

Output, Income and Employment Multipliers in Malaysian Economy: Input-Output Approach

Professor Dr. HUSSAIN ALI BEKHET

E-mail: profhussain@uniten.edu.my / drbekhet1953@hotmail.com

Tel: 60-9-455-2020 ext. 2049

Abstract

This study attempts to investigate the success or failure development policies for Malaysia economy through the multipliers indices over the period 1983-2000. We used four input-output tables had published so far by Department Statistics of Malaysia (DSOM) for the period under study. The study employed the Leontief inverse model that is open with respect to household for simple multipliers of the output, income and employment; type I multipliers of the income and employment. While it used Leontief inverse model that is closed with respect to household for total multipliers of the output, income and employment; type II multipliers of the income and employment. New evidence is found in this study: first, there is still a high dependency on the primary sectors, such as Oil palm, Rubber primary products and Wood sectors. Second, output and income multipliers for Agriculture sector are still very weak even where some success has resulted from planning policies. Third, the main result of the investment policy was to transform Malaysia from a country of surplus labour to one with a shortage. Fourth, there is no consideration of efficiency or comparative cost in the selection of 'key' sectors by reference to multiplier indices.

Keywords: Input-output Model, Output Multipliers, Income Multipliers, Employment Multipliers, Leading Sector

1. Introduction:

Economists have long been interested in measuring the total impact upon output, income and employment resulting from a given change in demand or investment. To this end, the multiplier as developed by KEYNES is one of the most useful analytical techniques [MIERYK, 1967].

Since KEYNES dealt in broad aggregates, his income and employment multipliers were also highly aggregated. KEYNES pointed out that if a certain amount of income were injected into the economy, consumer spending would rise, and by an amount more than the injection of income. The proportion of added income spent by consumers became someone else's new income. The latter, in turn, spent some fraction of their additional income, and this procedure continued through several rounds of spending.

KEYNES noted that if one could measure the marginal propensity to consume, that is, the difference between two successive levels of consumer spending associated with two successive levels of income, the income multiplier could also be estimated. The approximate total addition to national income which would result from a given injection of new income would be the multiplier, times this income increment

The concept of an aggregate multiplier is a useful one, and it plays an important role in public policy decisions. Aggregate multipliers are useful analytical tools, but they do not show the details of how multiplier effects are worked out throughout the economy, and at times economists and businessmen are more interested in the details than in the overall impact

One of the major uses of input-output information, in the format of an input-output model, is to assess the effect on an economy of changes in elements that are exogenous to that economy. When the exogenous changes occur because of the action of only one impacting agent, and when the changes are expected to occur in the short-run, the term 'impact analysis' is usually employed. Whether using the input-output model for impact analysis or for forecasting, the usefulness of the resulting total output, $\underline{x}$, will depend on the accuracy of both the Leontief inverse, $(I-A)^{-1}$ and final demand, $\underline{f}$. Our concern in this paper is with the Leontief inverse matrix. The $\underline{f}$ vector incorporates the assumed or projected behavior of one or more final demand elements.

Several summary measures, derived from the elements of $(I-A)^{-1}$, are often employed in impact analysis. These are what are known as input-output multipliers.

The notion of multipliers rests on the difference between the initial effect of exogenous (final demand) changes and the total effects of that change. The total effect can be defined in either of two ways: First, as the direct and indirect effects (which mean that they would be found via elements in the Leontief inverse of a model that is open with respect to households). Second, as direct, indirect, and induced effects (which means that they would be found via elements of the Leontief inverse of a model that is closed with respect to households). Three of the most frequently used types of multipliers are those that estimate the effects of the exogenous changes on:

- (A) Output of the sectors in the economy.
- (B) Income earned by households because of the new output.
- (C) Employment that is expected to be generated because of the new outputs.

The multipliers that are found by using direct and indirect effects are also known as 'simple' multipliers. When direct, indirect effects are used, they are called 'total' multipliers. In this paper I shall examine these multipliers for the general input-output model of the national economy of Malaysia, for 1983, 1987, 1991 and 2000.

