Resosudarmo \(2015\)](#). Can labor intensity explain the heterogeneity of the effects of sectoral growth on poverty? Specifically, to answer that question, this research analyzes the relative sensitivities of poverty reduction to the labor-intensive and non-labor-intensive sectors, with particular attention to the effects of disaggregating the secondary sector.

## 2. Methodology

### 2.1 Theoretical View

The effort to properly categorize the economy into several different sectors was begun approximately eight decades ago, for example, with the work of [Clark \(1940\)](#). Several subsequent studies on individual economic sectors followed the work of Clark with a roughly similar framework, that is, to separate economic activities into three categories: primary, secondary, and tertiary. [Wolfe \(1955\)](#) compared the previous studies on economic sectors and concluded that the primary sector could be seen as a part of the economy with certain productivity constraints that arise from natural growth factors, hence the placement of agriculture into this category. For the secondary sector, Wolfe asserted that mechanical factors are the source of constraints on its productivity growth, while for the tertiary sector, Wolfe sets relatively unaided human skill as the constraint on productivity growth. Manufacturing is the subsector that obviously should be categorized as the secondary sector. [Clark \(1940\)](#) also places mining, construction, and utilities in the secondary sector. Wolfe's explanation of this categorization is that mining, construction, and utilities exhibit strong mechanical factors and are thus suitable for placement into the secondary sector. The tertiary sector comprises services such as transportation and communication, arts and crafts, personal and domestic service, amusement, education, and government.

This study aimed to adapt the theoretical model developed by [Loayza and Raddatz in 2010](#), which considers the structure of output growth and first sets out to elaborate a two-sector production function with asymmetric technologies. The use of two sectors is for the sake of simplification of the

formula derivation; the  $n$ -sector output production function (for  $n > 2$ ) is analogous to this two-sector analysis. As stated earlier, the work of Loayza and Raddatz employs the categorization of economic sectors. Therefore, the primary sector is comprised of agriculture; the secondary sector consists of mining, manufacturing, construction, and utilities; and the tertiary sector includes all the services activities in the economy.

Suppose the population of a country consists of the rich and the poor. Each of these two categories has a production factor in the form of labor. The rich and the poor maximize their lifetime utility by consuming final goods with an identical discount factor. However, it is assumed that the poor do not have access to assets; hence their income stems exclusively from providing a labor service. As a result, their consumption depends entirely on their real wage. This implies that the real-wage rate determines the rate of poverty. On the other hand, suppose that the supply side of the economy consists of two agents: final-good firms and intermediate-good firms. To simplify, the final-good firms produce final good  $Y$  using two intermediate goods,  $y_1$  and  $y_2$ , and operate under a neoclassical production function with constant elasticity of substitution (CES) mechanism,

$$Y = (b_1 y_1^\beta + b_2 y_2^\beta)^{1/\beta}, \tag{1}$$

where  $b_1$  and  $b_2$  are the shares of intermediate goods 1 and 2, respectively, as the inputs for the final-good production, and  $\beta = (\epsilon - 1)/\epsilon$ , with  $\epsilon$  as the elasticity of substitution between intermediate goods. The use of a CES production function implies that  $\beta \leq 1$ , and that  $b_1, b_2 > 0$  and  $b_1 + b_2 = 1$ . Each intermediate good is produced under a labor-augmented technological change Cobb–Douglas production function in a perfectly competitive market:

$$y_i = k_i^{(1-\alpha_i)} (A_i n_i)^{\alpha_i}, \quad i = 1, 2, \tag{2}$$

where  $k_i$ ,  $A_i$ , and  $n_i$  are the capital, level of technology, and labor, respectively, that are used to produce intermediate goods  $i$ . As in any labor-augmenting technology production function, the technology  $A_i$  is assumed to be an exogenous variable  $A_i = e^{g_i t}$  that grows at a rate  $g_i$ . The constant return to scale and full capital and labor mobility is assumed for both functions.

The perfect competition assumption applied in the final-good production requires the price of the final good to be equivalent to the production cost of each unit of that good:

$$p = (p_1^{1-\epsilon} + p_2^{1-\epsilon})^{\frac{1}{1-\epsilon}}, \tag{3}$$

where  $p$  is the price of the final good, and  $p_1$  and  $p_2$  are the prices of intermediate goods 1 and 2, respectively. To obtain the share of value-added from each intermediate sector to the final-good production, the first-order condition is applied to the final-good firm's optimization problem:

$$\frac{p_i y_i}{Y} = s_i = b_i \left(\frac{y_i}{Y}\right)^{\frac{\epsilon-1}{\epsilon}}, \quad i = 1, 2 \tag{4}$$

Equation (4) operates under the perfect-competition assumption in which economic profit is equal to 0 and the price of the final good is set to 1. Given the set of assumptions, the sum of the  $s_i$  has the characteristic of 1. By equation (4), the demand for intermediate goods 1 and 2 can be written as

$$\frac{y_1}{y_2} = \left(\frac{p_2}{p_1}\right)^\epsilon \tag{5}$$

The perfect-competition assumption is also applied to intermediate-good firms, so the optimization problem will yield the following first-order conditions:

$$y_i = \frac{\omega n_i}{p_i \alpha_i} = \frac{r k_i}{p_i (1 - \alpha_i)}, \quad i = 1, 2 \tag{6}$$

Equation (6) illustrates the allocation of capital and labor inputs to intermediate-good production for each sector. Market clearing for capital and labor implies that  $n_1 + n_2 = n$  and  $k_1 + k_2 = k$ .

### Real Wage Derivation

The premise behind this research is that labor intensity differs across sectors. This means that any changes in laborers' income are affected overall and in terms of sectoral growth. Applying the assumption of free labor mobility between sectors that results in wage equalization, growth in wages depends on the sum of the products of weighted growth in the individual sectors and the corresponding labor intensities. This shows the importance of variation in labor intensities between sectors and simultaneously provides a closed-form formula for wage growth which will be the basis for empirical studies. To connect wage growth with poverty, this research assumes that unlike the rich, who are endowed with assets, the poor

benefit only from their labor. In other words, the real wage is the only source of income for consumption. Hence the rate of change of poverty will be a function of wage growth.

