Growth, Poverty and Distribution: a SAM Approach

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Abstract

The objective of this paper is to examine to what extent does the sectoral growth can be the effective means to reduce poverty and inequality. A multiplier decomposition technique for a socio-economic system which represented by a social accounting matrix (SAM) is used to analyse the hypothesis. The growth effects on poverty and distribution are applied to the various ethnic groups in Malaysia. Clearly, the sectoral growth does indeed reduce the aggregate poverty and inequality. However, the growth only has a little impact on inequality, despite with the government intervention. Similarly, analysis at detailed level of household across ethnic groups in the rural and urban areas reveal the inequality is less sensitive with respect to the growth. Our decomposition analysis strongly infers that the differential impact from the production sectors on the poverty and inequality is largely explained by the distributional effect especially by the factorial effect.

Keywords: Growth, Poverty, Distribution, Social accounting matrix (SAM), Multiplier decomposition.

JEL codes: C67, D30, O15

1. Introduction

Socio-economic welfare aspects of economic policies have frequently been analyzed through their impact on the rate of growth and the underlying expansion in production sectors. Empirical evidence suggests that economic growth is the most effective means to increase welfare of the poor and alleviate poverty (see, for instance, de Janvry and Sadoulet, 2000; Adams, 2004). In fact, a decline in poverty is not possible without growth, according to Fields (1989). It should be emphasized that a decline in poverty does not automatically imply a more equal income distribution. So, while the relationship between growth and poverty alleviation is clearly established, the extent to which growth is a necessary precondition for addressing distribution issues still remains unclear (for an overview, see Adelman and Robinson, 1989; and more recently Ogwang, 1995). There is a broad consensus that poverty alleviation goes along with economic growth, but growth itself may not be sufficient to improve the distribution of income (see, for instance, Tanzi, 1998; Deininger and Squire, 1996; Shari, 2000).

The role of growth on distributional impacts is rather complex, depending on several factors. Some policies aiming at growth, contribute more to the income growth of one household group than another household group, subject to factor endowments, production structure and technology, and institutions. Further, the beneficiaries of growth to low-income groups are determined not only by the type of economic development and the policy that has been followed, but also by the level of development (Fields, 1989). In addition, measuring the effects of growth on the income distribution at an aggregate level may well produce different outcomes than measurement at a disaggregate level, due to the aggregation bias. This background has motivated us to study the growth effects on poverty alleviation and income distribution by taking into account the detailed impacts for separate socio-economic groups, within a single analytical framework. The growth effects on poverty and distribution are analysed to Malaysia as a case which has multi-racial societies[1]. The results may have important policy implications regarding poverty alleviation, distribution strategies, and growth (in particular, the composition of sectoral growth).

The current achievement in the standard of living across ethnic groups in Malaysia has been brought to the public attention. Current standard of living shows that the poverty rate and income gap over ethnic groups are considerably widened despite to the fact that the country enjoyed high economic growth[2]. For instance, in 2000, poverty among Malay remained by far the highest at 12.4% compared to Indian by 3.5% and Chinese by 1.2%. Similarly, inequality rates (measured by Gini coefficient) among Malaysians show that Malay is the highest inequality by 0.43, followed by Chinese (0.41) and Indian (0.40). Consequently, the disparity in mean household income between Malay:Chinese and Malay:Indian remained high at 1:1.74 and 1:1.36, respectively. This condition may lead to the social unrest as most of the largest groups are living in poverty and earning less than other groups. Towards this end, the government, under the current Ninth Malaysia Plan (2006-10), continues to pursue a development policy emphasizing growth with equal distribution. With this development policy, an obvious question continue to be raised is to what extent does the sectoral growth can be the effective means to increase welfare of the low-income group and alleviate poverty, given the existing economic structure? In this study, we provide an indication how the growth in a certain production sector affects the poverty and distribution.

The analysis is performed by using a social accounting matrix (SAM). SAM is the widespread framework for analysis of income distribution in socio-economics system. The ability of the SAM is that it provides a useful conceptual basis in analysing both distribution and growth issues within a single framework. In line with the current

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[1] The major ethnic groups in Malaysia are the Malay (indigenous, 61% of the population in 2005), the Chinese (26%), the Indian (8%) and a group of other ethnic minority groups (5%)

[2] For record, the economy grew annually with an average rate of 7.0% in the period 1991-2002

development interest, i.e. socio-economic equity, household sector in the SAM is disaggregated into major ethnic groups in Malaysia, namely, Malay, Chinese, Indian and a group of other minority ethnics. Furthermore, to understand the various mechanisms and linkages through which the growth in sectoral outputs affects the income distribution and poverty within a complex economic system, requires an appropriate measure. Thus, a multiplier decomposition technique will be applied in order to examine the various impacts of growth on income. In addition, the multiplier decomposition will be extended so as to incorporate inequality and poverty alleviation measures.

This paper consists of six sections. Section 2 discusses the SAM frame that used to estimate the potential impact of growth on income via the multiplier effects. It then details the multiplier analysis by decomposing it into several individual effects. Section 3 shows the extension of the multiplier decomposition technique by incorporating explicitly the poverty alleviation and distribution effects. Section 4 explains data set associated in this study. It provides detailed discussion on the structure of the Malaysian SAM and a household-based income survey. Section 5 applies the decomposition procedure to the case of Malaysia. Finally, Section 6 is devoted to a summary and draws some policy implications.

2. SAM-based Modelling

SAM is a framework that is widely used for the analysis of income distribution in a socio-economic system. It is related to the National Accounts, but typically incorporates whatever degree of detail is required for special interests. In SAMs, receipts are recorded in row *i* for a certain recipient (such as a group of households, one of the production sectors, owners of capital). Outlays are given as expenditures in the corresponding column (*j*). The corresponding row and column totals of the matrix must be equal to each other, consistent with the bookkeeping idea that the sum of receipts equals the sum of outlays for each account. For example, the total income of a given institution, say the rural-household group, must exactly equal the total of its expenditures.

As a comprehensive data system, SAM can be used as a starting point for economy-wide analysis through the multiplier analysis. The following assumptions are required to performing static multiplier analysis. First, there is exists excess capacity that would allow prices to remain constant. Second, the expenditure propensities of endogenous accounts are fixed. Finally, the production technology and resource endowment are given. Given the resource endowment, labour market is assumed to be tightness which reflecting immobility labours across sectors. Under these assumptions, the SAM multiplier can be used to evaluate the potential impacts of sectoral growth on income of socio-economic groups.

Derivation of the SAM multipliers require to distinguishing the SAM accounts into endogenous and exogenous accounts. Following the conventional approach, e.g. Pyatt and Round (1979), Khan and Thorbecke (1989), and James and Khan (1997), production, factor, household and company are considered as the endogenous accounts. The rest of the remaining accounts, e.g. government, consolidated capital, rest of the world and indirect tax are considered as exogenous. This study however, provides a new approach by treating government as an endogenous component in the model of multipliers. As a result of this theoretical extension, redistribution income effect to household through public expenditure and taxation can be captured endogenously. As a result of this manipulation, an economy-wide model in the form of Table 1 is produced.

<Table 1>

Five endogenous transformations appear in Table 1. Allocation of the value added generated by the various production activities into income accruing to the various factors of production is shown by matrix T_{12}. Intermediate input requirement or inter-industry relationship is represented by matrix T_{22}. Matrix T_{23} shows the expenditure pattern of the various institutions (particularly household and government) on the commodities. The mapping of the factorial income distribution into household income distribution and company is reflected by matrix T_{31}. Finally, matrix T_{33} reveals the inter-institutional transfers, comprising distributed profit, government's transfer and direct taxes.

In the standard SAM modelling, endogenous accounts y can be obtained simply by multiplying the matrix of average expenditure propensities A for each row by the particular column sum and adding exogenous income x. Specifically,

$$\begin{aligned} y &= Ay + x \\ &= (I - A)^{-1}x = Mx \end{aligned} \tag{1}$$

where I is the identity matrix, A is (n x n) sub-matrices containing average expenditure propensities, showing the income of endogenous account i received from endogenous account j as a proportion of the expenditure of endogenous account j. The average expenditure propensities are derived numerically by dividing a particular element in any of the endogenous accounts by the total income for the column account in which the element occurs. From Table 1, it can be seen that A is partitioned as follows

$$A = \begin{pmatrix} 0 & A_{12} & 0 \\ 0 & A_{22} & A_{23} \\ A_{31} & 0 & A_{33} \end{pmatrix} \tag{2}$$

M is a (n x n) matrix of total multiplier (or known as SAM multiplier) and x is a (n x p) vector of exogenous variable. Equation (2) indicates that endogenous income of y: factorial incomes, y_1, production incomes, y_2, institution incomes, y_3, can be derived by multiplying injection, x by the SAM multiplier M.

