Development Research Center

Discussion Papers

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MEASUREMENT OF POVERTY AND NEGATIVE-INCOME TAX

by

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NOTE: Discussion Papers are preliminary materials circulated to stimulate discussion and critical comment. References in publication to Discussion Papers should be cleared with the author(s) to protect the tentative character of these papers.
1. Introduction

The measurement of poverty involves two distinct problems. One is the specification of "poverty level" which is the income below which one is considered to be poor. This income level should reflect the socially accepted "minimal" standard of living. Several economists have tackled this problem by calculating the income that would buy the minimum nutritional requirement of a family. Once the "poverty level" is determined, the second problem is that of selecting an index of poverty.

This paper deals with the second problem. Only work which has so far appeared on this subject is that of Sen [7,8] who derived an index of poverty using an axiomatic framework based on an ordinal welfare concept. The approach followed here is that of transfer of income from rich to poor so that, the income of every poor is brought to the "poverty level". The poverty index derived with this approach turns out to be similar to one proposed by Sen [7].

The negative income tax is one of the commonly suggested fiscal measure to transfer income from rich to poor in order to reduce poverty. One of the first formulas for negative income tax was proposed by Friedman [2]. Under this plan the poor families are affected in two ways. First their mean income increases and secondly their income inequality is reduced. In this paper we consider a negative income tax plan similar to one proposed by Friedman [2] and investigate its effect on the proposed poverty index.

The second section gives the derivation of the poverty index along with its upper and lower bounds. A discussion of the Sen's poverty index is presented in Section 3. An index of richness is introduced in Section 4 and

1/ Several income maintenance plans are now available in the literature (see for example Lampman [5], Green [4], Tobin [11], Schwartz [6] and Theobald [10].)
Section 5 investigates the effect of negative income tax on the poverty index. A numerical illustration using Malaysian data is provided in Section 5.

2. The Derivation of the Poverty Index

Suppose that income $x$ of a family is a random variable with probability density function $f(x)$. Then the distribution function $F(x)$ is defined as

$$F(x) = \int_{0}^{x} f(x) dX$$

(2.1)

and this can be interpreted as the proportion of families having income less than or equal to $x$. Let $x^*$ be the "poverty level" which is assumed to be known, then $F(x^*)$ will be the proportion of poor families in the society.

If $\mu$ is the mean income of the society and $\mu^*$ is the mean income of families having income below the "poverty level", then we have the following poverty measure:

$$P = F(x^*) \frac{(x^* - \mu^*)}{\mu}$$

(2.2)

$P$ is interpreted as the percentage of total income which should be transferred from non-poor to poor so that the income of every one below the "poverty level" is raised to $x^*$. $x^*$ is generally less than $\mu$. However, if $x^* = \mu$, then it can be shown that the poverty index $P$ reduces to the relative mean deviation which is a well known measure of income inequality.

Let us now divide the whole population into $k$ mutually exclusive regions. Denote:

- $\mu_i$ = mean income of the $i$-th region
- $f_i$ = proportion of population in the $i$-th region
- $F_i(x^*)$ = proportion of poor in the $i$-th region.
\( \mu_i^* \) is the mean income of poor in the \( i \)-th region.

Then we have the following relations

\[
F(x^*) = \sum_{i=1}^{n} F_i(x^*) f_i
\]

(2.3)

and

\[
\mu^* = \frac{1}{F(x^*)} \sum_{i=1}^{n} F_i(x^*) \mu_i^* f_i
\]

(2.4)

The equation (2.3) implies that the proportion poor in the whole population is equal to the weighted average of the proportion of poor in each region, the weights being proportional to the population of each region. Similarly, the equation (2.4) expresses the mean income of poor in the whole population as a weighted average of the mean income of poor in each region, the weights being proportional to the share of poor in each region.