Discussion on multipliers in input-output models can be found in MIERNYK, [1967], MIERNYK et al, [1976], RICHARDSON, [1972], SCHAFFER, [1976], PLEETER [1980], BULMER-THOMAS, [1982], MILLER and BLAIR [1985], and HEWINGS [1985]. For more detail, see; inter alia, MIERNYK [1976], PIBBS and HOLSMAN [1981], HARRIGAN [1982], and KATZ et al [1982]; SZYRMER [1992]; GIM [1998]; SONIS et al. [2000]; LENZEN [2001]; DeMESNARD [2002]; Oosterhaven and Stelder [2002]; JUN [2004]; DIETZENBACHER [2005]; GIM [2005]; LIEW [2005]; Oosterhaven [2007].

The subsequent four sections of this paper are structured as follows. Section Two discusses the problem and objectives of the paper. Section Three considers data and mathematical techniques. Section Four discuss the interpretation of the empirical results. Section Five gives some policy implications. Section Six offers some conclusions on the results of these multiplier analyses for the Malaysia economy.

2. The Problem and Objectives:

During the past three decades, the Malaysian planners have implemented a series of planning horizon, ranging from short to long-term development plans. Subsequently, updated and adequate data would be required for monitoring the progress and performance towards achieving the planned targets.

The planners aim for the period 1998-2010 sets strategic directions for economic development to the year 2010. This policy has been formulated to ensure that the structural change role in national development is sustained and enhanced in the light of new and emerging challenges facing economic development.

The specific target of the planners was, however, to increase per capita income during the 1980-1990 and 1991-2000 periods, by an annual compound rate of growth of 3.6% and 13.3% respectively. This aim required the manipulation of wages, salaries and the promotion of services. The planners intended to undertake the construction of a number of services, such as education, hospital etc, and increase household income by increasing wages and salaries. This policy was designed to distinguish between income changes resulting from population growth and those which follow from rising per capita income. Therefore, the planners have aimed to maximize the output, income and employment level during the 1980-2000 periods. Also, it aimed to reduce the growth rate of unemployment, which was reduced from 6.8 in 1971-1980 to 4.3 in 1971-2002 (Ching, 2006).

The planners have shown the allocations and annual compound growth rate target at sector level for the period 1980-2000 by several Malaysian plans (see www.epu.jpm.my/). It would therefore be expected that the Transportation, Education, Industry, Health, Services and Agriculture sectors would have a high ranking in terms of output, income and employment multipliers.

Towards this end, the planners will focus on new approaches to increase productivity and competitiveness, deepen linkages with other sectors, venture into new frontier areas as well as conserve and utilize natural resources on a sustainable basis. The policy aims to set in place the enabling and supportive measures as well as a conducive environment to promote growth in the economy. The policies and strategies formulated will continue to emphasise productivity and market driven growth (Ministry of Agriculture and Agro-Based Industry, 2006).

An approach employed by policy makers to project, plan and make decision on national development programs is to use an input-output model. Input-Output analysis has become an increasingly popular means for analyzing economic structures and assisting local economic development decision making. Input-output models provide a variety of useful information. It is a descriptive tool which describes the existing structure of a economy; it provides information on individual economic sectors, the linkages between them and how they co-vary. It also shows the relative importance of individual sectors conditions. Input-Output analyses describe the economic transactions pertaining to the economic activity that occurred within specified reference periods.

In Malaysia, as in most natural resources developing countries, the availability of foreign exchange generated by the rapidly growing export of oil and gas, rubber and Palm oil has been of great importance to the process of economic development. The aim of Malaysia development policy has been, primarily, to invest in the commodities sectors. The rationale behind this policy was to build a solid base for the Malaysia economy, by using the natural resources revenues to support the establishment of large scale enterprises, which could produce intermediate products at competitive prices for the other industries in the economy; this would thus aid the integration of the national economy. Secondary aims were to assist in income redistribution, import substitution, export growth and agricultural modernization.