Growth in income is mainly identified by the growth in the production output. From distribution planning standpoint, the multiplier matrix of M may not give comprehensive information on the distributional mechanisms in the economy as it implicitly reflects the total effect. Following the definition of (1) and (2), the impact of expansion in the production activities on income can be traced as follows;

$$\begin{aligned} \delta y_1 &= \quad A_{12}\delta y_2 + \delta x_1 \\ \delta y_2 &= \quad A_{22}\delta y_2 \quad A_{23}\delta y_3 + \delta x_2 \\ \delta y_3 &= A_{31}\delta y_1 \quad A_{33}\delta y_3 + \delta x_3 \end{aligned} \tag{3a}$$

which yields

$$
\begin{aligned}
\delta y_1 &= A_{12}\delta y_2 &&+ \quad \delta x_1 \\
\delta y_2 &= (I - A_{22})^{-1}A_{23}\delta y_3 &&+ \quad (I - A_{22})^{-1}\delta x_2 \\
\delta y_3 &= (I - A_{33})^{-1}A_{31}\delta y_1 &&+ \quad (I - A_{33})^{-1}\delta x_3
\end{aligned}
\tag{3b}
$$

We have shown that matrix A in equation (3) contains several effects, that are, $A = A_{12} + A_{22} + A_{23} + A_{31} + A_{33}$. Therefore the impact of production growth on income can be decomposed into separating effects, showing the inter-dependencies effect among endogenous components.

Generally, the SAM multiplier mainly can be decomposed into two different forms, that are, additive components (see, Pyatt and Round, 1979) and non-additive components (see, Thorbecke and Hong-Sang, 1996). The latter decomposition form is preferred for the extension of the multiplier analysis, incorporating poverty and distribution analyses. Applying the decomposition technique proposed by Thorbecke and Hong-Sang (1996), multiplier matrix of M can be decomposed into two multiplicative components namely, the distributional (D) and consumption (E) effects. By concentrating on the multiplier that links production activities to household group i.e. M_{32} (m x n), the distributional and consumption effects can be derived as follows;

$$M_{32} = (I - DE)^{-1}D \tag{4}$$

The distributional effect captures the initial effect of changes in sectoral output. It can be further decomposed into three multiplicative components, industrial, factorial and transfer effects. The industrial effect represents the indirect factor incomes received from the intermediate inputs required in the production of the initial commodity. The factorial effect captures the income effect received by household directly from the factors when they supplying primary inputs to the production sectors. Translation from the factorial income to the distribution of income of different household groups will be depending on the factor endowment of the respective household groups. For example, wage payments from skilled labour will go to the household that supply skilled labour. The transfer effect, on the other hand, records the income effect accruing to household as transfer and remittances from other institutions. Those effects can be derived as follows;

$$D = (I - A_{33})^{-1}A_{31}A_{12}(I - A_{22})^{-1} \tag{5}$$

thus,

$$D = D_3D_2D_1 \tag{6}$$

where the D (m x n) is a distributional effect, D_3 (m x m) = $(I - A_{33})^{-1}$ represents the transfer effect, D_2 (m x n) = $A_{31}A_{12}$ captures the income flows accruing to household groups from the factors used in the production process and D_3 (n x n) = $(I - A_{22})^{-1}$ denotes the industrial effect which is captured by the input-output sectoral linkages.

As our concerns is to examine the impact of demand injection from production sector on household groups, equation (6) need to be re-identified. The distributional and factorial effects can be obtained directly from D and D_2 as these matrices have the dimension relating to the production sector and household. However, the transfer effect (D_3) does not follow definition of those matrices. To derive the impact of transfer effect along with the above lines, we use equation (7) to define this effect.

$$d_{3,ij} = d_{ij}/d_{21,ij} \qquad (7)$$

where $d_{3,ij}$ represents the effect of matrix D_3, d_{ij} are elements of matrix D and $d_{21,ij}$ are elements of product D_2D_1. Similar to this rule, the industrial effect can be obtained by using the following manipulation

$$d_{1,ij} = d_{21,ij}/d_{2,ij} \qquad (8)$$

where $d_{1,ij}$ represents the effect of matrix D_1 and $d_{21,ij}$ are elements of product D_2.

Therefore,

$$d_{ij} = d_{3,ij}\, d_{2,ij}\, d_{1,ij} \qquad (9)$$

The consumption effect reflects the full circular flows in the economy on both consumption and production sides as a result of expenditure from other sectors. The more consumers spend on domestic commodities, the more diversified their consumption patterns, the greater inter-industry linkages on the production side, the higher consumption effect (Thorbecke and Hong-Sang, 1996). In our framework, the consumption effect is captured by matrix A_{23}. Assuming $A_{23} = E$ and substitute E into equation (4), therefore we obtain the complete decomposition of matrix M_{32}

$$M_{32} = [I - (I - A_{33})^{-1}A_{31}A_{12}(I - A_{22})^{-1}A_{23}]^{-1}\,(I - A_{33})^{-1}A_{31}A_{12}(I - A_{22})^{-1} \qquad (10)$$

If the first part of equation (10) is known as matrix R and the last part known as matrix D, then equation (10) can be re-expressed as;

$$M_{32} = R.D \qquad (11)$$

If m_{ij} is an element of M_{32}, then,

$$m_{ij} = r_{ij}d_{ij} \qquad (12)$$

where $r_{ij} = m_{ij}/d_{ij}$. Taking all together effects therefore, multiplier m_{ij} can be decomposed as

$$m_{ij} = r_{ij}d_{ij} = r_{ij}\, d_{3,ij}\, d_{2,ij}\, d_{1,ij} \qquad (13)$$

3. Incorporating Poverty and Distribution

Application of multiplier decomposition technique into poverty alleviation analysis had been conducted by Thorbecke and Hong-Sang (1996). A similar approach had been applied by Khan (1999). One interesting aspect of the present study is that the government sector is endogenously determined in the multiplier modelling. This approach can extend our knowledge on distribution effects due to variables controlled by public institution, such as public expenditure and taxation. In addition to poverty, we extend the multiplier decomposition technique by incorporating distribution effects. By incorporating both poverty alleviation and distribution measures in the multiplier modelling, we are able to analyse the impact of sectoral growth on poverty and inequality within a single framework. This is the second novel aspects of the present study.

3.1 Poverty Alleviation Impact

Thorbecke and Hong-Sang (1996) showed that the total poverty alleviation effects of an increase in sectoral growth can be decomposed into two multiplicative components: (i) the contribution due to the change in mean income of the poor, and (ii) the sensitivity of the particular poverty measure to this change in average of the poor. To assess the impact of a given sectoral growth on poverty alleviation, the Foster, Greer and Thorbecke (1984) (FGT) P_α measure is selected as an appropriate poverty measure. The FGT contains a number of other commonly used for poverty measures as special cases. For different values of α, the FGT P_α measure become, respectively, the head count ratio ($\alpha = 0$), the poverty gap ($\alpha = 1$), and distribution-sensitive measure ($\alpha = 2$).