Substituting (2.3) and (2.4) into (2.2) gives

\[
P = \frac{1}{\mu} \sum_{i=1}^{n} \mu_i^* f_i P_i
\]

(2.5)

where

\[
P_i = F_i(x^*) \frac{(x^* - \mu_i^*)}{\mu_i}
\]

(2.6)

is the poverty index in the \( i \)-th region. This leads to the following theorem.

**Theorem:** If the population is divided into mutually exclusive regions or groups then the poverty index in the whole population is equal to the weighted average of the poverty indices in each region, the weights being proportional to the income share of each region.
The above theorem shows how aggregate poverty can be decomposed into different elements. If the population is divided into different groups according to some socio-economic characteristics of households, this result should be useful in analyzing the contribution of poverty within each group to the aggregate poverty.

It should now be pointed out that the poverty index $P$ does not take into account the income distribution among the poor. The measure is in fact insensitive to the transfer of income from poor to relatively more poor within the poverty group. If all the poor have exactly the same income (which is less than the poverty level), then the measure $P$ provides adequate information about the poverty level. More inequality of income among poor with mean income remaining unchanged should imply higher value of the poverty index. When there is perfect inequality of income among poor, every family below "poverty level" gets zero income which means $\mu^* = 0$, and $P = \frac{F(x^*)x^*}{\mu}$. If we agree to use Gini-Index $G^*$ as a measure of income inequality among poor, then the poverty index should at least satisfy the following conditions.

$$\text{if } G^* = 0, \quad P = \frac{F(x^*)(x^* - \mu^*)}{\mu} \quad (1)$$

$$G^* = 1, \quad P = \frac{F(x^*)x^*}{\mu} \quad (2) \quad (2.7)$$

$$\frac{\partial P}{\partial G^*} > 0 \text{ for all } G^* \quad (3)$$

One of the poverty indices which satisfies these conditions is

$$\tilde{P} = \frac{F(x^*)[x^* - \mu^* (1 - G^*)]}{\mu} \quad (2.8)$$
It should be noted that \( \tilde{F} \) increases with \( G^* \) at constant rate. We can obtain a poverty index which increases with \( G^* \) at increasing or decreasing rate. Since the economic theory does not say anything about the rate of increase of the poverty index with respect to income inequality, we consider \( \tilde{F} \) to be a suitable measure of poverty mainly because of its simplicity.

The elasticity of the poverty index \( \tilde{P} \) with respect to \( G^* \) is

\[
\frac{G^*}{\tilde{P}} \frac{\partial \tilde{P}}{\partial G^*} = \frac{\mu^* G^*}{(x^* - \mu^*) + \mu^* G^*}
\]  

which is, of course, less than one. Thus, if the income among poor is redistributed such a way that the Gini-index reduces by 1\% then the poverty index reduces by less than 1\%. This elasticity provides the information regarding the effect of income inequality among poor on the poverty index.

In the diagram OPA is the Lorenz curve and OA is the egalitarian line. If P is the point on the Lorenz curve corresponding to a given
"poverty level" $v^*$ then $OE$ is the proportion of poor families, and $EP$ is their proportional income. $LP$ is the tangent at point $P$ and its slope is equal to $\frac{x^*}{\mu}$. The poverty level $P$ can be seen to correspond to the area of the triangle $OPF$ divided by the area of the triangle $OEK$. Further, it can be shown that the shaded area $ONP$ is equal to $\frac{F^2(x^*)\mu G^*}{2\mu}$ which means the poverty index $P$ corresponds to the area $ONPF$ divided by the area of the triangle $OEK$.

It is clear from the diagram that the area $ONPF$ is greater than the area $OPF$ and less than the area $OLPF$. This provides the upper and lower bounds of the poverty index $P$ as

$$P < \tilde{P} < P + \frac{F(x^*)\mu}{\mu}(1 - \frac{\mu^*}{x^*}) \quad (2.10)$$

where $P$ is given in (2.2).