Unfortunately, such a policy of inter-sectoral imbalance between economic sectors has led to a poorly integrated economy in the short-run, causing a heavy dependence on imports. The presently existing weak forward and backward linkages between sectors are cited among the problems existing in the Malaysian economy (BEKHET, 2009; and SHUJA and et al., 2007).

In addition, the planners' policy towards the industrial sector regarding the adoption of advanced technology resulted in production below its potential maximum in the short-run. This is because a number of structural "bottlenecks" developed, such as an insufficiently trained labour force and a lack of managerial and technical skills, as well as a heavily bureaucratic and hierarchical structure of organization.

This paper aims to assess the success or failure of Malaysian economic policy with input-output analysis. A static input-output model is used. Unfortunately, dynamic input-output models must be ignored, as the necessary capital matrix is not available for the Malaysian economy. The period of study is 1983 to 2000, during which time four input-output tables were established.

It would be expected that in resources-rich developing economy, such that of Malaysia, substantial structural change will take place over time. In particular, one might expect marked changes in the technologies employed, especially the nature of inter-industry trading. Also, change in the level and mix of final demand for produced goods would be expected to occur. One would anticipate that the role of state economic planning would be to facilitate and direct such developments.

Input-output analysis is well suited to the analysis of the nature of economic development through changing demand and changing technology. Thus this paper uses input-output methods to explore the success of economic planning in Malaysia. A variety of input-output techniques and concepts are employed. All lead towards the conclusion that economic structural has occurred in Malaysia during the period of study. Also, there is evidence of increasing efficiency in the Malaysian economy through changing the ranking of the income, output and employment multipliers for the sectors.

3. Data and Mathematical Techniques:

Basically, the present study uses secondary data based on the four input-output tables compiled for the Malaysia economy so far. These tables were produced by the Department of Statistics. For analytical and comparable purposes, the original input-output tables consisting of different number of sectors are aggregated into 39 sectors based on International Standard Industrial Classification (ISIC). These sectors are shown in (Table 1).

Input-output multipliers are used related to output, income, and employment, as defined earlier in this paper. They are now well established as indicators of the importance of particular sectors and the interdependence of the industrial of the importance of particular sectors and the interdependence of the industrial structure. The following notation is used throughout this paper:

$\underline{h}$ is the household input coefficient vector.

$\underline{\underline{h}}$ is a diagonalised ($n \times n$) matrix of the household input coefficients.

$\underline{\underline{A}}$ is a square matrix of order $(n+1) \times (n+1)$. it has an added household row and column (i.e. the household is endogenous).

$(\underline{\underline{I}} - \underline{\underline{A}})^{-1}$ is the augmented Leontief inverse matrix, which is also of order $(n+1) \times (n+1)$.

$(\underline{\underline{I}} - \underline{\underline{A}})^{-1}_r$ is the reduced augmented Leontief inverse matrix, of order $(n \times n)$ order. In this matrix, r refers to the matrix being reduced, by having eliminated the household row and column.

$\underline{e}$ is the number of workers employed by the household sector. It is defined as the employment vector.

$\underline{w}$ is the employment output ratio vector (numbers of jobs per RM million of output). I will show later how define this ratio (subsection 3.3).

$\hat{\underline{X}}$ is a diagonalised matrix of the total outputs.

$\hat{\underline{w}}$ is a diagonalised ($n \times n$) matrix of the employment output ratio.

3.1 Output Multipliers

An output multiplier for sector j is defined as the total value of production in all sectors of the economy that is necessary in order to satisfy a RM's (Malaysian Currency, Ringgit (RM)).worth of final demand for sector j 's output [VIETH.1976; P.16]. However, in this section I shall describe several kinds of output multipliers.

3.1.1 Simple Output Multiplier

For the simple output multiplier, the total production is the direct and indirect output effect, obtained from a model in which households are exogenous. The initial output effect on the economy is defined to be simply the initial RM's worth of sector j output needed to satisfy the additional final demand. Then, formally, the output multiplier is the ratio of the direct and indirect effect to the initial effect alone. These output multipliers are different from those for the Keynesian system because we can generate a multiplier for each sector rather based solely on the effects of interindustry trading without household spending being involved.