The previous section discusses the impact of change in sectoral growth on household's mean income. In this section, the poverty sensitivity measure to changes in household's mean income will be linked. Poverty sensitivity is determined by the elasticity of the selected poverty measure with respect to the mean income for the various poor groups and their growth rates. The elasticity of the poverty with respect to the mean income had been developed by Kakwani (1993), which then applied to the SAM by Thorbecke and Hong-Sang (1996). Under the assumption of distributional neutrality[3], the impact of change in the sectoral growth j on poverty alleviation can be shown as follows;

$$\frac{\delta P_{\alpha ij}}{P_{\alpha ij}} = \eta_{\alpha i} \left(\frac{\delta y'_i}{y'_i} \right) \tag{14}$$

where $\eta_{\alpha i}$ is the elasticity of $P_{\alpha ij}$ with respect to the mean income of each household groups i resulting from the growth of sector j. The next step of this approach is to link the increase in the mean income ($\delta y'_i$) to the previously derived multiplier (m_{ij}). Therefore, from equation (3) it follows that

$$\delta y'_i \quad = \quad m_{ij} \delta x_j \tag{15}$$

Combining equation (14) and (15) yields

$$\frac{\delta P_{\alpha ij}}{P_{\alpha ij}} = \eta_{\alpha i} m_{ij} \left(\frac{\delta x_j}{y'_i} \right) \tag{16}$$

[3] The intra-sectoral and within sector distributions are assumed to be static, given the factor endowment. This assumption implies labours are immobile (for an overview, see Huppi and Ravallion, 1991)

Poverty tends to be pervasive in developing countries and to be spread among the different household groups. In order to obtain detail poverty alleviation effects, the effects have to be disaggregated across the various household groups. Utilising the additive decomposability of P_j, the disaggregated poverty measure $P_{\alpha i}$ can be written as;

$$\frac{\delta P_{\alpha j}}{P_{\alpha j}} = \sum_{i=1}^{m} \left(\frac{\delta P_{\alpha ij}}{P_{\alpha ij}} \right) s_{\alpha i} \tag{18}$$

where

$$s_{\alpha i} = \sum_{k=1}^{qi} \left(\frac{z - y_k}{z} \right)^{\alpha} \Big/ \sum_{l=1}^{q} \left(\frac{z - y_l}{z} \right)^{\alpha} \tag{19}$$

$s_{\alpha i}$ denotes the poverty share of household group i out of total poverty ($\sum_{i=1}^{m} s_{\alpha i} = 1$), q_i is the number of poor in the ith group and the total number of poor ($q = \sum_{i=1}^{m} q_i$), and z is the poverty line.

Combining equation (16) and (18) gives,

$$\frac{\delta P_{\alpha j}}{P_{\alpha j}} = \sum_{i=1}^{m} s_{\alpha i} \eta_{\alpha i} m_{ij} \left[\frac{\delta x_j}{y'_i} \right] \tag{20}$$

Now let us define as $m'_{\alpha ii} = s_{\alpha i} m_{ij}$ and $q_{\alpha ii} = \eta_{\alpha i}(\delta x_j / y'_i)$. The modified multiplier $m'_{\alpha ii}$ now is part of multiplier m_{ij} which contributes to the income effect of the poor in a household group i. The term $q_{\alpha ii} = \eta_{\alpha i}(\delta x_j / y'_i)$ represents the poverty sensitivity of P_α to change in income. Since $m_{ij} = r_{ij} d_{ij}$ [equation (13)], defining $m'_{\alpha ii} = s_{\alpha i} m_{ij}$ and $d'_{\alpha ii} = s_{\alpha i} d_{ij}$, we get,

$$\frac{\delta P_{\alpha j}}{P_{\alpha j}} = \sum_{i=1}^{m} m'_{\alpha ij} q_{\alpha ij} = \sum_{i=1}^{m} (r_{\alpha ij})(d'_{\alpha ij})(q_{\alpha ij}) = \sum_{i=1}^{m} (r_{\alpha ij})(s_{\alpha ij} d_{\alpha ij})(q_{\alpha ij}) \tag{21}$$

The term $(s_{\alpha ij} d_{ij})$ represents the part of the total distributional effects received by the poor in the household group i, and the term $(r_{\alpha ij})$ denotes the related consumption effects. The poverty sensitivity effects are positively related to poverty elasticity ($\eta_{\alpha ij}$) and negatively related to mean income (y'_i). If we define the modified factorial effect as $(d'_{2\alpha ij}) = (s_{\alpha i} d_{2ij})$ and we obtain $d'_{\alpha ii} = s_{\alpha i} d_{ij} = d_{3\alpha ij}(s_{\alpha i} d_{2ij}) d_{1\alpha ij} = d_{3\alpha ij} d'_{2ij} d_{1\alpha ij}$. Then, equation (21) becomes

$$\frac{\delta P_{\alpha j}}{P_{\alpha j}} = \sum_{i=1}^{m} r_{\alpha ij} d_{3\alpha ij} d'_{2\alpha ij} d_{1\alpha ij} q_{\alpha ij} \tag{22}$$

Equation (22) shows that the overall income effect accruing to the poor across household groups can be decomposed as a result of the total multiplier effect ($m_{\alpha j} = m'_{\alpha ij} = s_{\alpha i}m_{ij}$) and poverty effect ($q_{\alpha j}$ = - ($\delta P_{\alpha j}$ /$P_{\alpha j}$)/$m_{\alpha j}$. The total multiplier effect, in addition, can be further decomposed into distributional effect ($d_{\alpha j} = s_{\alpha i}d_{ij}$) and consumption effect ($r_{\alpha j} = m_{\alpha j}/d_{\alpha j}$).

3.2 Distribution Impact

Similar to the poverty effects, the effects of growth on distribution also can be decomposed into two components, i.e. multiplier effect and distribution sensitivity effect. The multiplier effect captures the impact of sectoral growth on household's income, while distribution sensitivity measures the changes in inequality as result of change in income, determined by the elasticity of the selected distribution measure. Our analysis on distribution effect is based on the Gini coefficient, which is a common and extensive distribution indicator used in literature and practice. Incorporating distribution effect within the SAM is less complicated and straightforward. The only additional information required are elasticities of the Gini with respect to mean income.

The elasticities of Gini are estimated based on Lerman and Yitzhaki (1985) specification. The Gini coefficient of total income is derived from the inequality contribution of each of the income groups. Therefore, the Gini coefficient of total income G, can be expressed as:

$$G = \sum_{i=1}^{m} R_{ij}G_{ij}K_{ij} \qquad (23)$$

where R_{ij} is called the Gini correlation between income group i in sector j and the rank of total income, G_{ij} is the Gini coefficient for income group i in sector j and S_{ij} is the share of income group i to the total income.

Dividing each of the right hand side terms by G, we obtain,

$$\frac{R_{ij}G_{ij}K_{ij}}{G} \text{ for each } i, \qquad (24)$$

Equation (24) can be interpreted as the inequality contribution of groups i as a proportion of the overall Gini coefficient. Thus, contribution of a group to the overall Gini is determined not only by the Gini of the group, but also the share of the group income to the total income and the correlation term R_{ij}. Then, denoting e_i as the change in income group i that is identical across households, Lerman and Yitzhaki (1985) show that

$$\frac{\delta G / \delta e_i}{G} = \frac{R_{ij}G_{ij}K_{ij}}{G} - S_{ij} \qquad (25)$$

which represents the marginal effect (change in G) with respect to a change in income group i. Taking multiplier effect together therefore, the total distribution effects can be represented by

$$\frac{\delta e_i}{G_i} = \sum_{i=1}^{m} r_{ij} d_{3ij} d_{2ij} d_{1ij} g_{ij} \qquad (26)$$

4. Data Set: A SAM for Malaysia and HIS, 2000

The major set of data used in this study is the 2000 SAM for Malaysia which was constructed by Saari (2007)[4]. The SAM is used for deriving the multiplier decomposition for both analyses of poverty and distribution. Nine accounts are identified in the SAM, comprising factors of production, production activities, households, company, government, consolidated capital, current and capital for the rest of the world and indirect tax. The SAM was designed mainly for the analysis of income distribution across ethnic groups in Malaysia. Nine categories of households were distinguished based on the citizenship status, ethnicity and geographical location. The first distinction of households was made between citizens and non-citizens. It is important to distinguish between these two categories because, recently, the number of foreign workers has significantly influenced the composition of the domestic labor force. The registered growth of foreign workers is almost 12 times larger than the growth of local workers (which was 1.5% in the period 2000-05, see Economic Planning Unit, 2006). Most of the foreign workers in Malaysia are from Indonesia, Bangladesh and the Philippines, being employed in plantations and farms, and manufacturing sectors.

The classification of household with a Malaysian citizenship is further disaggregated according to ethnic groups. They are Malay, Chinese, Indian and Other (comprising dozens of ethnic minority groups which are mostly located in East Malaysia, such as groups of Iban, Kadazan, Bajau, Murut, Suluk). These disaggregations are important because the recent development strategy of the government includes specific concerns for the income distribution among these socio-economic groups. In addition, each of the ethnic groups was further disaggregated into geographical location, distinguishing between rural and urban areas. The geographical criterion is useful because the urban and rural distinction captures many aspects of duality. For example, households with otherwise similar characteristics are quite likely to be paid different wages and generally exhibit different of socio-economic behaviour. All in all, this leads to nine different household groups.

In the accounts for factors of production, a distinction was made between labour and capital. The criteria for classifying labour and households are inevitably inter-related given the fact that characteristics of individuals are the essential ingredients common to both sets of accounts. Therefore, the classification of labour types in the SAM was similar to the household classification (i.e. citizenship status, location and ethnic group). In addition, the eight citizen groups were subdivided according to education level. The education criterion[5] turns out to be important in

[4]See Saari (2007) for more details description of this SAM.