Following the labor allocation in equation (6), suppose the rate of growth mechanism ( $\hat{x} = dx/x$ ) is applied to intermediate good 1 to obtain the rate of change in the real wage,

$$\hat{\omega} = \hat{p}_1 + \hat{y}_1 - \hat{n}_1, \tag{7}$$

where  $\hat{\omega}$  is the rate of change in the real wage, and  $\hat{p}_1$ ,  $\hat{y}_1$ , and  $\hat{n}_1$  are the rates of change in the price of intermediate good 1, the output production per capita of intermediate good 1, and the amount of labor for intermediate good 1, respectively. Applying the same procedure to the share of sectoral value added to the final output  $s_1$  to get the first two terms on the right-hand side of equation (7) while ensuring that  $\hat{Y} = s_1\hat{y}_1 + s_2\hat{y}_2$  because of a constant return to scale, we obtain

$$\hat{s}_1 + \hat{Y} = \frac{\varepsilon - 1}{\varepsilon} \hat{y}_1 + \frac{1}{\varepsilon} (s_1\hat{y}_1 + s_2\hat{y}_2) \tag{8}$$

The last term on the right-hand side of equation (7) is the rate of change of employment in sector 1. Using the solution of the first-order condition on intermediate-good firms in equations (5) and (6), we obtain

$$\left(\frac{\alpha_1}{\alpha_2}\right) \left(\frac{n_2}{n_1}\right) \left(\frac{y_1}{y_2}\right)^{\frac{\varepsilon-1}{\varepsilon}} = 1 \tag{9}$$

Equation (9) will be used in the derivation of the real wage, that is, in obtaining the change in the employment level for each intermediate-good firm. Utilizing the market-clearing condition  $n = n_1 + n_2$  while deriving the first-order condition on both final-good and intermediate-good firms, the rate of change in employment for firm 1 is

$$\hat{n}_1 = l_2 \frac{\varepsilon - 1}{\varepsilon} (\hat{y}_1 - \hat{y}_2) + \hat{n}, \tag{10}$$

where  $l_2$  is the share of employment in sector 2 ( $n_2/n$ ).

Combining equations (8) and (10) leads us to equation (11), in which we have the elements of sectoral growth, labor intensity, and population growth.

$$\hat{\omega} = \sum_{i=1}^2 s_i \hat{y}_i + \frac{\varepsilon - 1}{\varepsilon} \sum_{i=1}^2 (l_i - s_i) \hat{y}_i - \hat{n} \tag{11}$$

A transformation of equation (11) allows the use of per capita terms in the variables of sectoral growth. With a slight abuse of notation, we can rewrite equation (11) as

$$\hat{\omega} = \sum_{i=1}^2 s_i \hat{y}_i + \frac{\varepsilon - 1}{\varepsilon} \sum_{i=1}^2 (l_i - s_i) \hat{y}_i, \tag{12}$$

where  $\hat{y}$  is now the rate of growth of GDP per capita and  $l_i = n_i/n$  is the ratio of the share of labor in sector  $i$  to the sum of labor in all sectors. The first term on the right-hand side of equation (12) illustrates how an increase in sectoral GDP per capita will increase output by an amount that corresponds to a rise in the real wage. The second term, which describes sectoral growth, depends on elasticity substitution across sectors and labor intensity ( $l_i - s_i$ ), where the latter is defined as the difference between the share of employment and the share of sectoral value-added.

The formula for the rate of change in the real wage in equation (12) has the following implication; the larger the share of a sector, the more impact it has on the real wage. However, the impact of the share of a sector can be crowded out if it is not balanced by the share of employment, as indicated in the second term on the right-hand side of the equation. This implies that even though a sector has a substantial share of the economy if it is not labor-intensive, its impact on the rate of change of the real wage will be smaller than in a labor-intensive sector. This the real wage will grow more significantly if higher sectoral growth  $\hat{y}$  occurs in a sector with a large share of employment  $l_i$ .

The next step is to connect the rate of change in the real wage to poverty. The notion that the poor are endowed only with income that comes from their labor is used to assist the theoretical analysis that changes in poverty are determined by changes in the real wage,

$$\hat{h} = \psi(\hat{\omega}), \tag{13}$$

where  $\hat{h}$  is poverty growth. Equation (13) implies that by association, the function that gives the changes in poverty is also a function of the variables used in the real-wage equation ( $\hat{h} = \psi(\hat{\omega}) = \psi(s, \hat{y}, l)$ ). It is expected that the first derivative of  $\psi$  in equation (13) will be negative ( $\psi'(\hat{\omega}) < 0$ ), to capture the idea that as the real wage increases, the poverty rate will decrease. It should be noted that by the assumption that the poor who work belongs to the category of unskilled labor, the share of employment in a given sector is the ratio of the share of unskilled labor employed in that sector to overall labor.

### Poverty Measurement

The poverty headcount index is acknowledged as the most commonly used poverty indicator, mainly because it is easy to interpret (World Bank, 2014). Loayza and Raddatz (2010) use this measurement as their main poverty variable, although further robustness checks also involve other measures of poverty. The headcount index  $P_0$  uses a simple formula to illustrate the proportion of the poor ( $N_p$ ) in the total population ( $N$ ):

$$P_0 = \frac{N_p}{N} \tag{14}$$

### Hypotheses

Based on the theoretical considerations outlined above, the hypotheses in this research can be divided into two groups. First, although the aggregated secondary sector has been widely seen as not being pro-poor, at the disaggregated level, poverty reduction is more sensitive to some of its subsectors than to others. Second, labor intensity is the source of variation in the effect of sectoral growth on the poor through the mechanism of real-wage growth. This implies that poverty reduction is more sensitive to labor-intensive sectors than to non-labor-intensive sectors.

### 2.2 Empirical Strategy

Given the theoretical considerations already discussed, the research strategy can be depicted as in Figure 1.

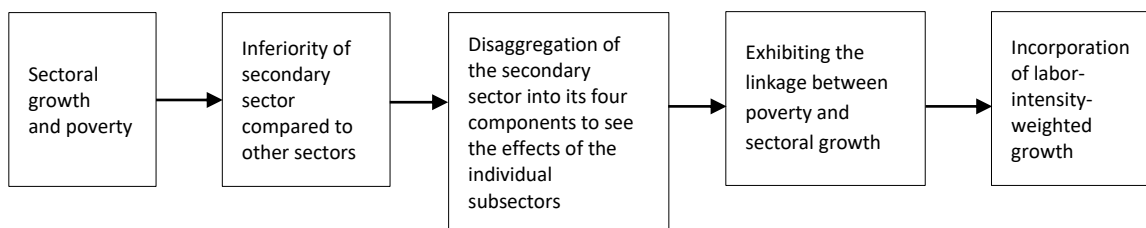


Figure 1. Research Strategy

Thus the first empirical model is as follows:

$$\hat{h}_{jt} = \delta_0 + \sum_{i=1}^3 \delta_i s_{ijt} \hat{y}_{ijt} + \beta_1 UCT_{2005} + \beta_2 UCT_{2008} + \beta_3 UCT_{2009} + \varepsilon_{jt} \tag{15}$$

where the variables represent the following quantities:

- $\hat{h}_{jt}$  : rate of change in poverty headcount index ( $P_0$ ) in province  $j$  at time  $t$
- $s_{ijt}$  : share of GDP per capita of sector  $i$  in province  $j$  at time  $t$
- $\hat{y}_{ijt}$  : growth of GDP per capita of sector  $i$  in province  $j$  at time  $t$
- $UCT_{2005}$  : dummy variable for nationwide antipoverty policy (Unconditional Cash Transfer) in 2005
- $UCT_{2008}$  : dummy variable for nationwide antipoverty policy (Unconditional Cash Transfer) in 2008
- $UCT_{2009}$  : dummy variable for nationwide antipoverty policy (Unconditional Cash Transfer) in 2009
- $i$  : the sectors of GDP (in this case, the primary, secondary, and tertiary sectors)
- $j$  : province in Indonesia

The purpose of this part of the empirical analysis was to confirm that the secondary sector has the slightest effect on poverty in Indonesia. Assuming that it is true, the next model will examine whether decomposing the secondary sector into four categories (mining, manufacturing, construction, and utilities) yields the expected result; not all subsectors within the secondary sector are poverty-reducing. A similar model was employed:

$$\hat{h}_{jt} = \delta_0 + \sum_{i=1}^6 \delta_i s_{ijt} \hat{y}_{ijt} + \beta_1 UCT_{2005} + \beta_2 UCT_{2008} + \beta_3 UCT_{2009} + \varepsilon_{jt} \tag{16}$$

with disaggregation of GDP among six sectors, where  $i = 1$  denotes the primary sector (agriculture);  $i = 2$  through  $i = 4$  denote the subsectors of the secondary sector (mining, manufacturing construction, and utilities, respectively); and  $i = 6$  denotes the tertiary sector (services). The share of sectoral GDP  $s_i$  and the sectoral growth  $\hat{y}_i$  are now varied across the six sectors, hypothesis testing of the significance of a single parameter  $\delta_i$  is done for every sector. In this case, it is expected to be negative for sectors suspected of being labor-intensive, such as construction (including the primary sector, although this is not the main concern of this research). On the contrary, sectors that are not labor-intensive are expected to have insignificant or even positive  $\delta_i$ . This would mean that growth in every non-labor-intensive sector will either not decrease poverty or aggravate the condition of poverty in Indonesia.

To capture the next objective of this research and determine whether labor-intensive growth might help to explain the heterogeneity of the linkage between poverty and sectoral growth, a second empirical model is built with the basis of equation (12) in multi-sector form,

$$\hat{\omega} = \sum_{i=1}^6 s_i \hat{y}_i + \frac{\varepsilon - 1}{\varepsilon} \sum_{i=1}^6 (l_i - s_i) \hat{y}_i \tag{17}$$

Under the same assumption that changes in poverty are linearly related to real-wage growth,  $\hat{h} = \theta_0 + \theta_1 \hat{\omega}$ , sectoral growth affects poverty via changes in the real wage,

$$\hat{h} = \theta_0 + \sum_{i=1}^6 \theta_{1i} s_i \hat{y}_i + \left( \sum_{i=1}^6 \theta_{2i} (l_i - s_i) \hat{y}_i \right) \tag{18}$$

Thus the second empirical regression model can be written as

$$\hat{h}_{jt} = \theta_0 + \sum_{i=1}^6 \theta_{1i} s_{ijt} \hat{y}_{ijt} + \left( \sum_{i=1}^6 \theta_{2i} \left( \frac{l_{ijt}}{s_{ijt}} - 1 \right) s_{ijt} \hat{y}_{ijt} \right) + \beta_1 UCT_{2005} + \beta_2 UCT_{2008} + \beta_3 UCT_{2009} + \varepsilon_{jt} \tag{19}$$

$\theta_{1i}$  illustrates the elasticity of sectoral per capita growth to poverty reduction after being controlled by labor-intensity-weighted growth, and  $\theta_{2i}$  reflects the effect of labor-intensive growth.  $\hat{h}$  is the rate of change of poverty, and  $l_{ij}$  is the ratio of unskilled labor to overall labor in sector  $i$  and province  $j$ . It is expected that both  $\theta_{1i}$  and  $\theta_{2i}$  will be negative.

### Nationwide Antipoverty Programs

The unconditional cash transfer in 2005 and 2008–2009 was a nationwide effort of GOI (The Government of Indonesia) to offset the effect of the reduction in fuel subsidies on poor households. The program was designed as emergency income support to aid household consumption that was affected by the rise in fuel prices. The unconditional nature of this cash transfer makes its effect instantaneous; that is, consumption among poor households will not severely decline under challenging times and obstruct poverty reduction. Omitting the control variable that accommodates the unconditional cash transfer would potentially bias the estimation of the growth–poverty linkage in the event of a reduction in fuel subsidies. [Bhattacharyya and Resosudarmo \(2015\)](#) controlled this factor by adding a time dummy in their empirical studies; however, they did not discern which antipoverty policy that happened in Indonesia. This is the point of departure from the research of [Bhattacharyya and Resosudarmo \(2015\)](#); that is, our study focuses on the nationwide unconditional cash transfer in 2005 and 2008–2009, and the resulting changes in the poverty rate when economic growth presumably contributed very little to poverty alleviation during that time.

### Data and Sample

To produce a statistically sufficient model, this research aimed to compile panel data for Indonesia during the period 2003–2018, with provinces as an observation unit. The number of provinces in 2003 was 32; however, because of the circumstances surrounding the data for 2000, only 30 provinces were included in the analysis. Several regions that have proliferated since 2000 were regrouped into their respective original regions to ensure data continuation. The poverty headcount index ( $P_0$ ) was taken from official data published annually by Statistics Indonesia (BPS). This research used unskilled labor, which is defined as the workers that belonged to categories 4–9 in ILO’s ISCO-08 ([International Labour Office, 2012](#); [Weingarden & Tsigas, 2010](#)): clerical support workers (major group 4); services and sales workers (major group 5); skilled agricultural, forestry, and fishery workers (major group 6); crafts and related trades workers (major group 7); plant and machine operators, and assemblers (major group 8); elementary occupations (major group 9). The ISCO categories correspond to similar categories in the data



used by Indonesia, that is, the occupational classification using KBJI (*Klasifikasi Baku Lapangan Pekerjaan Indonesia*), Standard Classification of Indonesian Employment. The unskilled labor data were obtained from Sakernas (National Labor Force Survey) collected by Statistics Indonesia. For the variable of sectoral growth per capita, we used the data on population and sectoral RGDP (Regional Gross Domestic Product) published by BPS.