I shall be using $\Delta \underline{f}$ and $\Delta \underline{x}$ to represent changes in the final demand and gross outputs, respectively. Here $\Delta \underline{f}$ indicates an additional RM's worth of final demand for the output of any sector of the Malaysian economy. The implications for all sectors in the economy of an additional RM's worth of final demand for any sector output are given by:

$$\Delta \underline{x} = (\underline{\underline{I}} - \underline{\underline{A}})^{-1} \Delta \underline{f} \quad (1)$$

The output multiplier for any sector (for example agriculture) is defined as the sum of elements in the agriculture column divided by one RM. The one RM in the denominator is the initial effect on the agriculture sector output of the new RM's worth of final demand for the agriculture sector's product. Mathematically, the vector of the simple output multiplier $\underline{m}$ is given by:

$$\underline{m} = \underline{i}' (\underline{\underline{I}} - \underline{\underline{A}})^{-1} \quad (2)$$

The results for the Malaysian economy are shown in Table 2.

It will be noted that the results are very identical to the linkages, where they are discussed as linkages analysis. However, these figures may also be interpreted as multiplier, as will be discussed in section 4.

3.1.2 Total Output Multipliers

If we consider the input coefficient matrix, $\underline{A}$, closed with respect to households (i.e. households are endogenous), then we capture in the model the additional induced effects of household income generation through payments for labour services and associated consumer expenditures on goods produced by the various sector. This is akin to the Keynesian multiplier, discussed above. We call this coefficient matrix the augmented coefficient matrix $\overline{A}$, which was defined earlier in this section. Also, I defined the augmented Leontief inverse matrix as $(\underline{I}-\overline{A})^{-1}$.

Clearly, the elements in $(\underline{I}-\overline{A})^{-1}$ also relate final demand changes to sectoral outputs, only now these are in a model with households endogenous, and hence the effects tend to be larger. We assess the impact of a new RM's worth of final demand for any sector's output with:

$$\Delta \underline{x} = (\underline{I}-\overline{A})^{-1} \Delta \underline{f} \quad (3)$$

In the general, the total output multiplier vector, $\overline{\underline{m}}$, is given by:

$$\overline{\underline{m}} = \underline{i}' (\underline{I}-\overline{A})^{-1} \quad (4)$$

However, if we are interested in the total output multipliers from the original n sectors, by ignoring the household row and column we can calculate the reduced total output multipliers. This can be done by using the $(\underline{I}-\overline{A})_r^{-1}$ matrix, which was defined earlier. In general, the reduced total output multiplier vector, $\overline{\underline{m}}_r$, is given by summing the reduced augmented Leontief inverse matrix $(\underline{I}-\overline{A})_r^{-1}$:

$$\overline{\underline{m}}_r = \underline{i}' (\underline{I}-\overline{A})_r^{-1} \quad (5)$$

I have applied equations (4) to the four Malaysian input-output tables between 1983 and 2000. The results are shown in Table 2.

Not only do industries make purchases from other sectors, they also make purchases from the labour force. The next task is to calculate the income multipliers associated with these purchases.

3.2 Income Multiplier

As the name implies, income multipliers attempt to translate, in one way or another, the impacts of final demand spending changes, into changes income received by household (labour supply). There are basically two ways in which this can be done. One straightforward approach is simple to convert each element in a particular column of $(\underline{I}-\overline{A})^{-1}$, which measures the value of direct plus indirect output effects, into RM's worth of household income, via household input coefficients [MILLER and BLAIR, 1985; P.105]. These are the coefficients that make up the $(n+1)$ th sector (household) row, $\underline{h}'$. This is used in closing the model with respect to household, and indicates household income received per RM's worth of sectoral output. Thus the direct plus indirect effects for sector j would be in terms of (one) RM's worth of new household income. The initial effect is in terms of (one) RM's worth of final demand, and hence output for sector. Unlike output multipliers, then, they do not blow up or multiply one (initial) estimate of output to another (larger) estimate of output. Rather, they translate an initial output estimate (which comes from an initial final demand change) into an expanded (direct plus indirect) estimate of the value of resulting employment (household income).