[5] Education levels are based on certificates obtained from school, college or university. Those who do not have any formal education or a primary school certificate are in the low education category, those with secondary school certificates e.g. L.C.E., M.C.E. or H.S.C. are in the medium education category, while those with at least a diploma or degree are in the high education category.

explaining income differences. Assuming labour is homogenous across ethnic groups, the wage rate received by workers in the production sectors totally depends on their education level. All in all, this leads to 25 different labour types. Capital inputs were further distinguished into households and companies in the form of unincorporated business profits and corporate business profits, respectively.

Another important aggregation in the SAM framework is the production account. The primary source of the production activities is the 2000 input-output table which contains 92 sectors. The remaining accounts in the SAM were all in an aggregate form. These include company, government, capital, the rest of the world and indirect tax accounts. Therefore, taking together all accounts, the total sum of accounts in the SAM is 134, implying a 134 by 134 matrix.

In addition to the SAM, a household-based income survey is required to compute elasticities of poverty and inequality with respect to increase in income. Therefore, the household income survey (HIS)[6] for year 2000 is preferred instead of household expenditure survey. We shall return to this point shortly. The measure of poverty and inequality have several dimensions, that are, to indicate an individual's living standard, the cut-off point below which an individual is considered to be poor, and functional form which aggregates the various living standards of the poor into the poverty measure.

Even though it has generally been accepted that consumption expenditure is a better welfare indicator than income, we prefer to use the latter because of two main reasons. First, in case of Malaysia, the income-based survey i.e. HIS is more representative than the consumption-based survey i.e. HES. Specifically, the HIS covered about 170,903 randomly sampled households throughout the nation whereas the HES only spread over to approximately 14,084 households. In addition to the sampling coverage, the HIS is chosen in the sense that it is consistent with the published figures by an authority.

Calculating the elasticity and poverty measure require to identifying a poverty line income (PLI). We use the new PLI based on 2005 methodology which is provided by the Economic Planning Unit (2006) as a baseline. The concept and measurement of poverty were reviewed in order to take into account the social and economic changes that have taken place in Malaysia since 1977 when the first PLI was formulated. According to the 2005 PLI, a rural poverty line is MR 698 per month while urban poverty line is MR 687 per month.

5. Results and Discussions

The effect of growth (as measured by the growth in final demand) on poverty and distribution is applied to a highly aggregated SAM, consisting 27 categories of factors, 9 production activities, 9 household groups and a single account for company, government, capital, the rest of the world and indirect tax. The production activities in the SAM have been aggregated from 92 to 9 sectors, given the limitation of the survey data. As mentioned in the previous section, besides using the SAM, we also use the survey data, i.e. HIS to compute elasticity of poverty and inequality, which in turn are

[6] HIS also is used substantially in estimating factors and household accounts in the SAM

integrated in the SAM model. To some extent, we observe that the survey data may not representative to compute elasticity of poverty due to measurement error in the underlying survey, particularly relating to the sample. For instance, the mining & quarrying and utility sectors have to be consolidated because sampling derived from the survey is too small. In fact, the estimation bias becomes large when the degree of disaggregation is high.

5.1 Effects on Aggregate Poverty and Distribution

The effect of growth in the sectoral final demand on aggregate poverty and distribution in a decomposed form is given in Table 2. The effect on aggregate poverty and distribution are obtained by aggregating the effects across household groups. It can be seen that the aggregate effect on poverty and distribution can be decomposed into the multiplier effect and sensitivity effect. The multiplier effect captures the effect of growth on income generation. The multiplier effect can be decomposed into distributional and consumption effects. The distributional effect in addition, is further decomposed into industrial, factorial and transfer effects. The sensitivity effect on the other hand, represents the sensitivity of the welfare measures to the increase in household income. The growth effect is positively related to the multiplier effect and negatively related to the sensitivity effect. Therefore, growth tends to reduce poverty and inequality through the increase in income of the poor and low-income group.

<TABLE 2>

Specifically, any increment in the sectoral final demand, the total poverty and distribution effects can be obtained by multiplying the multiplier and the sensitivity effects which are measured by elasticities of particular measures with respect to the increase in mean income. The multiplier effect is equal to the product of corresponding distributional and consumption effects. Taking head count as an example, every unit increases in agriculture final demand, reduces the poverty by 0.0996. Apart from this effect, 2.1319 is contributed by poverty sensitivity effect and 0.0467 is explained by the modified multiplier. Moreover, the modified multiplier is a product of distributional (0.0320) and consumption effects (1.4608). In turn, the distributional effects are equal to the product of the corresponding industrial (1.2590), factorial (0.0215) and transfer (1.1823) effects. Similar procedures are applied to the distribution analysis as measured by the Gini coefficient.

There are two main mechanisms involve in generating the welfare effect of the poor and low-income groups, that are, increase in income of the particular group (measured by the multiplier effect) and sensitivity of the welfare measures (identified by elasticity of the welfare measures) to the increase in the income. This implies, the latter effect mainly depends on the income effect which generated by the former. Thus, it is instructive to look at the detailed effects derived from the multiplier effect. Scrutinizing Table 2 across poverty and inequality measures, it can be seen that the total income effect from the production sectors is largely explained by the distributional effect (on average almost 70%) than the consumption effect (30%). In fact, the degrees of consumption effect much smaller variances across production sectors. This indicates that the diversification of the household consumption of commodities has less effect on the income generation.

Decomposing the distributional effects into industrial, factorial and transfer effects, the results indicate that the factorial effect creates the largest impact to household income generation. On average, the factorial effect generates almost 65% to the distributional effect, while the transfer and industrial effects contribute approximately 25% and 10%, respectively. As might be expected, the transfer effect shows considerably important effect as a result of redistribution income effect from the public sector. Therefore, by decomposing the multiplier into separate effects, we can conclude that the differential impact from the production sectors on the household welfare is largely explained by the distributional effect especially by the factorial effect.

Concentrating on the poverty analysis across all the poverty measures, our results strongly suggest the modified multiplier and poverty sensitivity effects show significant effects to the poverty alleviation. In one hand, poverty alleviation effect is largely explained by the sensitivity effect while on the other hand, the modified multiplier contributes more to the poverty reduction. For instance, it can be seen that the growth effect from the transport & communication shows the largest poverty reduction for distribution-sensitive measure by 0.3202, which is largely explained by the poverty sensitivity effect (10.4391). It is important to note that the poverty sensitivity effect (elasticity of poverty) tends to be high when the poverty rate in the particular sector is low, and vice versa. The growth effect from the government services sector on the head count ratio on the other hand, is mainly contributed by the modified multiplier effect (0.0496).

Unlike the poverty alleviation effect, the effect of growth on distribution, measured by the Gini coefficient is mainly explained by the multiplier effect. In fact, distribution sensitivity effect shows a very small variation across production sectors. In contrast, the multiplier effect reveals a large variation across production sectors, which is largely contributed by the distributional effect, especially by the factorial effect. In addition, the capacity of the production sectors in generating income to the households however, may depend on the technological intensity of the production sectors. Looking the factorial effect across production sectors, we can conclude that most of the production sectors (except the government services) are highly capital intensive. Consequently, the capacity of the production sectors in generating income, particularly to the poor and low-income group is low.

Figure 1 summarises the growth effect on total poverty alleviation and distribution. It is generally accepted that growth can alleviate poverty and reduce inequality. Nevertheless, the growth only has a little impact on inequality, which is consistent to the finding by Adams (2004). Clearly, Figure 1 reveals that the capacity of the growth to reduce inequality is relatively low compared to the poverty, despite with the government intervention. As the income distribution tends to be stable, economic growth has the general effect of rising incomes for all members of society, including the poor.

<FIGURE 1>

5.2 Effects on Individual Ethnic Groups

The unique data set in our SAM allowing to perform the analysis at ethnicity level. As shown in Table 3, the modified multiplier and poverty sensitivity effects show a large variation across ethnic groups in the rural and urban areas. It can be verified that the total poverty alleviation is largely explained by the modified multiplier than the poverty sensitivity effects. The following additional observations are suggested by Table 3. In general, although the impact of sectoral growth on poverty alleviation varies depending on which poverty measured is used; the ranking of the ethnic groups based on their total poverty alleviation effects tends to be almost constant across poverty measures. Specifically, both in the rural and urban areas, Malay receive the largest poverty reduction from the sectoral growth, followed by Other, Chinese and Indian. Clearly, sectoral growth effectively can improve income of the poor which in turn reducing poverty.