3. Sen's Poverty Index

Let us now define

$$g(x) = \frac{(x^* - x)}{\mu} \quad (3.1)$$

which is the "poverty gap" expressed in percentage terms over the mean income. Following Sen [7], the index of poverty is defined as the weighted sum of the income $g(x)$ using non-negative weights $\nu(x)$:

$$G = \int_0^{x^*} g(x)\nu(x)f(x)dx \quad (3.2)$$

If we consider the sub-population of poor families only then $OEP$ is their Lorenz curve and $OP$ is the egalitarian line, therefore Gini-index $G^*$ of poor families is given by the area $ONP$ divided by the area of a triangle $OEK$.

Gastworth [3] obtained the upper and lower bounds for the Gini-index. The bounds on the poverty index as given in (2.9) can also be obtained using his results.
where

\[ F(x^*) = \int_0^{x^*} v(x)f(x)\,dx \] \hspace{1cm} (3.3)

We can now argue that larger the "poverty gap", greater should be weight attached to it. This implies that \( v(x) \) should be a decreasing function of \( x \). If \( v(x) \) is one for all \( x \), then \( G \) reduces to the poverty index \( \Psi \) (given in 2.2). Let us now take

\[ v(x) = \frac{2[F(x^*) - F(x)]}{F(x^*)} \] \hspace{1cm} (3.4)

which is twice the proportion of poor families having income greater than or equal to \( x \). Using (3.4) into (3.2) and integrating by parts, we obtain the poverty index \( \Psi \) as given in (2.8).

Sen [7] basically uses the weights as given in (3.4) but he expresses the "poverty gap" as the percentage of the poverty level \( x^* \) instead of the mean income \( \mu \) of the society. Sen's [7] poverty index can then be shown to be approximately equal to

\[ \Psi_s \approx x [x^* - \mu (1 - G^*)] \] \hspace{1cm} (3.5)

which in the diagram correspond to the area ONPF divided by area OEl. The upper and lower bounds for \( \Psi_s \) are obtained as

\[ F(x^*) \left[ 1 - \frac{\mu^*}{x^*} \right] < \Psi_s < F(x^*) \left[ 1 - \frac{\mu^{*2}}{x^{*2}} \right] \] \hspace{1cm} (3.6)

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\[ 4/ \] This follows from Axiom E of Sen [7].

\[ 5/ \] Sen [7]'s expression for this measure looks different because he is working with the discrete case where as we are concerned with the continuous case.
It will be useful to interpret the poverty measure $\hat{P}$ in terms of a social welfare function recently considered by Sen [9]. The form of the welfare function is:

$$W = \int_0^\infty x v(x) f(x) \, dx$$

where $v(x)$ is the weight given to income $x$, such that:

$$\int_0^\infty v(x) f(x) \, dx = 1$$

Let us now consider the sub-population of poor only. Their social welfare function $\bar{W}$ satisfying Axioms E, L, 0 and M of Sen [9] can be approximately written as:

$$\bar{W} = F(x^*) \mu (1 - G^*)$$

When $P\%$ income is transferred from non-poor to poor, the income of every poor is raised to $x^*$ and therefore, the welfare function of the poor after the transfer becomes

$$\bar{W}^* = F(x^*) x^*$$

According to (3.7) $\mu$ is the maximum welfare of the society with a given mean income, it is then obvious that $\hat{P}$ is equal to the gain in the welfare of the poor (due to the transfer of income) expressed as a percentage of the maximum welfare of the society. If all the poor have exactly the same income (which is less than $x^*$), then the gain in welfare (expressed as a percentage of the maximum welfare of the society) is equal to $P$.

4. An Index of Richness

Let $z$ be the income level above which a family is considered to be rich, then similar to the poverty index $P$, we have the following measure of richness
\[ R = \frac{[1 - F(z)] \cdot (m - z)}{\mu} \]  \hspace{1cm} (4.1)

where \( m \) is the mean income of rich and \([1 - F(z)]\) is the proportion of rich families in the society. The measure \( R \) is interpreted as the proportion of the total income of the society which should be taken away from rich so that no one has income greater than \( z \). \( z \) is generally greater than \( \mu \). However, if \( z = \mu \), then it can be shown that \( R \) reduces to the relative mean deviation.6/

Again dividing the population into \( k \) mutually exclusive regions, we obtain the following result

\[ R = \frac{1}{\mu} \sum_{i=1}^{k} \mu_i f_i R_i \]  \hspace{1cm} (4.2)

where \( R_i \) is the index of richness in the \( i \)-th region. Thus the index of richness in the whole population is equal to the weighted average of the richness indices in each region, the weights being proportional to the income share of each region.