3.2.1 Simple Household Income Multiplier

In general, we will be using $\underline{n}$ for the simple household income multiplier for sector j . The "simple" refers to the fact that these multipliers are found using elements in the $(\underline{I}-\overline{A})^{-1}$ matrix with the households exogenous. We can represent this mathematically, as:

$$\underline{n} = \underline{h}' (\underline{I}-\overline{A})^{-1} \quad (6)$$

Continuing with the tables for Malaysian economy, we have the results shown in Table 3.

These figures illustrate the effect of an additional RM of final demand for the output of any sector, when all of direct and indirect effects are converted into RM estimate of income. This would generate the total effect by that amount of new household income, this total, which would be earned by employees in that sector.

3.2.2 Total Household Income Multiplier

If the augmented matrix $(\underline{I}-\overline{A})^{-1}$ is used rather than $(\underline{I}-\underline{A})^{-1}$, total (direct, indirect and induced) income effects, or total household income, multipliers are obtained. As before, using the overbar to denote the multiplier derived from $\overline{A}$, a similar equation to (6) is obtained, namely:

$$\overline{\underline{n}} = \underline{h}' (\underline{I}-\overline{A})^{-1} \quad (7)$$

The results of the Malaysian economy are shown in table 3.

We recall the interpretation of any element in $(\underline{I}-\overline{A})^{-1}$ as measuring the total effect on sector i output of one RM's worth of new demand for sector j output. Thus, the household input coefficient is the total effect on the output of the household sector, which is the total value of labour services needed when there is one RM's worth of new final demand for goods of sector j . This is precisely what we mean by the total household income multiplier.

If we are only interested in household income generating effects originating in the n original sectors, we would calculate a reduced total household income multiplier, $\bar{n}_r$, by ignoring the last row and column in equation (7).

3.2.3 Type I Income Multiplier

There is a second kind of simple income multiplier, the type I income multiplier, for any sector j . This has the simple household income multiplier as in equation (6), as a numerator, and uses as a denominator not the initial RM's worth of output, but rather its initial labour income effect, $\underline{h}$. We can use $\underline{y}$ to represent this type of income multiplier for sector j . Then, following BRADLEY and JAMES [1969; p.310] we can write:

$$\underline{y} = \underline{h}'(\underline{I} - \underline{A})^{-1} \hat{\underline{h}}^{-1} \quad (8)$$

For our input-output tables for the Malaysian economy, the results are shown in table 4 for 1983, 1987, 1991 and 2000 respectively. These multipliers represent the ratio of the direct plus indirect income effects to the direct income effect.

3.2.4 Type II Income Multiplier

This multiplier has the total household income multiplier as in equation (7), as a numerator, and uses as a denominator the initial labour income effect, $\underline{h}$ [MILLER and BLAIR 1985; P.108]. As usual, using the overbar to denote a measure that is calculated from $(\underline{I} - \underline{A})^{-1}$ matrix, a similar equation to (8) is obtained, namely:

$$\bar{y} = \underline{h}'(\underline{I} - \underline{A})^{-1} \hat{\underline{h}}^{-1} \quad (9)$$

The parallel between this measure and the type I effect in equation (8) is the same as that between the total $\bar{n}$ and simple $\underline{n}$ household income multiplier is equations (7) and (6) respectively. The numerator for $\underline{y}$ is $\underline{n}$ from equation (6), and the numerator for $\bar{y}$ is $\bar{n}$ from equation (7). The results of this multiplier, for the Malaysian economy, for the 1983, 1987, 1991 and 2000 tables are shown in Table 4.

These multipliers show by how much the initial income effects (household input coefficients) are blown up, or multiplied. This occurs when direct, indirect and induced effects (due to household spending because of increased household income) are taken into account, in which household are an endogenous sector.