<TABLE 3>

In contrast to the poverty alleviation effect, the contribution of the sectoral growth to reduce inequality reveals a different pattern as shown in Table 4. In the rural area, almost all sectors contribute a large inequality effect to Malay, followed by Chinese, Indian and Other. Nevertheless, in the urban area, almost all sectors create a large inequality effect to Chinese, followed by Malay, Indian and Other. In addition, our results also tend to show that growth is less effective in reducing inequality in the rural area than that urban area. Consequently, the income gap between ethnic groups is expected to become wide due to the fact the rural households earn less than urban households. Similar to the poverty effect, the differential impact from production sectors on distribution effect is mainly contributed by the multiplier effect especially from the distributional effect. Therefore, the income growth of the low-income group, e.g. Malay is less sensitive with respect to the sectoral growth; implying growth alone is not sufficient to improve welfare of the low-income group.

<TABLE 4>

This study provides a detailed welfare impact on socio-economic groups which may have important policy implications regarding to the sectoral development, poverty alleviation and distribution strategies. Our results call for a more cautious and area-specific approach to policy formulation as far as poverty and inequality are concerned. The results in Table 1 show that the growth of transport and communication sector has the biggest impact on poverty reduction across all poverty measures. Nevertheless, our results in Table 3 reveal that this sector considerably has the lowest poverty rates compared to other sectors. Thus, the question is shall we put special attention on the growth of this sector to alleviate poverty? Similarly, does the target should be given on the government services to reduce inequality?

Nevertheless, information in Table 3 and Table 4 alone may not sufficient for a comprehensive analysis of the poverty and inequality in the economy. Supplementary information concerning the poverty and inequality rates across ethnic groups and production sectors are necessary to be able to derive appropriate policy formulations. Thus, Table 5 gives the poverty and distribution profiles along the ethnic groups across production sectors. It can be observed that the major source of poverty in the economy is largely explained by the agriculture sector, where most of the poor groups, i.e. Malay and Other are trapped in this sector. The results therefore, strongly support the common hypothesis that an increase in agricultural income by promoting high growth can increase welfare of the poor. The poverty rates for the rest of the sectors considerably low. In contrast, the inequality rates over ethnic groups show a less variation across production sectors. This implies, the distribution policy through their impact on growth can be continued together with poverty strategies. The economic growth is expected to be more effective to reduce poverty if more inequality can be reduced (Bruno et al., 1998).

<TABLE 5>

6. Conclusion and Implications

This study attempts to examine the growth effects on poverty alleviation and income distribution by taking into account the detailed impacts for the various ethnic groups, within a single analytical framework. By using the SAM approach, the various mechanisms and linkages through which the growth in sectoral outputs affects the poverty and income distribution can be decomposed into the multiplier effect and sensitivity effect of the particular welfare measures. The multiplier effect captures the effect of growth on income generation of the poor and low-income group. The sensitivity effect on the other hand, represents the sensitivity of the welfare measures to the increase in income of the particular group. The multiplier effect in addition, can be further decomposed into the distributional and consumption effects. The distributional effect in turn can be decomposed into industrial, factorial and transfer effects. The decomposition analysis is performed by treating government as an endogenous component in the model of multipliers. As a result of this theoretical extension, redistribution income effect to household through public expenditure and taxation can be captured simultaneously.

Clearly, the growth which measured by the sectoral final demand does indeed reduce the aggregate poverty and inequality. However, the growth only has a little impact on income distribution, despite with the government intervention. This indicates that the income growth of the low-income group is less sensitive with respect to the sectoral growth; implying the growth alone is not sufficient to improve welfare of the low-income group. Decomposing the growth effect into several effects, the results strongly suggest that the differential impact from the production sectors on the poverty and distribution is largely explained by the distributional effect especially by the factorial effect. Analysis at detailed level of household by ethnic groups in the rural and urban areas suggests the similar conclusion. The results show that the growth effectively can improve income of the poor (mostly dominated by Malay) both in the rural and urban areas, which in turn reducing poverty rates. Nevertheless, the growth is less effective in reducing inequality for the low-income group. It is observed that in the rural area, Malay is the most beneficial from the growth while in the urban area, it is largely benefited to Chinese.

Effort to reduce poverty and particularly inequality require a radical re-orientation of development strategies. Based on this study, there are two policies options that can be addressed directly to achieve equity goals. First, the results show that agriculture is the sector where growth is the most beneficial to the poor. In fact, most of the poor had been trapped in this sector. Thus, among the common suggestions still can be considered, *inter alia*, including land reform, modernisation of the sector and improvement in the agricultural productivity. All the strategies to promote growth and development of the agriculture should be given special attention on the development of rural agriculture. Second, the results strongly suggest for an upgrading of the labour skills through an improvement in the human capital. It can be observed that the factorial effect shows a small income effect from the production sectors due to the fact that most of the production sectors are highly capital-intensive. Thus, to meet the demand of the highly technology-intensive production, the quality of the labour force (especially the low-income group) should be improved by increasing the share of the labour force with educational attainment at tertiary level.

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Table 1

Schematic representation of endogenous and exogenous accounts in SAM

			Expenditures				
			Endogenous accounts			Exo. account	Total
			Factors	Production activities	Institutions	Sum of other accounts	
			1	2	3	4	5
Receipts	Factors	1	0	T_{12}	0	x_1	y_1
	Production activities	2	0	T_{22}	T_{23}	x_2	y_2
	Institutions	3	T_{31}	0	T_{33}	x_3	y_3
	Sum of other accounts	4	l'_1	l'_2	l'_3	t	y_x
	Total	5	y'_1	y'_2	y'_3	y'_x	

Note: institutions contain household, company and government.