In the diagram, AG is the line with slope \( \frac{z}{\mu} \) and Q is the point on the Lorenz curve corresponding to the income level \( z \). Then the index \( R \) can be shown to be equal to the area of the triangle AOG divided by the area ADR.

5. Negative Income Tax

We consider the following negative income tax plan.

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The index \( R \) does not take into account the exact distribution of income among rich families. This implies that the income of every rich family is given equal weight. If the society is only concerned with the number of rich families and their income, the index \( R \) should be an adequate measure of level of richness. Neglecting the disparity of income among rich is not of serious consequence.
If a family has per capita income more than the "poverty level" \( x^* \), it is taxed at a fixed rate \( \alpha \%) \) and if the per capita income of a family falls below the "poverty level", the family is given cash subsidy again at fixed rate \( \alpha \%) \) on income below \( x^* \). The disposable income of a family with before tax income \( x \) is then given by

\[
d(x) = \alpha x^* + (1 - \alpha)x
\]

With mean disposable income:

\[
\mu_d = \alpha x^* + (1 - \alpha)\mu.
\]

The mean disposable income of the families below the "poverty level" is

\[
\mu_d^* = \frac{1}{F(x^*)} \int_0^{x^*} d(x)f(x)dx
\]

which simplifies to

\[
\mu_d^* = \mu^* + \alpha(x^* - \mu^*)
\]

This shows that the negative income tax plan increases the mean income of the poor families.

Let \( q(x) \) be the proportional income of families having income less than or equal to \( x \), then the Gini-index of the income of poor families is given by

\[
G^* = 1 - \frac{2\mu}{F(x^*)\mu^*} \int_0^{x^*} q(x)f(x)dx.
\]

When the negative income tax is imposed, the Lorenz curve for the whole distribution shifts upward making the income distribution more equal. This can be shown as following:

If \( q_d(x) \) is the proportion of total disposable income of families having before tax income less than or equal to \( x \), then we have
which on using (5.1) simplifies to

\[ q_d(x) = q(x) + \frac{ax^*}{\mu_d} [F(x) - q(x)]. \tag{5.7} \]

Since the Lorenz curve is concave from above, \( F(x) > q(x) \) which proves that the Lorenz curve of the after tax income will be above the Lorenz curve for the before tax income. The Gini-index of the after tax income of the poor is given by

\[ \tilde{G}^* = 1 - \frac{2\mu_d}{F^2(x^*) \mu_d} \int_0^{x^*} q_d(x)f(x)dx \tag{5.8} \]

which on using (5.7) and (5.5) simplifies to

\[ \tilde{G}^* = \frac{(1-\alpha)\mu^* G^*}{\mu^*} \tag{5.9} \]

Substituting (5.9), (5.3) and (5.2) into (2.8), we obtain the poverty index after the negative income tax is imposed as

\[ \tilde{P}^* = \frac{(1-\alpha)}{\mu_d} F(x^*) [x^* - \mu^*(1-G^*)] \tag{5.10} \]

and therefore the percentage change in poverty index is given by

\[ \frac{\tilde{P}^* - \tilde{P}}{\tilde{P}} = -\frac{ax^*}{ax^* + (1-\alpha)\mu} \tag{5.11} \]

This equation expresses the percentage change in poverty index as the function of two parameters, viz, \( \frac{x^*}{\mu} \) and \( \frac{\alpha}{\mu} \). If for example, the "poverty level" is specified to be half of the mean income of the society, i.e. \( \frac{x^*}{\mu} = 0.5 \), then the marginal tax rate of about 18% will reduce the poverty index by 10%. The average tax rate for the whole society in this example will be about 9%. 