To capture the effect of mining-driven versus nonmining-driven provinces, this research set an average threshold of 20% share of mining to total output for 2003–2018 to the full set of sample data in order to separate mining provinces from nonmining provinces. It is well known that the economies of the provinces that satisfy that threshold depend on natural resources. There are twenty-four nonmining-driven provinces (Nangroe Aceh Darussalam, Sumatera Utara, Sumatera Barat, Jambi, Bengkulu, Lampung, Bangka Belitung, DKI Jakarta, Jawa Barat, Jawa Tengah, Yogyakarta, Jawa Timur, Banten, Bali, Nusa Tenggara Timur, Kalimantan Barat, Kalimantan Tengah, Sulawesi Utara, Sulawesi Tengah, Sulawesi Selatan, Sulawesi Tenggara, Gorontalo, Maluku, Maluku Utara) and six mining-driven provinces (Riau, Sumatera Selatan, Nusa Tenggara Barat, Kalimantan Selatan, Kalimantan Timur, and Papua).

### Estimation Process

Essentially, our panel data approach has three types of models: OLS, a fixed-effect model, and a random-effect model. There are appropriate tests to determine which model best explains the dependent variable. The Breusch–Pagan Lagrange Multiplier Test for random effects is the tool we used to choose between OLS and the random-effect model. The null hypothesis of the Breusch–Pagan LM test is that there is no random effect. Failure to reject the null hypothesis means that OLS is more appropriate than the random-effect model. The Hausman test is used to determine the consistency of the estimation in the random-effect model versus the fixed-effect model. The ability to reject the null hypothesis via the Hausman Test implies that the fixed-effect model is more suitable than the random-effect model.

## 3. Results and Discussion

### 3.1 Empirical Result<sup>1</sup>

The panel regression result for the full sample with pooled OLS estimation is shown in the second column in Appendix 1. The coefficients of interest, share-weighted growth of industry and services, give a rough prognosis that growth in the industry and services sectors is poverty-reducing, even though the share-weighted growth of agriculture shows otherwise. However, it should be noted that all variables of interest fail to be statistically significant. The lack of individual significance in sectoral growth rates may be interpreted as evidence against the impact of sectoral growth on poverty, but that may be because of an insufficient disaggregation level (Loayza & Raddatz, 2010). Since the area of interest of this study is the secondary sector, the next step in the analysis is the further disaggregation into six sectors, with a particular focus on dividing the secondary sector into four subsectors. Appendix 2 presents the regression results based on that disaggregation. The coefficients for all subsectors of the secondary sector except manufacturing are negative. This indicates that the share-weighted growth of mining is poverty-reducing and that this is also the case for utilities and construction. However, it should be noted that out of the six sectors, only the share-weighted growth of construction and services is statistically significant.

The lack of significance in some of the individual independent variables may be an indication that sectoral GDP per capita growth does very little to the poverty alleviation. However, it is very dangerous and potentially misleading to immediately infer that economic growth has failed to improve the conditions of poverty in Indonesia. The lack of statistical evidence could indicate failure to identify the appropriate independent variable in defining the pattern of the dependent variable, or use of an insufficient sample, or both, but it could also stem from a poor understanding of the economy structure in the various provinces in Indonesia. This is crucial because Indonesia is a large country with diverse characteristics: geographically, socially, and economically. Table 1 shows that in 2018 no province was agriculture driven. However, if we take into account the conditions in 2003–2018 and categorize each province (as agricultural, industrial, or services) by how long the main sector holds its position as the key driver of the economy, only two of the thirty provinces (Lampung and Sulawesi Tengah) can be said to be

<sup>1</sup> All regression models have been subjected to either the Breusch–Pagan Lagrange Multiplier Test or the Hausman Test. All the chosen models were estimated using pooled OLS regression.

agriculture driven. The lack of agriculture-driven provinces is an early indicator of the diminishing role of the primary sector in Indonesia, as commonly happens in developing countries. The preliminary assessment in Figure 1 clearly shows the difference in the relationship between growth and poverty in mining-driven and nonmining-driven provinces. A negative correlation between economic growth and poverty exists in nonmining provinces, whereas it is indeterminate in mining provinces. Thus taking into account the inconclusive findings of several studies of the linkage between natural resources and poverty (Bhattacharyya & Resosudarmo, 2015; Loayza & Rigolini, 2016; Pegg, 2006; Ross, 2001), the next step is to examine the linkage between growth and poverty in mining-driven and nonmining-driven provinces in Indonesia.

Table 1. GDP Share by Sector in Indonesia

Province	Share of Primary Sector (%)		Share of Secondary Sector (%)		Share of Tertiary Sector (%)	
	2003	2018	2003	2018	2003	2018
Nangroe Aceh Darussalam	17.0	27.9	59.8	21.9	23.2	50.2
Sumatera Utara	26.3	24.8	32.5	32.9	41.2	42.3
Sumatera Barat	25.1	22.3	22.7	23.5	52.2	54.2
Riau	13.7	19.9	69.3	61.3	17.0	18.9
Jambi	30.6	26.4	32.1	42.1	37.3	31.5
Sumatera Selatan	19.3	16.9	54.0	53.0	26.7	30.0
Bengkulu	39.7	27.9	10.7	14.5	49.5	57.6
Lampung	42.1	28.8	23.0	34.6	34.9	36.6
Kep. Bangka Belitung	22.1	18.4	46.9	43.9	31.0	37.7
DKI Jakarta	0.1	0.1	28.5	25.6	71.4	74.3
Jawa Barat	14.8	7.2	51.5	54.1	33.7	38.7
Jawa Tengah	21.0	12.9	39.1	47.1	39.9	40.0
DI Yogyakarta	19.2	8.3	24.5	23.7	56.3	68.0
Jawa Timur	18.4	10.5	35.3	44.8	46.3	44.7
Banten	9.3	5.5	58.2	46.0	32.5	48.5
Bali	22.3	13.5	15.7	17.6	62.1	68.9
Nusa Tenggara Barat	26.6	23.5	39.4	29.5	34.0	47.0
Nusa Tenggara Timur	42.6	27.1	10.6	13.8	46.7	59.1
Kalimantan Barat	26.0	23.2	29.9	31.7	44.1	45.2
Kalimantan Tengah	41.7	20.9	17.2	39.8	41.1	39.3
Kalimantan Selatan	24.0	14.0	41.3	46.7	34.7	39.3
Kalimantan Timur	6.7	8.1	79.4	71.9	14.0	20.0
Sulawesi Utara	21.1	19.4	30.5	28.8	48.5	51.8
Sulawesi Tengah	45.2	28.3	16.2	38.8	38.6	32.9
Sulawesi Selatan	35.0	22.6	27.6	30.2	37.5	47.2
Sulawesi Tenggara	37.3	23.3	22.3	40.1	40.4	36.6
Gorontalo	31.5	37.5	19.1	16.4	49.3	46.1
Maluku	34.7	23.3	7.4	15.6	57.9	61.1
Maluku Utara	36.3	21.2	22.7	24.9	41.1	53.9
Papua	17.0	10.3	67.2	57.8	15.9	31.9