Table 2

Growth effects on poverty and distribution

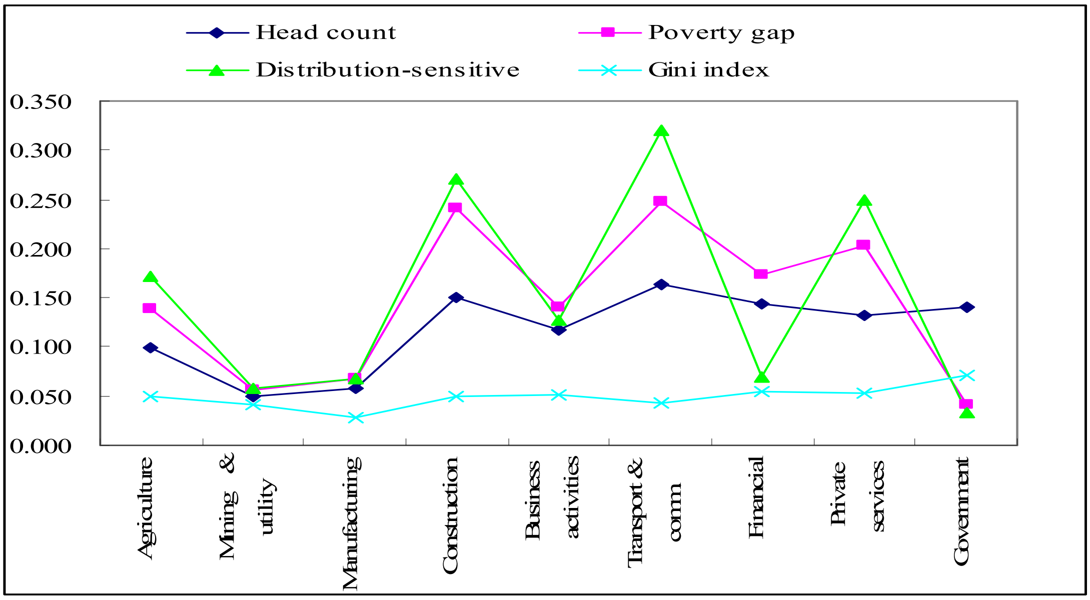
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Head count									
Poverty alleviation ($dP_{0j} = m'_{0j}q_{0j}$)	-0.0996	-0.0487	-0.0574	-0.1498	-0.1168	-0.1630	-0.1442	-0.1323	-0.1401
Poverty sensitivity (q_{0j})	-2.1319	-1.8713	-3.0023	-3.5605	-3.1129	-5.4271	-3.6888	-2.7259	-2.8257
Modified multiplier ($m'_{0j} = r_{0j}d'_{0j}$)	0.0467	0.0260	0.0191	0.0421	0.0375	0.0300	0.0391	0.0485	0.0496
Distributional ($d'_{0j} = d_{30j}d'_{20j}d_{10j}$)	0.0320	0.0186	0.0134	0.0284	0.0249	0.0209	0.0258	0.0329	0.0355
Transfer (d_{30j})	1.1823	1.1393	1.0883	1.1807	1.1573	1.0810	1.1579	1.1843	1.0076
Factorial ($d'_{20j} = s_{0j}d_{20j}$)	0.0215	0.0139	0.0064	0.0168	0.0157	0.0124	0.0163	0.0207	0.0309
Industrial (d_{10j})	1.2590	1.1789	1.9097	1.4310	1.3701	1.5546	1.3671	1.3422	1.1413
Consumption (r_{0j})	1.4608	1.4001	1.4273	1.4819	1.5091	1.4375	1.5131	1.4764	1.3973
Poverty gap									
Poverty alleviation ($dP_{1j} = m'_{1j}q_{1j}$)	-0.1393	-0.0559	-0.0671	-0.2411	-0.1397	-0.2469	-0.1736	-0.2034	-0.0420
Poverty sensitivity (q_{1j})	-2.9908	-1.9392	-3.3655	-5.4528	-4.2866	-8.3056	-4.3533	-3.7528	-1.0653
Modified multiplier ($m'_{1j} = r_{1j}d'_{1j}$)	0.0466	0.0288	0.0199	0.0442	0.0326	0.0297	0.0399	0.0542	0.0394
Distributional ($d'_{1j} = d_{31j}d'_{21j}d_{11j}$)	0.0320	0.0206	0.0142	0.0299	0.0219	0.0207	0.0269	0.0365	0.0263
Transfer (d_{31j})	1.1738	1.1513	1.1050	1.1888	1.1025	1.0788	1.1465	1.2053	1.0010
Factorial ($d'_{21j} = s_{1j}d_{21j}$)	0.0216	0.0153	0.0069	0.0177	0.0139	0.0122	0.0172	0.0230	0.0219
Industrial (d_{11j})	1.2604	1.1671	1.8600	1.4201	1.4274	1.5735	1.3609	1.3173	1.2005
Consumption (r_{1j})	1.4556	1.4003	1.4003	1.4794	1.4893	1.4371	1.4833	1.4837	1.4974
Distribution-sensitive									
Poverty alleviation ($dP_{2j} = m'_{2j}q_{2j}$)	-0.1715	-0.0577	-0.0677	-0.2704	-0.1264	-0.3202	-0.0698	-0.2493	-0.0325
Poverty sensitivity (q_{2j})	-3.7485	-1.6439	-3.1521	-6.8524	-4.4910	-10.4391	-1.4298	-4.3557	-0.8237
Modified multiplier ($m'_{2j} = r_{2j}d'_{2j}$)	0.0458	0.0351	0.0215	0.0395	0.0281	0.0307	0.0488	0.0572	0.0394
Distributional ($d'_{2j} = d_{32j}d'_{22j}d_{12j}$)	0.0317	0.0246	0.0155	0.0268	0.0194	0.0214	0.0338	0.0387	0.0263
Transfer (d_{32j})	1.1535	1.1710	1.1118	1.1129	1.0092	1.0521	1.1424	1.1882	0.9809
Factorial ($d'_{22j} = s_{2j}d_{22j}$)	0.0216	0.0181	0.0076	0.0159	0.0125	0.0125	0.0221	0.0246	0.0219
Industrial (d_{12j})	1.2716	1.1609	1.8365	1.5175	1.5353	1.6189	1.3382	1.3257	1.2251
Consumption (r_{2j})	1.4448	1.4265	1.3818	1.4712	1.4540	1.4349	1.4431	1.4799	1.4973
Gini									
Inequality reduction ($dG_j = m_jg_j$)	-0.0493	-0.0408	-0.0277	-0.0498	-0.0515	-0.0430	-0.0543	-0.0531	-0.0714
Distribution sensitivity (g_j)	-0.1115	-0.1059	-0.1103	-0.1131	-0.1112	-0.1066	-0.1139	-0.1102	-0.0846
Multiplier ($m_j = r_jd_j$)	0.4420	0.3854	0.2516	0.4403	0.4631	0.4030	0.4764	0.4820	0.8447
Distributional ($d_j = d_{3j}d_{2j}d_{1j}$)	0.3076	0.2609	0.1773	0.3181	0.3253	0.2874	0.3350	0.3440	0.6332
Transfer (d_{3j})	1.1264	1.1899	1.1058	1.0565	1.1088	1.0891	1.1110	1.0811	1.0148
Factorial (d_{2j})	0.2070	0.1860	0.0852	0.2049	0.2183	0.1715	0.2209	0.2280	0.5645
Industrial (d_{1j})	1.3195	1.1786	1.8811	1.4695	1.3442	1.5389	1.3649	1.3952	1.1053
Consumption (r_j)	1.4368	1.4771	1.4190	1.3840	1.4233	1.4021	1.4219	1.4012	1.3340

Source: derived from the model

Note: (1) agriculture, (2) mining & utility, (3) manufacturing, (4) construction, (5) business activities, (6) transport & communication, (7) financial, (8) private services, (9) government services