In the above plan the tax rate is equal to the subsidy rate which does not guarantee that aggregate income after tax is equal to aggregate income before tax. Accordingly, its effects are not purely redistributive. In order to keep total income constant, we need a different rate of tax to the rate of subsidy. Let us assume that \( \lambda \) is the rate of subsidy and \( a \) is the tax rate, the disposable income of a family with before tax income \( x \) is then given by

\[
d(x) = x + \lambda(x - x) \quad \text{if} \quad x < x^* \\
= x - a(x - x^*) \quad \text{if} \quad x > x^* 
\]

where \( a \) and \( \lambda \) satisfy the relation

\[
\frac{a}{\lambda} = \frac{P}{(1 - x^*) + P}, \quad (5.13)
\]

\( P \) is defined in (2.2). Hence \( \lambda = 1 \) which eliminates poverty, can be achieved with \( a < 1 \) only if \( x^* < \mu \) i.e. \( x < \mu \) is necessary if poverty is to be eliminated by inter-personal redistribution. Further, it can be shown that under this plan the before and after tax poverty indices are related as

\[
\tilde{P}^* = (1 - \lambda)\tilde{P}, \quad (5.14)
\]

and, therefore, \( \lambda \) is equal to the percentage reduction in poverty index due to this income transfer plan.

For Malaysia (see the next section) \( P = 0.0547, \mu = 61.64 \) and \( x = 25 \) then the ratio of the tax rate to subsidy rate as computed from (5.13) is 0.08427 which means that we need to have 8.4% tax rate in order to eliminate poverty. However, if we wish to reduce the poverty index by 50% only, then from equation (5.14), \( \lambda = 0.50 \) which gives \( a = 0.042 \). Thus the average tax rate of only 4.2% will reduce the poverty in Malaysia by as much as 50%.
6. A Numerical Illustration

A numerical illustration is provided in this section using Malaysian data obtained from the Post Enumeration Survey (PES). The survey was conducted in 1976 covering approximately 135,000 individuals or about 1.5% of the total population. The per capita household income is used to measure the extent of poverty in Malaysia. The income includes wages, salaries, business, property and interest income; remittances and transfers both in cash and kind.

The data were available in grouped form consisting of thirty-two income classes. The mid-point of each income class was taken as an approximation to the mean income for first fourteen income classes and for the remaining eighteen income classes, the mean income estimated by Anand [1] was used.

The 'poverty level' is defined to be twenty-five Malaysian dollars per month. This figure was used by Anand [1]. There are about 37% of the households whose per capita income falls below this 'poverty level'.

A household with per capita income more than $180 per month is considered to 'be' rich. This figure is arbitrary and there are about 5.6% of the households who are rich according to this definition of 'richness'.

Table 1 gives the computation of poverty indices within various groups of families classified according to their race. The poverty index

7/ For details see Anand [1].
8/ Anand [1] estimated the mean income in these income classes by fitting a Pareto distribution.
in the whole population is computed to be 0.055 which implies that only 5.52 of the total income is needed to be transferred from the non-poor to the poor in order to eliminate poverty in Malaysia. The poverty index among Malays is maximum and next comes Indians then others and Chines. 81.2% of the contribution to the total poverty is due to Malays, 10.8% Chines, 6.6% Indians and 1.4% to other races. The index of richness in the total population is 0.1585 which implies that 15.85% of the total income should be taken away from rich so that no family has income more than the level of richness. Although the index of richness is highest among other races, but their contribution to the total richness is only 13.9%. Chines contribute 474 to the total index of richness.

Table 2 gives the break-down of families according to rural and urban sectors. The contribution of rural sector to the total poverty is about 90% and to the total richness is only 32%.