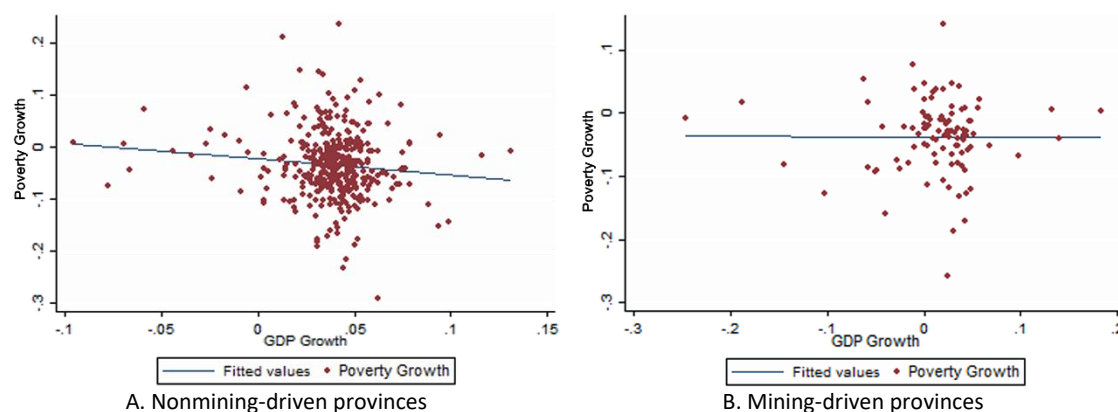


Figure 2. Growth–Poverty Relationship in Mining-Driven and Nonmining-Driven Provinces, 2003–2018

### Nonmining-Driven Economy

In the regression results (Appendix 1), a diminishing effect of the primary sector on poverty is confirmed with insignificant coefficients for growth in the primary sector. It can also be seen that growth in both the secondary and tertiary sectors appears to be significantly poverty-reducing. However, the magnitude of the growth impact in the secondary sector on poverty alleviation is notably less than that in the tertiary sector. Disregarding the insignificant effect of the primary sector, these results validate the notion that industry is less poverty-reducing. Hence the empirical analysis was expanded to examine the six-sector disaggregation of the economy.

The decomposition of the secondary sector allowed for further examination of the inferior impact of industry on poverty compared to that of services. Appendix 2 shows the results of the regression of economic growth on poverty in the six sectors. That regression shows similar results as the regression with three-sector disaggregation; growth in agriculture is not statistically significant in reducing poverty, and growth in services has the strongest impact on the poor. All subsectors within the secondary sector indicate that they are poverty-reducing. However, only growth in mining and growth in construction appears to be statistically significant. Although this data set consists of only nonmining-driven provinces, all provinces still have some share of mining output to total output even though their share of mining lies outside the threshold set for sample division. This result might be an early sign that growth in manufacturing and utilities eclipses the impact of the secondary sector overall. Nevertheless, the regression results for the six-sector economy bring us to the next step of the empirical analysis, the incorporation of labor-intensity-weighted growth.

Appendix 3 presents the sectoral growth–poverty model with the inclusion of labor-intensity-weighted sectoral growth. All subsectors within the secondary sector show signs of poverty reduction, that is, the coefficients are negative. However, the statistical evidence points towards the notion that mining and construction are the only ones in which labor-intensity-weighted growth matters for poverty alleviation. Indeed, these results are aligned with the empirical model where growth in output per capita of mining and construction is poverty-reducing, while the effect in the service sector is otherwise. Before incorporating the labor-intensive-growth variable, share-weighted growth in the service sector is highly poverty-reducing. However, labor-intensity-weighted service growth appears not to significantly reduce poverty. It is safe to infer that this is mainly driven by the low ability of the service sector to absorb unskilled laborers. That is why when we take a look at the regional pattern of labor intensity in the service sector, only three out of twenty-four provinces have high labor intensity and none of those present within the very high category.

### Mining-Driven Economy

The growth–poverty nexus in natural-resource-based regions (or in this case mining-driven provinces) is a source of puzzlement. Moreover, in his study, [Rosidi \(2020\)](#) raises a question on the phenomenon of lower economic growth in countries with abundant natural resources compared to countries with low natural resources. As can be seen in Figure 1(B), the negative correlation between economic growth and the rate of change in the poverty headcount seems very weak in provinces that are

rich in mined materials. Nevertheless, the same formal test is needed to confirm our initial assessment of GDP growth per capita versus poverty reduction. Appendix 1 and 2 present the regressions of the three-sector and six-sector disaggregation. The sectoral growth in the three-sector disaggregation fails to be statistically significant, while in the six-sector disaggregation, only agriculture significantly reduces poverty. This might be a sign of an insufficient sample, as only six provinces are mining-driven; nevertheless, it appears that the phenomenon of the lack of a linkage between growth and poverty exists in the mining-driven economy in Indonesia. However, Figures 2(A) and 2(B) show that the poverty headcount in mining-driven provinces has declined, and the economy is growing. The inclusion of the unconditional cash transfer in this study and its strong significance in the results of the regressions leads to the argument that poverty in mining-driven provinces decreases not because of economic growth but rather as a result of the antipoverty program by the government.