Figure 1

Summary of the growth effect on poverty and distribution



Source: derived from Table 2

Table 3

Growth effects on poverty by ethnic groups

	Agriculture			Mining & utility			Manufacturing			Construction			Business activities		
	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)
Head count (P_{0j})															
Rural-Malay	-0.0221	-1.7767	0.0124	0.0000	0.0000	0.0000	-0.0167	-3.6228	0.0046	-0.0425	-2.8305	0.0150	-0.0296	-2.8899	0.0102
Rural-Chinese	-0.0074	-2.9110	0.0026	0.0000	0.0000	0.0000	-0.0011	-4.6416	0.0002	-0.0056	-7.5338	0.0007	-0.0038	-7.1461	0.0005
Rural-Indian	-0.0034	-3.3066	0.0010	-0.0002	-30.7402	0.0000	-0.0008	-4.6456	0.0002	-0.0007	-2.7687	0.0003	-0.0014	-1.3824	0.0010
Rural-Other	-0.0080	-1.8085	0.0044	-0.0107	-2.4074	0.0044	-0.0054	-3.0554	0.0018	-0.0082	-5.6781	0.0014	-0.0068	-2.8449	0.0024
Urban-Malay	-0.0273	-1.9033	0.0144	-0.0157	-2.4635	0.0064	-0.0165	-3.6823	0.0045	-0.0488	-3.4945	0.0140	-0.0432	-3.4705	0.0124
Urban-Chinese	-0.0132	-3.1699	0.0042	0.0000	0.0000	0.0000	-0.0035	-3.1217	0.0011	-0.0094	-5.8207	0.0016	-0.0087	-3.5405	0.0025
Urban-Indian	-0.0050	-4.6355	0.0011	-0.0007	-3.3117	0.0002	-0.0018	-3.9763	0.0005	-0.0082	-6.0094	0.0014	-0.0036	-3.0721	0.0012
Urban-Other	-0.0032	-1.9092	0.0017	-0.0015	-7.4835	0.0002	-0.0042	-4.0794	0.0010	-0.0086	-5.1464	0.0017	-0.0044	-2.5000	0.0018
Non-citizen	-0.0100	-1.9861	0.0050	-0.0199	-1.3458	0.0148	-0.0073	-1.3997	0.0052	-0.0178	-2.9685	0.0060	-0.0153	-2.7783	0.0055
Poverty gap (P_{1j})															
Rural-Malay	-0.0354	-2.5135	0.0141	0.0000	0.0000	0.0000	-0.0179	-5.9009	0.0030	-0.0835	-4.5706	0.0183	-0.0386	-4.6097	0.0084
Rural-Chinese	-0.0081	-3.8293	0.0021	0.0000	0.0000	0.0000	-0.0008	-3.9031	0.0002	-0.0044	-7.7795	0.0006	-0.0022	-7.5323	0.0003
Rural-Indian	-0.0033	-3.9393	0.0008	0.0000	-42.6017	0.0000	-0.0006	-3.8114	0.0002	-0.0011	-1.5946	0.0007	-0.0026	-1.2963	0.0020
Rural-Other	-0.0123	-2.3667	0.0052	-0.0109	-3.1181	0.0035	-0.0067	-4.9841	0.0014	-0.0088	-8.5320	0.0010	-0.0090	-4.5952	0.0020
Urban-Malay	-0.0433	-3.1423	0.0138	-0.0124	-1.5016	0.0083	-0.0161	-3.7347	0.0043	-0.0812	-6.0347	0.0135	-0.0488	-5.8985	0.0083
Urban-Chinese	-0.0132	-4.0175	0.0033	0.0000	0.0000	0.0000	-0.0035	-2.1732	0.0016	-0.0092	-5.1320	0.0018	-0.0083	-2.6931	0.0031
Urban-Indian	-0.0039	-8.3994	0.0005	-0.0005	-2.1537	0.0002	-0.0016	-3.2158	0.0005	-0.0084	-10.8821	0.0008	-0.0039	-2.5326	0.0015
Urban-Other	-0.0048	-2.6963	0.0018	-0.0006	-6.8041	0.0001	-0.0042	-7.3374	0.0006	-0.0103	-9.2813	0.0011	-0.0065	-3.8072	0.0017
Non-citizen	-0.0150	-2.9884	0.0050	-0.0314	-1.8815	0.0167	-0.0156	-1.9056	0.0082	-0.0342	-5.2238	0.0066	-0.0199	-3.6942	0.0054
Distribution-sensitive (P_{2j})															
Rural-Malay	-0.0491	-3.2257	0.0152	0.0000	0.0000	0.0000	-0.0136	-8.2179	0.0017	-0.1096	-6.3140	0.0174	-0.0357	-6.3449	0.0056
Rural-Chinese	-0.0082	-4.4300	0.0019	0.0000	0.0000	0.0000	-0.0007	-2.9620	0.0002	-0.0035	-7.4500	0.0005	-0.0013	-7.3153	0.0002
Rural-Indian	-0.0032	-4.1283	0.0008	0.0000	-27.0124	0.0000	-0.0005	-2.7562	0.0002	-0.0008	-0.3369	0.0023	-0.0044	-1.2667	0.0035
Rural-Other	-0.0175	-2.9145	0.0060	-0.0103	-3.9070	0.0026	-0.0058	-6.9201	0.0008	-0.0069	-10.8548	0.0006	-0.0083	-6.3500	0.0013
Urban-Malay	-0.0533	-4.3293	0.0123	-0.0064	-0.4202	0.0152	-0.0150	-3.3699	0.0045	-0.0862	-8.5672	0.0101	-0.0374	-8.3297	0.0045
Urban-Chinese	-0.0129	-4.5212	0.0028	0.0000	0.0000	0.0000	-0.0032	-1.1183	0.0029	-0.0096	-4.2076	0.0023	-0.0079	-1.6874	0.0047
Urban-Indian	-0.0022	-12.1437	0.0002	-0.0003	-0.9830	0.0003	-0.0015	-2.2237	0.0007	-0.0054	-15.7542	0.0003	-0.0040	-1.7255	0.0023
Urban-Other	-0.0064	-3.4766	0.0018	-0.0003	-5.8605	0.0000	-0.0027	-10.5691	0.0003	-0.0076	-13.3495	0.0006	-0.0068	-5.1331	0.0013
Non-citizen	-0.0188	-3.9611	0.0048	-0.0404	-2.3937	0.0169	-0.0247	-2.3958	0.0103	-0.0408	-7.4456	0.0055	-0.0206	-4.2997	0.0048

Table 3 (continue)

	Transport & comm.			Financial			Private services			Govt. Services		
	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)
Head count (P_{0j})												
Rural-Malay	-0.0605	-5.6876	0.0106	-0.0708	-4.1304	0.0171	-0.0331	-1.8699	0.0177	-0.0495	-4.4998	0.0110
Rural-Chinese	0.0000	0.0000	0.0000	-0.0012	-3.3336	0.0004	-0.0037	-3.2429	0.0011	-0.0043	-3.9043	0.0011
Rural-Indian	0.0000	0.0000	0.0000	-0.0015	-6.1587	0.0002	0.0000	0.0000	0.0000	-0.0027	-10.0975	0.0003
Rural-Other	-0.0139	-4.6023	0.0030	-0.0106	-5.7311	0.0018	-0.0043	-4.4619	0.0010	-0.0217	-7.2159	0.0030
Urban-Malay	-0.0469	-6.5649	0.0071	-0.0335	-3.4622	0.0097	-0.0409	-2.6929	0.0152	-0.0326	-5.2809	0.0062
Urban-Chinese	0.0000	0.0000	0.0000	-0.0062	-2.6114	0.0024	-0.0093	-5.1234	0.0018	-0.0052	-2.4791	0.0021
Urban-Indian	0.0000	0.0000	0.0000	-0.0008	-24.3632	0.0000	-0.0034	-6.4151	0.0005	-0.0022	-15.1568	0.0001
Urban-Other	-0.0122	-9.3868	0.0013	-0.0071	-2.0147	0.0035	-0.0097	-5.7228	0.0017	-0.0032	-4.3112	0.0007
Non-citizen	-0.0295	-3.7192	0.0079	-0.0125	-3.2045	0.0039	-0.0280	-2.9344	0.0095	-0.0187	-0.7471	0.0250
Poverty gap (P_{1j})												
Rural-Malay	-0.0892	-10.2594	0.0087	-0.0823	-7.2774	0.0113	-0.0680	-2.6259	0.0259	-0.0099	-3.8493	0.0026
Rural-Chinese	0.0000	0.0000	0.0000	-0.0015	-3.0912	0.0005	-0.0043	-2.4665	0.0017	-0.0005	-6.5063	0.0001
Rural-Indian	0.0000	0.0000	0.0000	-0.0011	-5.4197	0.0002	0.0000	0.0000	0.0000	-0.0001	-9.8846	0.0000
Rural-Other	-0.0248	-8.0723	0.0031	-0.0090	-7.8156	0.0011	-0.0041	-4.0846	0.0010	-0.0007	-13.1892	0.0001
Urban-Malay	-0.0581	-7.5662	0.0077	-0.0394	-2.9470	0.0134	-0.0657	-4.3884	0.0150	-0.0053	-4.3389	0.0012
Urban-Chinese	0.0000	0.0000	0.0000	-0.0080	-1.5866	0.0050	-0.0079	-4.3894	0.0018	-0.0030	-1.4042	0.0021
Urban-Indian	0.0000	0.0000	0.0000	-0.0002	-22.0072	0.0000	-0.0024	-5.9783	0.0004	0.0000	-14.4765	0.0000
Urban-Other	-0.0113	-18.1950	0.0006	-0.0143	-2.8671	0.0050	-0.0082	-10.6229	0.0008	-0.0007	-3.3802	0.0002
Non-citizen	-0.0634	-6.5694	0.0097	-0.0179	-5.3280	0.0034	-0.0429	-5.6127	0.0076	-0.0217	-0.6546	0.0331
Distribution-sensitive (P_{2j})												
Rural-Malay	-0.0983	-14.8432	0.0066	-0.0610	-10.4201	0.0059	-0.1092	-3.3860	0.0322	-0.0075	-2.9045	0.0026
Rural-Chinese	0.0000	0.0000	0.0000	-0.0019	-2.5273	0.0008	-0.0050	-1.4747	0.0034	-0.0007	-9.1318	0.0001
Rural-Indian	0.0000	0.0000	0.0000	-0.0009	-4.4396	0.0002	0.0000	0.0000	0.0000	-0.0001	-9.2123	0.0000
Rural-Other	-0.0336	-11.5545	0.0029	-0.0061	-9.2804	0.0007	-0.0042	-3.2924	0.0013	-0.0011	-19.2247	0.0001
Urban-Malay	-0.0787	-7.8708	0.0100	0.0447	2.1649	0.0207	-0.0756	-6.0810	0.0124	-0.0040	-3.2477	0.0012
Urban-Chinese	0.0000	0.0000	0.0000	-0.0066	-0.5169	0.0128	-0.0076	-3.4321	0.0022	-0.0006	-0.2903	0.0021
Urban-Indian	0.0000	0.0000	0.0000	-0.0001	-22.6225	0.0000	-0.0020	-5.1559	0.0004	0.0000	-13.5510	0.0000
Urban-Other	-0.0074	-27.0436	0.0003	-0.0209	-3.7377	0.0056	-0.0046	-15.4900	0.0003	-0.0005	-2.2932	0.0002
Non-citizen	-0.1022	-9.3995	0.0109	-0.0171	-7.4610	0.0023	-0.0413	-8.1958	0.0050	-0.0180	-0.5441	0.0331

Source: computed from the model

Note: total poverty alleviation effect, poverty sensitivity effect and modified multiplier effect are represented by (I), (II) and (III), respectively. Tabular results of details decomposition effects are available on request from authors