The poverty indices for different states are presented in Table 3. Poor states, viz, Kelantan, Perlis, Kedeh and Trengganu have mean per capita income significantly lower than the national mean income. The poverty index as shown by column 7 is very high for these states. The richest state is Selangor which has population of 18.2% but it contributes only 8.2% to the total poverty and 48.3% to the total index of richness.

In Table 4 the whole population is disaggregated according to the household size. It is clear that the poverty index increases as the family size increases whereas the index of richness decreases with the family size. It is interesting to note that the mean income of poor does not very significantly with the household size but the proportion of poor increase
significantly when the household gets larger.

The break–dam of the population according to the age of the household head is provided in Table 5. The poverty index is highest and the index of richness lowest among the households with age of the household head exceeding 60 years. The younger households (age less than 30) have the least poverty. The proportion of poor among this group is only 7% compared to 36% for the whole Malaysian. The index of richness is also highest far this group.
### Table 1: Poverty Index by Races in Malaysia

<table>
<thead>
<tr>
<th>Race</th>
<th>Proportion of the populations</th>
<th>Mean Income</th>
<th>Mean Income of Poor</th>
<th>Proportion of Poor</th>
<th>Poverty Index P</th>
<th>% Contrib. of P to Total Poverty</th>
<th>Poverty Index P</th>
<th>Upper Bound of P</th>
<th>Elasticity of Poverty Index</th>
<th>Index of Richness</th>
<th>% Contrib. of each race to total richness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Malay</td>
<td>55.4</td>
<td>61.61</td>
<td>15.39</td>
<td>.3139</td>
<td>.1187</td>
<td>81.2</td>
<td>.1615</td>
<td>.1518</td>
<td>.2668</td>
<td>.0421</td>
<td>19.4</td>
</tr>
<tr>
<td>Chinese</td>
<td>32.0</td>
<td>85.39</td>
<td>17.29</td>
<td>.3173</td>
<td>.0133</td>
<td>10.8</td>
<td>.0201</td>
<td>.0225</td>
<td>.3152</td>
<td>.1700</td>
<td>47.5</td>
</tr>
<tr>
<td>Indians</td>
<td>11.7</td>
<td>78.21</td>
<td>17.36</td>
<td>.2480</td>
<td>.0243</td>
<td>6.6</td>
<td>.0343</td>
<td>.0624</td>
<td>.2929</td>
<td>.2642</td>
<td>19.2</td>
</tr>
<tr>
<td>Others</td>
<td>0.9</td>
<td>239.86</td>
<td>11.76</td>
<td>.4091</td>
<td>.0226</td>
<td>1.6</td>
<td>.0298</td>
<td>.0332</td>
<td>.2677</td>
<td>.6443</td>
<td>13.8</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>61.64</td>
<td>15.75</td>
<td>.3647</td>
<td>.0547</td>
<td>100.0</td>
<td>.0756</td>
<td>.0892</td>
<td>.2760</td>
<td>.1585</td>
<td>100.0</td>
</tr>
</tbody>
</table>