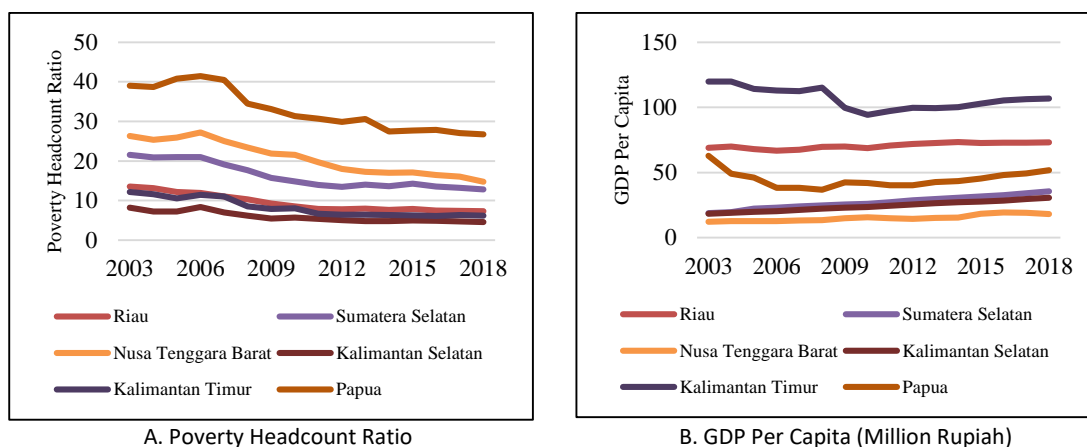


Figure 3. Poverty Headcount Ratio and GDP Per Capita (Million Rupiah) in Mining-Driven Provinces, 2003–2018

### 3.2 Discussion

One of the main empirical results of this study indicates that the sectoral growth in the economy has done very little to alleviate poverty in Indonesia. However, this does not mean that improving the performance of the economic sectors is a futile attempt at reducing poverty. The lack of empirical evidence of poverty reduction as a result of sectoral growth could be due to generalizing the economic conditions in Indonesia as a whole. Such a general assessment runs the risk of oversimplification, which could, in turn, result in ill-founded policy implications. This is a fact that has been acknowledged by [Bhattacharyya and Resosudarmo \(2015\)](#) who disaggregated growth into mining and nonmining growth and found asymmetrical results after finding that overall GDP growth per capita appears not to affect poverty reduction. In addition, [Berardi and Marzo \(2015\)](#) stated that the impact of economic growth on poverty reduction depends on the extent to which growth is inclusive and benefits the poor, which has been shown to vary depending on the structure of the economy.

#### Economic Growth–Poverty Linkage in Nonmining-Driven Provinces

Without controlling the distributional effect of growth in the form of labor intensity, it should be noted that in order to be pro-poor, a sector needs to have not only a substantial growth rate but also a notable size in the economy. In nonmining-driven provinces, the main drivers of poverty reduction, in descending order, are construction, services, and mining. Construction is a sector that relies more on manpower, in that no matter how high the level of technology is used in construction, there is still a need for a significant amount of labor. Moreover, construction, especially infrastructure development, has a substantial forward linkage because construction plays a major role in creating and attracting the buyer to the distribution systems ([Fathi, 2014](#)). In 2018, the ratio of the state budget for infrastructure to the value-added in construction project was 26.27%. Thus, the redistribution effect from construction and its remarkable growth sector can make that sector pro-poor.

Several provinces in the nonmining category consist of (or include) a metropolitan area, especially DKI Jakarta, Indonesia's capital. The consumption preference in those regions, and generally in Java, has moved from food to nonfood (especially tertiary) goods, which has encouraged growth in services. In addition, several provinces are driven by tourism, such as Bali and DI Yogyakarta. In these provinces,

services play a massive role in the economy (the shares of services in DKI Jakarta, DI Yogyakarta, and Bali in 2018 were 74.3%, 68%, and 68.9%, respectively), because tourism pushes growth in other sectors, such as trade, transportation, and communication. This large share of the service sector is arguably the main factor behind the finding that the service sector is seemingly pro-poor.

One inevitable question also emerges from this finding: Why is mining in nonmining-driven provinces poverty-reducing? First, mining in nonmining-driven provinces is on a relatively much lower scale compared to the resource-rich provinces such as Papua and Kalimantan Timur. Low-scale mining is typically not capital intensive and does not require heavy machinery and high technology, and it is also more likely to be local/national owned. Second, in nonmining-driven provinces, a significant portion of the mining sector comes from quarrying, which typically requires a sizeable amount of manpower. Therefore, in nonmining-driven regions, several provinces have high or even very high labor intensity. In addition, the ability of mining in nonmining-driven provinces to absorb unskilled labor is also compensated for by its share-weighted growth.

After controlling for labor intensity, construction and mining can retain their classification as pro-poor. This supports the notion that these two sectors are labor-intensive, that is, aside from having sizeable growth, construction and mining also absorb a fair amount of unskilled labor. However, the opposite occurs in services. The service sector is comprised of wholesale and retail trade, transportation and storage, accommodation and food service activities, information and communication, financial and insurance activities, real estate, business activities, public administration, education, health and social work activities, and other services. Many subsectors of the service sector, such as information and communication, financial and insurance activities, and education, are highly skill-intensive (and in turn, high productivity level), which limits the chances of unskilled labor to enter that sector. This is aligned with the study by [Aggarwal \(2018\)](#), who found that sectors with high productivity levels showed difficulties in creating a large number of employment opportunities.

Agriculture in nonmining-driven provinces does not indicate being poverty-reducing. This veers sharply from many previous studies that support agriculture as being fundamental to poverty reduction. Three significant contributors to the value-added from agriculture in nonmining-driven provinces are plantation crops, food crops, and fisheries. Food crops are mainly cultivated in Java Island because of the suitability of its soil in producing fruits, vegetables, and cereal crops. However, Java is also the densest island in Indonesia and the home of several manufacturing-based provinces. In recent decades, there has been a rapid land conversion from agriculture to factories because of the effort to move toward a more productive sector. As a result, the production of food crops has deteriorated sharply and brought down the share and the growth of agriculture. On the other hand, plantation crops such as palm trees, rubber trees, cocoa, and coffee have a large export value. It means that the production (and hence the income of its employees) depends on the price in not only the national market but also in the international market and the exchange rate. The development of plantation crops also faces challenges in the form of environmental issues such as deforestation laws and regulations.