Table 4

Growth effects on distribution by ethnic groups

	Agriculture			Mining & utility			Manufacturing			Construction			Business activities		
	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)
Rural-Malay	-0.0050	-0.0680	0.0741	-0.0048	-0.0772	0.0617	-0.0031	-0.0761	0.0412	-0.0043	-0.0695	0.0613	-0.0048	-0.0748	0.0636
Rural-Chinese	-0.0047	-0.1187	0.0397	-0.0017	-0.0751	0.0227	-0.0024	-0.1408	0.0168	-0.0049	-0.1359	0.0360	-0.0040	-0.1271	0.0312
Rural-Indian	-0.0014	-0.0901	0.0152	-0.0009	-0.0900	0.0097	-0.0007	-0.0932	0.0070	-0.0008	-0.1002	0.0084	-0.0009	-0.0989	0.0095
Rural-Other	-0.0017	-0.0643	0.0259	-0.0006	-0.0500	0.0121	-0.0004	-0.0604	0.0071	-0.0007	-0.0691	0.0108	-0.0008	-0.0683	0.0122
Urban-Malay	-0.0078	-0.0834	0.0932	-0.0102	-0.0959	0.1063	-0.0058	-0.0935	0.0619	-0.0092	-0.0987	0.0928	-0.0104	-0.0940	0.1104
Urban-Chinese	-0.0224	-0.1774	0.1260	-0.0143	-0.1324	0.1081	-0.0115	-0.1482	0.0775	-0.0235	-0.1423	0.1655	-0.0237	-0.1422	0.1668
Urban-Indian	-0.0031	-0.1257	0.0245	-0.0029	-0.1089	0.0267	-0.0017	-0.0993	0.0173	-0.0028	-0.1109	0.0253	-0.0036	-0.1206	0.0302
Urban-Other	-0.0011	-0.0891	0.0120	-0.0010	-0.0874	0.0110	-0.0004	-0.0749	0.0058	-0.0008	-0.0686	0.0114	-0.0009	-0.0788	0.0114
Non-citizen	-0.0022	-0.0705	0.0313	-0.0045	-0.1666	0.0271	-0.0017	-0.1015	0.0169	-0.0028	-0.0959	0.0288	-0.0024	-0.0856	0.0277

	Transport & comm.			Financial			Private services			Govt. Services		
	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)	(I)	(II)	(III)
Rural-Malay	-0.0049	-0.0781	0.0632	-0.0046	-0.0710	0.0648	-0.0051	-0.0746	0.0687	-0.0104	-0.0581	0.1797
Rural-Chinese	-0.0036	-0.1316	0.0272	-0.0034	-0.1260	0.0271	-0.0042	-0.1190	0.0350	-0.0030	-0.0953	0.0311
Rural-Indian	-0.0011	-0.1027	0.0111	-0.0008	-0.0783	0.0099	-0.0011	-0.1194	0.0094	-0.0010	-0.0718	0.0135
Rural-Other	-0.0007	-0.0641	0.0112	-0.0007	-0.0600	0.0118	-0.0014	-0.0838	0.0163	-0.0017	-0.0561	0.0310
Urban-Malay	-0.0120	-0.1046	0.1152	-0.0130	-0.0991	0.1312	-0.0123	-0.1067	0.1153	-0.0229	-0.0718	0.3192
Urban-Chinese	-0.0145	-0.1285	0.1128	-0.0241	-0.1515	0.1593	-0.0227	-0.1386	0.1635	-0.0177	-0.1106	0.1601
Urban-Indian	-0.0031	-0.1024	0.0305	-0.0036	-0.1048	0.0344	-0.0034	-0.1037	0.0331	-0.0045	-0.0902	0.0497
Urban-Other	-0.0010	-0.0875	0.0111	-0.0010	-0.0823	0.0116	-0.0014	-0.0873	0.0160	-0.0018	-0.0701	0.0257
Non-citizen	-0.0020	-0.0944	0.0208	-0.0031	-0.1161	0.0263	-0.0016	-0.0635	0.0247	-0.0084	-0.2434	0.0347

Source: computed from the model

Note: total distribution effect, distribution sensitivity effect and multiplier effect are represented by (I), (II) and (III), respectively.
Tabular results of details decomposition effects are available on request from authors

Table 5

Estimated poverty measures and inequality (%)

	Agriculture				Mining & utility				Manufacturing				Construction				Business activities			
	P_0	P_1	P_2	G	P_0	P_1	P_2	G	P_0	P_1	P_2	G	P_0	P_1	P_2	G	P_0	P_1	P_2	G
Rural-Malay	29.01	8.26	3.16	36.03	0.00	0.00	0.00	42.43	5.60	0.81	0.16	33.15	13.00	2.33	0.56	38.89	10.13	1.81	0.43	38.62
Rural-Chinese	11.13	2.30	0.72	42.85	0.00	0.00	0.00	31.42	0.68	0.14	0.06	39.21	1.09	0.12	0.03	45.50	1.07	0.13	0.03	39.38
Rural-Indian	11.72	2.37	0.77	33.74	0.02	0.00	0.00	34.70	1.23	0.25	0.11	33.96	1.62	0.62	0.53	33.88	6.69	2.91	1.78	35.95
Rural-Other	29.40	8.73	3.55	34.49	9.88	2.40	0.81	35.62	12.51	2.09	0.47	36.53	7.12	0.75	0.12	35.03	12.27	2.19	0.53	37.80
Urban-Malay	26.63	6.43	2.03	43.78	1.62	0.65	0.54	36.50	3.62	0.77	0.29	36.70	7.99	1.14	0.21	44.71	7.09	1.03	0.20	41.68
Urban-Chinese	5.69	1.13	0.35	45.18	0.00	0.00	0.00	40.93	0.73	0.23	0.15	38.33	0.52	0.08	0.03	37.74	0.93	0.25	0.14	38.08
Urban-Indian	7.66	0.81	0.12	40.55	0.22	0.07	0.05	45.41	1.34	0.32	0.15	31.57	2.86	0.24	0.03	36.98	2.44	0.69	0.37	37.53
Urban-Other	23.77	6.43	2.35	48.33	0.50	0.06	0.02	39.15	8.93	1.07	0.17	39.80	7.83	0.76	0.10	33.43	9.77	2.03	0.57	38.34
Non-citizen	27.79	6.97	2.34	37.81	14.79	5.13	2.34	73.49	15.45	5.32	2.42	50.37	11.09	1.78	0.38	44.53	12.51	2.67	0.85	50.40

	Transport & communication				Financial				Private services				Government services			
	P_0	P_1	P_2	G	P_0	P_1	P_2	G	P_0	P_1	P_2	G	P_0	P_1	P_2	G
Rural-Malay	4.82	0.43	0.05	36.74	5.86	0.71	0.11	42.81	16.56	4.57	1.70	40.79	1.58	0.33	0.13	30.83
Rural-Chinese	0.00	0.00	0.00	35.37	0.29	0.07	0.04	35.74	2.09	0.60	0.35	35.61	0.91	0.12	0.02	27.70
Rural-Indian	0.00	0.00	0.00	39.79	0.55	0.09	0.03	33.04	0.00	0.00	0.00	29.35	0.52	0.05	0.01	41.26
Rural-Other	7.77	0.86	0.13	34.63	3.49	0.40	0.07	33.45	3.85	0.76	0.29	34.74	2.51	0.18	0.02	31.28
Urban-Malay	1.78	0.21	0.04	38.74	1.63	0.41	0.20	40.54	8.48	1.57	0.39	41.40	0.50	0.09	0.04	34.99
Urban-Chinese	0.00	0.00	0.00	36.07	0.33	0.13	0.10	42.47	0.71	0.13	0.05	36.79	0.34	0.14	0.12	35.08
Urban-Indian	0.00	0.00	0.00	37.91	0.02	0.00	0.00	40.91	1.03	0.15	0.04	31.42	0.07	0.00	0.00	38.94
Urban-Other	3.36	0.17	0.01	41.10	6.71	1.74	0.61	43.65	6.76	0.58	0.07	39.08	0.75	0.17	0.08	32.98
Non-citizen	10.95	1.45	0.25	59.33	3.28	0.52	0.11	44.89	24.87	3.76	0.74	46.23	18.66	11.28	8.87	83.42

Source: estimated from HIS

Note: P_0, P_1, P_2 and G represent the head count, poverty gap, distribution-sensitive and Gini, respectively.