### Table 2: Poverty Index by Urban and Rural Sectors in Malaysia

<table>
<thead>
<tr>
<th>Sector</th>
<th>Proportion of the Populations</th>
<th>Mean Income</th>
<th>Mean Income of Poor</th>
<th>Proportion of Poor</th>
<th>Poverty Index P</th>
<th>% Contrib. of Poor to Total Poverty</th>
<th>Poverty Index P</th>
<th>Upper Bound of P</th>
<th>Elasticity of Poverty Index</th>
<th>Index of Richness</th>
<th>% Contrib. of each sector to total richness</th>
</tr>
</thead>
<tbody>
<tr>
<td>Urban</td>
<td>28.3</td>
<td>100.43</td>
<td>16.81</td>
<td>.1572</td>
<td>.0128</td>
<td>10.9</td>
<td>.0385</td>
<td>.0314</td>
<td>.3059</td>
<td>.2345</td>
<td>66.2</td>
</tr>
<tr>
<td>Rural</td>
<td>71.7</td>
<td>46.40</td>
<td>15.65</td>
<td>.4459</td>
<td>.0898</td>
<td>89.1</td>
<td>.1232</td>
<td>.1461</td>
<td>.2708</td>
<td>.0735</td>
<td>31.8</td>
</tr>
<tr>
<td>Total</td>
<td>100.0</td>
<td>61.70</td>
<td>15.79</td>
<td>.3641</td>
<td>.0543</td>
<td>100.0</td>
<td>.0752</td>
<td>.0886</td>
<td>.2773</td>
<td>.5585</td>
<td>100.0</td>
</tr>
<tr>
<td>STATE</td>
<td>1 Proportion of the Populations</td>
<td>2 Mean Income</td>
<td>3 Mean Income of Poor</td>
<td>4 Proportion of Poor</td>
<td>5 Poverty Index P</td>
<td>6 % Contr. of Pp, scare to Tot. Poverty.</td>
<td>7 Poverty Index P</td>
<td>8 Upper Bound of P</td>
<td>9 Elasticity of Poverty Index</td>
<td>10 Index of Richness</td>
<td>11 Count of Pp, scare to Tot. Richness</td>
</tr>
<tr>
<td>------------</td>
<td>---------------------------------</td>
<td>---------------</td>
<td>-----------------------</td>
<td>----------------------</td>
<td>------------------</td>
<td>----------------------------------------</td>
<td>------------------</td>
<td>---------------------</td>
<td>----------------------------------</td>
<td>----------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>1 Johore</td>
<td>13.4</td>
<td>58.00</td>
<td>16.29</td>
<td>0.3290</td>
<td>0.0694</td>
<td>11.5</td>
<td>0.0690</td>
<td>0.0116</td>
<td>0.0044</td>
<td>0.1109</td>
<td>8.8</td>
</tr>
<tr>
<td>2 Kelantan</td>
<td>11.3</td>
<td>44.00</td>
<td>15.56</td>
<td>0.4852</td>
<td>0.1039</td>
<td>15.5</td>
<td>0.1275</td>
<td>0.0686</td>
<td>0.0709</td>
<td>0.1107</td>
<td>5.7</td>
</tr>
<tr>
<td>3 Kedah</td>
<td>9.5</td>
<td>31.55</td>
<td>14.51</td>
<td>0.6519</td>
<td>0.2167</td>
<td>19.5</td>
<td>0.2901</td>
<td>0.3425</td>
<td>0.2530</td>
<td>0.0591</td>
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<td>0.0711</td>
<td>0.3051</td>
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<td>0.0615</td>
<td>4.8</td>
<td>0.0938</td>
<td>0.0661</td>
<td>0.2919</td>
<td>0.1121</td>
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<td>57.86</td>
<td>17.17</td>
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<td>0.0341</td>
<td>5.8</td>
<td>0.0443</td>
<td>0.0578</td>
<td>0.2904</td>
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<td>5.1</td>
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<tr>
<td>8 Pahang</td>
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<td>57.35</td>
<td>16.18</td>
<td>0.3650</td>
<td>0.0298</td>
<td>16.2</td>
<td>0.0732</td>
<td>0.0866</td>
<td>0.2814</td>
<td>0.1243</td>
<td>13.2</td>
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<tr>
<td>9 Perlis</td>
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<td>28.95</td>
<td>14.51</td>
<td>0.5568</td>
<td>0.2127</td>
<td>2.8</td>
<td>0.2876</td>
<td>0.3361</td>
<td>0.2604</td>
<td>0.0109</td>
<td>0.3</td>
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<td>95.32</td>
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<td>0.1900</td>
<td>0.0159</td>
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<td>0.0273</td>
<td>0.1866</td>
<td>0.3858</td>
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<td>0.1406</td>
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<td>0.2236</td>
<td>0.2565</td>
<td>0.1092</td>
<td>2.2</td>
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</table>

**TOTAL**    | 100.0                           | 61.70         | 18.79                 | 0.3641               | 0.0563           | 100.00                                 | 0.0752           | 0.0892               | 0.2775                           | 0.1588               | 100.0                           |
### Table 4: Poverty Index by Household Size in Malaysia