Manufacturing in nonmining-driven provinces also does very little in the way of poverty alleviation. Ministerial regulation No. 51/M-IND/PER/10/2013 states that the manufacturing of food products and beverages, textile and apparel, leather and footwear, and furniture are the only four out of sixteen manufacturing categories that are labor intensive. Taking a closer look at the share of those labor-intensive manufacturing categories, in 2010–2018, the value-added from labor-intensive manufacturing was only 33%–40% of the total value added from manufacturing in Indonesia. As twenty-four of the thirty provinces in Indonesia are nonmining, it is safe to say that that figure also represents the condition of nonmining-driven provinces as a whole. In other words, manufacturing in nonmining-driven provinces still tends to be capital intensive.

There is one possible explanation of why the utility sector appears not to be poverty-reducing. Utilities comprise electricity and gas, water supply, sewerage, waste management, and remediation activities. Those categories are mainly operated and owned by state-owned enterprises. While state-owned enterprises are typically not profit-oriented, so that one might expect that they would make a significant contribution to the poor, state-owned enterprises are also heavily regulated. This is compounded by the fact that the development of utility enterprises faces many challenges, such as environmental regulations, capital limitations, and land conversion. In other words, even though one might argue that the development of utilities should be pro-poor, it is difficult to make utilities a pro-growth sector.

## Economic Growth–Poverty Linkage in Mining-Driven Provinces

The economies of resource-rich regions such as Papua and Kalimantan Timur have been known to depend heavily on extraction activities. In 2018, 44.5% of the Kalimantan Timur's GDP came from mining. A similar situation is observed in Papua, although the share of mining is gradually declining, which used to be 59% in 2003. Massive-scale mining is a source of immense wealth; however, its capital-intensive nature makes it difficult for it to be a pro-poor sector. In addition, the export-oriented nature of mineral goods makes it vulnerable to the state of the global market and the exchange rate, which is why the mining sector in mining-driven provinces fails to alleviate poverty. Ross (2001) stated that many countries in the developing world possess tremendous oil and mineral wealth yet continue to suffer from crushing poverty. Berardi and Marzo (2015), who studied sectoral growth in resource-rich African countries, stated that poverty reduction is difficult to attain if a country with very low initial conditions in terms of per capita income, limited institutional capacities, and social development focuses on export commodities unless strong and effective redistribution policies are implemented.

The economies of mining-driven provinces usually have a substantial agricultural output, which comes from food crops and plantation crops. The large share of agriculture and its ability to absorb unskilled labor makes agriculture in mining-driven provinces poverty-reducing. Moreover, manufacturing in mining-driven provinces does not contribute to poverty reduction, possibly because even though manufacturing has a substantial share in mining regions in Indonesia, most of the manufacturing, such as oil, gas, chemicals, and paper products, are capital intensive. Utilities also fail to significantly reduce poverty because most power plants and other utilities enterprises are located in Java. Hence, the contribution of this sector in mining-driven provinces, which are mainly located on the islands of Sumatera, Kalimantan, and Papua, is minor.

In contrast to nonmining-driven provinces, the construction sector in mining-driven provinces appears not to be poverty-reducing. As mentioned earlier, infrastructure is a major contributor to value-added in a construction project. This could explain why construction in mining-driven provinces cannot alleviate poverty because infrastructure development occurs mainly on Java Island, although when President Joko Widodo (2014–present) is in office, there has been an exceptional effort to develop infrastructure outside Java. Another possible explanation for this construction–poverty linkage is that construction in mining-driven provinces is undertaken largely to support exploration/extraction activities and is operated by mining companies/subsidiaries, hence the impact of construction on poverty reduction becomes parallel with the mining sector. In mining-driven provinces, services also do not exhibit the characteristic of being pro-poor. This could be because the economy's dependence on the resource sector may not have sufficient forward linkages (Bhattacharyya & Resosudarmo, 2015) and thus cannot boost services to grow accordingly. In addition, resource-rich regions, especially Papua, have a high level of poverty, which reflects the consumption preferences of its people. Poor people tend to have far larger food consumption compared to nonfood consumption. This preference for food causes the service sector to face difficulties in terms of development.

### The Role of the Unconditional Cash Transfer

One thing that is constant throughout the empirical results is the significance of the role of unconditional cash transfer in poverty reduction. A closer look at the coefficients of the dummy variables for the unconditional cash transfer, however, shows that the coefficient for 2005 is consistently positive. This leads to confusion as to why, unlike in 2008–2009, the unconditional cash transfer in 2005 did not have a favorable outcome on poverty alleviation. One possible answer is that it was due to the shock of the sudden sharp increase in fuel prices, which could not be offset by a nationwide antipoverty program at that time. Though one may argue that the use of dummy variables might not completely reveal solid evidence of cash transfer effect on poverty reduction, it is safe to say that a massive nationwide antipoverty policy is an important factor in poverty reduction in Indonesia.

This evidence of the role of the cash transfer inevitably leads to apprehension regarding the possibility of poverty reduction in Indonesia. Although the magnitude of the cash transfer impact is lower than growth in several sectors, it is nevertheless highly significant. However, the cash transfer is not likely to change the incidence of poverty or behaviors associated with poverty, and the transfer amounts are usually not large enough for households to invest in productive opportunities (World Bank, 2012). To ensure a sustainable income in the future, the poor have to be able to increase their productivity. Thus the unconditional cash transfer is not a sustainable factor in alleviating poverty.

## Conclusions

The role of economic growth in poverty alleviation, which has long been well established, cannot be used to draw the same conclusion on the role of sectoral growth. It was previously found that the impact of the secondary sector, while arguably a high-productivity sector, on poverty reduction is inferior to other sectors. However, in this study, it appears that sectoral growth has little effect on improving the condition of the poor in Indonesia. Nevertheless, this conclusion could be inappropriate. Perhaps a better conclusion regarding the sectoral growth–poverty linkage can be found if the characteristics of mining-driven and nonmining-driven provinces in Indonesia that are taken into account.

In nonmining-driven provinces, the secondary sector pales in comparison to services in alleviating poverty. The six-sector disaggregation of the economy (with or without controlling for the distributional effect through labor intensity) reveals that not all the subsectors within the secondary sector are significantly poverty-reducing. This supports the notion that aggregating the secondary sector into one massive category might obscure its real effect on the poor. The subsectors that significantly reduce poverty in nonmining-driven provinces are mining and construction. Construction exhibits labor-intensive characteristics. Infrastructure development, one of the main government programs since 2014 and, with a sizeable forward linkage, plays a major role in adding values from construction. Similarly, mining can be categorized as labor-intensive because of its low level in nonmining-driven provinces. In addition, the substantial contribution of quarrying in the mining sector, which requires large amounts of manpower, helps explain why mining in nonmining-driven provinces is labor-intensive.