3.2.5 Relationships between Income Multipliers

To the extent that the results of an input-output analysis in which households remain exogenous tend to underestimate total effects, type II multipliers may be more useful than simple, or type I, multipliers in estimating potential impacts. However, if one is primarily interested in ranking or ordering the sectors, for example, which sector has the largest multiplier, which has the next largest, and so on, then simple or type I multipliers are just as useful as total or type II income multipliers. This is because the ratio of total to simple household multipliers or type II to type I income multipliers can be shown to be a constant across all sectors [MILLER and BLAIR, 1985; P.105].

$$\bar{y}_i / y_i = \bar{n}_i / n_i \quad (10)$$

The results for Malaysian economy for this ratio are 1.065, 1.068, 1.066 and 1.153 for the 1983, 1987, 1991 and 2000 tables respectively.

Moreover, the constant ratio can be easily found without any need for $(\underline{I} - \underline{A})^{-1}$ matrix. This represents a computational advantage [MILLER and BLAIR, 1985; P.109].

The above is a brief discussion of the relationship between income multipliers. For more detailed discussions see especially SANDOVAL [1967], BRADLEY [1969], KATZ [1980], and MILLER and BLAIR [1985].

3.3 Employment Multiplier

If we assume that the levels of employment in an industry are closely related to output, such that the employment/output ratio can be defined for all levels of output, then the entries in the input-output system can be converted to employment terms to yield employment multipliers [GEOFFREY, 1985; P.36]. This means, if it is possible to estimate relationships between the value of the output of a sector and employment in that sector (in physical, not monetary, terms), then one can calculate employment multipliers, rather than income multipliers for each sector. So, here we are used the employment output ratio (numbers of jobs per RM million of output), $\underline{w}$. Then, mathematically, $\underline{w}$ is:

$$\underline{w} = \underline{e} \hat{\underline{x}}^{-1} \quad (11)$$

$\underline{w}$ represents the RM value of labour inputs to each of the n sector per RM's worth of sectoral output. It represents the payments per employee. That is, using the physical input coefficients, in $\underline{w}$ makes explicit the differing wage rates in different sectors. We will only calculate the employment multipliers for 1991 and 2000 because the employees for that years unavailable.

3.3.1 Simple and Total Employment Multipliers

These measures of employment effects (or household employment multipliers) are parallel to the income effect and household income multipliers described in the previous section. The major difference is that the physical labour input coefficient vector, $\underline{w}$, is used instead of the monetary labour input coefficient, $\underline{h}$. That is, the elements in $\underline{w}$ are

used in place of the elements in $\underline{h}$. Using $\underline{l}$ for the simple employment effect or simple household employment multiplier for sector j , the measure analogous to $\underline{n}$ in equation (6) is:

$$\underline{l} = \underline{w}'(\underline{I}-\underline{A})^{-1} \quad (12)$$

I have applied this equation to the Malaysian economy for the 1983, 1987, 1991 and 2000 tables. These results are shown in table 5.

These multipliers would represent the number of new jobs created expressed as total employment for every new employee to meet increased final demand of new output.

If the augmented Leontief inverse matrix, $(\underline{I}-\overline{\underline{A}})^{-1}$ is used instead of $(\underline{I}-\underline{A})^{-1}$ then we would have total employment effects or total household employment multiplier. This is analogous to $\overline{\underline{n}}$ in equation (7) with:

$$\overline{\underline{l}} = \underline{w}'(\underline{I}-\overline{\underline{A}})^{-1} \quad (13)$$

The total employment multipliers for the Malaysian economy are shown in table 5.

If we are interested only in the total employment effect on the original n sectors, not including the household sector, we would calculate a reduced total employment effect $\overline{\underline{l}}_r$ multiplier. This means, we are omitting that last element in the j th column of $(\underline{I}-\overline{\underline{A}})^{-1}$ from the summation, i.e.:

$$\overline{\underline{l}}_r = \underline{w}'(\underline{I}-\overline{\underline{A}})^{-1}_r \quad (14)$$

3.3.2 Type I and type II Employment Multiplier

Type I and type II employment multipliers follow from the same argument as was presented for type I and income type II income multipliers, [RICHARDSON, 1972; P.35]. One may wish to relate the simple or total employment effect to an initial change in employment, not final demand (and output) in monetary terms. The type I employment multiplier uses $\underline{l}$ as a numerator and $\underline{w}$ (not RM1) as the denomination. Mathematically, the vector of the employment multiplier $\underline{t}$ is given by;

$$\underline{t} = \underline{w}'(\underline{I}-\underline{A})^{-1} \hat{\underline{w}}^{-1} \quad (15)$$

The results for the Malaysian economy are shown in table 6.