<table>
<thead>
<tr>
<th>Household Size</th>
<th>Proportion of Population</th>
<th>Mean Income</th>
<th>Mean Income of Poor</th>
<th>Proportion of Poor</th>
<th>Poverty Index P</th>
<th>% Contr. of Eq. Val. of Ind. Poverty</th>
<th>Poverty Index P</th>
<th>Upper Bound of P</th>
<th>Elasticity of Poverty Index w/ Inequality of Richness</th>
<th>% Contr. of Eq. Val. of Ind. Poverty of Richness</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 member</td>
<td>8.9</td>
<td>135.97</td>
<td>17.30</td>
<td>2.49</td>
<td>.0138</td>
<td>4.9</td>
<td>.0154</td>
<td>.0232</td>
<td>.2052</td>
<td>.2838</td>
</tr>
<tr>
<td>2-3 members</td>
<td>21.2</td>
<td>79.72</td>
<td>14.70</td>
<td>2.46</td>
<td>.0344</td>
<td>17.3</td>
<td>.0647</td>
<td>.0546</td>
<td>.2926</td>
<td>.2076</td>
</tr>
<tr>
<td>4-6 members</td>
<td>25.6</td>
<td>53.65</td>
<td>15.93</td>
<td>.3581</td>
<td>.0605</td>
<td>24.7</td>
<td>.0630</td>
<td>.0991</td>
<td>.2882</td>
<td>.1019</td>
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<tr>
<td>over 6</td>
<td>44.2</td>
<td>42.60</td>
<td>15.84</td>
<td>.4248</td>
<td>.0950</td>
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<td>.1284</td>
<td>.1552</td>
<td>.2602</td>
<td>.0752</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.0</td>
<td>61.64</td>
<td>15.75</td>
<td>.3647</td>
<td>.0567</td>
<td>100.0</td>
<td>.0756</td>
<td>.0892</td>
<td>.2760</td>
<td>.1585</td>
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### Table 5: Poverty Index by Documented Age Group in Malaysia

<table>
<thead>
<tr>
<th>Age</th>
<th>Proportion of Population</th>
<th>Mean Income</th>
<th>Mean Income of Poor</th>
<th>Proportion of Poor</th>
<th>Poverty Index P</th>
<th>% Contr. of Eq. Val. of Ind. Poverty</th>
<th>Poverty Index P</th>
<th>Upper Bound of P</th>
<th>Elasticity of Poverty Index w/ Inequality of Richness</th>
<th>% Contr. of Eq. Val. of Ind. Poverty of Richness</th>
</tr>
</thead>
<tbody>
<tr>
<td>under 30</td>
<td>16.8</td>
<td>86.34</td>
<td>15.06</td>
<td>.2775</td>
<td>.0315</td>
<td>13.7</td>
<td>.0451</td>
<td>.0511</td>
<td>.2212</td>
<td>.2061</td>
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<tr>
<td>30 - 49</td>
<td>17.9</td>
<td>56.14</td>
<td>15.83</td>
<td>.3941</td>
<td>.0644</td>
<td>51.4</td>
<td>.0886</td>
<td>.1052</td>
<td>.2736</td>
<td>.1492</td>
</tr>
<tr>
<td>50 - 59</td>
<td>19.0</td>
<td>59.92</td>
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<td>17.3</td>
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<td>.0845</td>
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<tr>
<td>over 60</td>
<td>16.3</td>
<td>54.23</td>
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<td>.1091</td>
<td>.2731</td>
<td>.1319</td>
</tr>
<tr>
<td>TOTAL</td>
<td>100.0</td>
<td>61.64</td>
<td>15.75</td>
<td>.3647</td>
<td>.0567</td>
<td>100.0</td>
<td>.0756</td>
<td>.0892</td>
<td>.2760</td>
<td>.1585</td>
</tr>
</tbody>
</table>
REFERENCES