Mining-driven provinces, however, do not display a sectoral growth–poverty linkage. Resource-based regions tend to rely on capital-intensive extraction activities, which do not appear to be strong in terms of income redistribution. In addition, mineral goods, mainly export commodities, are very sensitive to global demand, price, and exchange rate fluctuation. Agriculture is the only sector that appears to be poverty-reducing. This is because resource-rich regions also have a sizeable amount of agricultural output in their economy.

The importance of labor absorption indicated by the results of this study suggests that adopting policies that lean toward discouraging businesses from employing labor is inadvisable. In particular, the government needs to formulate policies that will effectively remove the bias against labor. In line with policies that induce labor employment, skill-development policies that ensure a correct response of the labor market to the demand from each sector are required for creating opportunities for labor to enter a more productive sector and realize higher income.

This study has two obvious limitations. First, regional proliferation limits the ability of this study to incorporate other channels of distributional effects such as the Gini ratio, the use of other poverty measurements, and the use of other socio-economic factors that may affect poverty since they involve recalculation processes from either socio-economic household surveys or national labor force surveys. Second, the use of the level of unskilled labor could be an argument against the actual effect of labor intensity. In future research, it may be instructive to use the share of wages of unskilled labor as a proxy.

## Acknowledgments

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## Appendix

Appendix 1. Regression Summary of Three-Sector Disaggregation

	Poverty Rate of Change		
	Indonesia	Nonmining-Driven Provinces	Mining-Driven Provinces
Growth of Primary Sector (Per Capita, Share Weighted)	0.100 (0.191)	0.0342 (0.227)	-0.519 (0.439)
Growth of Secondary Sector (Per Capita, Share Weighted)	-0.0638 (0.0849)	-0.289** (0.139)	0.0677 (0.110)
Growth of Tertiary Sector (Per Capita, Share Weighted)	-0.205 (0.146)	-0.435** (0.185)	0.178 (0.367)

	Poverty Rate of Change		
	Indonesia	Nonmining-Driven Provinces	Mining-Driven Provinces
2005 Unconditional Cash Transfer (Dummy Variable)	0.0368**** (0.0106)	0.0393*** (0.0121)	0.0136 (0.0222)
2008 Unconditional Cash Transfer (Dummy Variable)	-0.0842**** (0.0106)	-0.0813**** (0.0120)	-0.0952**** (0.0223)
2009 Unconditional Cash Transfer (Dummy Variable)	-0.0613**** (0.0106)	-0.0617**** (0.0120)	-0.0650*** (0.0222)
Constant	-0.0246**** (0.00441)	-0.0154** (0.00656)	-0.0299**** (0.00702)
Observations	480	384	96
R-squared	0.195	0.202	0.245
F-Stat	19.10	15.89	4.826
p-value	0.0000	0.0000	0.000262

Standard errors in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01, \*\*\*\* p<0.001

Appendix 2. Regression Summary of Six-Sector Disaggregation

	Poverty Rate of Change		
	Indonesia	Nonmining-Driven Provinces	Mining-Driven Provinces
Growth of Agriculture (Per Capita, Share Weighted)	0.0257 (0.197)	-0.101 (0.239)	-1.080* (0.623)
Growth of Mining (Per Capita, Share Weighted)	-0.0660 (0.0958)	-0.356** (0.157)	0.0939 (0.123)
Growth of Manufacturing (Per Capita, Share Weighted)	0.0560 (0.184)	-0.000940 (0.232)	-0.358 (0.369)
Growth of Utilities (Per Capita, Share Weighted)	-1.214 (2.908)	-2.188 (2.988)	29.22 (23.91)
Growth of Construction (Per Capita, Share Weighted)	-0.494* (0.253)	-0.555* (0.289)	1.279 (0.994)
Growth of Services (Per Capita, Share Weighted)	-0.262* (0.151)	-0.484** (0.188)	0.257 (0.536)
2005 Unconditional Cash Transfer (Dummy Variable)	0.0355**** (0.0107)	0.0392*** (0.0121)	0.0130 (0.0228)
2008 Unconditional Cash Transfer (Dummy Variable)	-0.0846**** (0.0106)	-0.0817**** (0.0120)	-0.0951**** (0.0223)
2009 Unconditional Cash Transfer (Dummy Variable)	-0.0619**** (0.0106)	-0.0622**** (0.0120)	-0.0679*** (0.0225)
Constant	-0.0206**** (0.00496)	-0.0124* (0.00696)	-0.0367*** (0.0108)
Observations	480	384	96
R-squared	0.203	0.213	0.268
F-Stat	13.27	11.24	3.500
p-value	0.0000	0.0000	0.000993

Standard errors in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01, \*\*\*\* p<0.001

Appendix 3. Regression Summary of Six-Sector Disaggregation for Nonmining-Driven Provinces with Labor-Intensity-Weighted Growth

	Poverty Rate of Change
Growth of Agriculture (Per Capita, Share Weighted)	-0.389 (0.447)
Growth of Mining (Per Capita, Share Weighted)	-1.481** (0.577)
Growth of Manufacturing (Per Capita, Share Weighted)	-0.0987 (0.460)
Growth of Utilities (Per Capita, Share Weighted)	-10.75 (6.552)
Growth of Construction (Per Capita, Share Weighted)	-1.651** (0.700)
Growth of Services (Per Capita, Share Weighted)	-0.134 (0.239)
Growth of Agriculture (Per Capita, Weighted by Labor Intensity)	0.308 (0.424)



	Poverty Rate of Change
Growth of Mining (Per Capita, Weighted by Labor Intensity)	-1.360** (0.650)
Growth of Manufacturing (Per Capita, Weighted by Labor Intensity)	-0.283 (0.796)
Growth of Utilities (Per Capita, Weighted by Labor Intensity)	-9.285 (8.016)
Growth of Construction (Per Capita, Weighted by Labor Intensity)	-2.156* (1.281)
Growth of Services (Per Capita, Weighted by Labor Intensity)	0.622 (0.423)
2005 Unconditional Cash Transfer (Dummy Variable)	0.0387*** (0.0122)
2008 Unconditional Cash Transfer (Dummy Variable)	-0.0809**** (0.0119)
2009 Unconditional Cash Transfer (Dummy Variable)	-0.0608**** (0.0119)
Constant	-0.0142** (0.00703)
Observations	384
R-squared	0.237
F-Stat	7.601
p-value	0.0000

Standard errors in parentheses

\* p<0.1, \*\* p<0.05, \*\*\* p<0.01, \*\*\*\* p<0.001

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