The meaning of these is that for each new job created in any sector, for example Oils and Fats product, there is a total of 12.646 and 16.245 jobs created in all sectors throughout the economy in 1991 and 2000 respectively.

When using $(\underline{I}-\overline{\underline{A}})^{-1}$ rather than $(\underline{I}-\underline{A})^{-1}$ it allows us to measure the type II employment multiplier. Using $\overline{\underline{t}}$ for the vector of this multiplier which is parallel to the type II income multipliers, [MILLER and BLAIR 1985; PP.112-113]. Then, we have:

$$\overline{\underline{t}} = \underline{w}'(\underline{I}-\overline{\underline{A}})^{-1} \hat{\underline{w}}^{-1} \quad (16)$$

The results obtained by this equation for the Malaysian economy are shown in Table 6.

The high values of sectors Oils & Fats product, Processed Rubber & Rubber product, Animal Feeds product, Industrial Chemicals and Forestry & Logging product is a result of pre-1990 planning policy. These sectors were the only real area of growth of employment opportunity. The other sectors were characterised by high unemployment.

3.3.3 Relationships between Employment Multipliers

The purpose of this section is to consider the relationship between type I and II employment multipliers. It is not possible to establish a constant relationship between type II and type I employment multipliers, as was the case for income multipliers, as was explained in the previous section. This is derived in MILLER and BLAIR [1985, P.145]. For more details on employment multipliers see BRADLEY and GANDER [1969], KATZ [1980], MILLER and BLAIR [1985] AND SANDOVAL [1967].

4. Interpretation of the Empirical Results:

If we assume that planners try to determine in which sector of the economy to spend one additional unit, a comparison of output multipliers would show where this spending would have the greatest impact on output or employment generated throughout the economy. Note that when maximum total output effects are the exclusive goal of planner's spending, it would always be rational to spend all the money in the sector whose output, income and employment multiplier is the largest.

Tables 2-6 show the ranking of the sectors of the Malaysian economy in terms of the ranking of each sector's multipliers. Therefore, a sector with several elements in the high ranking would be said to be a key sector, in terms of the definition in the first paragraph of this section.

4.1 Output Multipliers

For Malaysian Economy, the largest simple and total output multipliers for 1983 and 1987 are associated with Oils and fats product, Foods Production other, Livestock breeding, Furniture & Fixtures, Processed Rubber & Rubber product, and Hotel & Restaurants sectors. For 1991 and 2000 Tables are associated with Oils and Fats product,

Livestock breeding, Petroleum and Coal product, Foods production, Wooden products, and Industrial Chemicals (see Table 2).

Therefore, planners of the Malaysian economy should theoretically have spent all funds available for investment in these sectors at that time, because this spending would have had the largest impact on the total RM value of output generated throughout the economy. Of course, there would be other reasons for using some of the expenditure on the output of the other sectors. These reasons could be taking into account strategic factors, equity, capacity constraints for production, and so on.

Note also that multipliers of this sort may overstate the effect on the economy in the above illustration. If some sectors are operating at or near full capacity, then some of needed new inputs would have to be imported into the economy, or outputs from some sectors would be shifted from exports and kept in the economy for use as inputs.

4.2 Household Income Multipliers

With household income multipliers, one has some choice regarding what should logically be termed the initial effect of new final demand. With output multipliers, it was fairly clear that the initial effect of RM's worth of final demand for sector j output is that sector j production must increase by one RM (and eventually, of course by more than one RM). With income effects, the same RM's worth of new demand for sector j becomes, initially the same RM's worth of new output by sector j . This is what we considered to be the initial effect in developing the household income multipliers, above. However, the initial RM's worth of new output from sector j means an initial additional income payment of h_j to workers in sectors i (see Section Three for definition of h_j). Hence h_j could be viewed as the initial income effect of the new demand for sector j output.

From the input-output table for the Malaysian economy in 1983, 1987, and 1991 using the simple and total household income multipliers, it emerges that expenditures had the greatest effect in generating new household income when they were spent on the output of the Education, Health, Other Services, Banks and Financial & Insurance, Rubber primary products, Wholesale & Retail Trade, and Forestry & Logging products sectors. However, in 2000 the greatest effect in generating new household income came when spending was on the same sectors above with Building & Construction, and Wooden Products instead of Rubber primary products, and Forestry & Logging products sectors.

If we examine the type I and type II income multipliers for 1983, 1987, and 1991, it emerges that expenditures had the greatest effect in generating new household income when spent on the Oils & Fats products, Petroleum & Coal product, Animal Feeds product, Processed Rubber & Rubber Product, Foods Production other, Wooden products, and Real estate & ownership dwellings. However, in 2000 the greatest effect in generating new household income came when expenditures were applied to the same sectors as in 1983, plus Livestock breeding and Industrial Chemicals instead of Animals Feeds product and Processed Rubber & Rubber product sectors.

4.3 Employment Multipliers

The simple and total household employment multipliers for the Malaysian economy appear to be very small. But that is simple because they represent jobs created per RM of new sectoral output (which, as usual, arise because of an additional RM's worth of final demand for the sector). The result would be substantially higher in the Rubber primary products, Agriculture products, Rubber primary products, Furniture & Fixtures, oil Palm primary products, Hotel & Restaurant, Education and Processed Rubber & Rubber products sectors, being for the 1983, 1987, 1991 and 2000 tables respectively (see Table 5).

The meaning of the results of the type I and type II employment multipliers, as shown in Table 6, is that for each new job created in any sector, for example Oils and Fats, there was a total of 13.419 jobs created in all sectors throughout the economy in 1991, and 17.897 jobs in 2000 respectively (Table 6). If we examine the type I and II employment multipliers, then the sectors that would have generated the highest job multipliers in all sectors throughout the economy in the 1980-2000 period were Oils & Fats, Animal Feeds, Processed Rubber, Industrial Chemicals, Motor Vehicle manufacturing and Food Production. But if we examine the Simple and Total employment multipliers, then these sectors were

However, the question is what the policy implications of these results are. This could be discussed in the next section.

5. Policy Implications

The theoretical basis and objectives of Malaysian planning since 1970 have been discussed in (Section 2) and more details in (CHING, 2006). This policy emphasised the provision of work opportunities and the raising of the standard of living, through increasing real national income and per capita income.

The results have shown in Tables 2-6 and discussed in the previous section show how far this policy has been achieved. The results show that although some progress has been made, it falls far short of what the planners desired.

The output and income multipliers for the commodities sectors still remain weak. The employment multipliers are still high ranking for the Rubber primary products, Agriculture products, Furniture & Fixtures, Processed Rubber, Hotel & Restaurant, and Education sectors, which is a reflection that these were considered as key sectors for the

planner's policy to maximize the employment level during the period under study. But if we examine the type I and II employment multipliers, then these sectors were Oils & Fats, Processed Rubber, Animal Feeds, Industrial Chemical and Food Production

But in general the impact of spending on the Rubber product, Furniture & Fixtures, Hotel & Restaurant, and Education sectors was higher than that of spending on the rest of the economy. These results give us the same evidence, as found in the linkages analysis (SHUJA, et al., 2007, and BEKHET, 2010). That is, there is still a high dependency on the primary sectors. Also, output and income multipliers for the Agriculture sector are still very weak, even where some success has resulted from planning policies. But the main result of the investment policy was to transform Malaysia from a country of surplus labour to one with a shortage. Malaysia attracted an immigrant labour force which is estimated the ratio of foreign workers to labour force worsened from 1:10 in 1995 to 1:8 in 1997 and improved to 1:13 in 2000 [Eight Malaysia Plan, 2003].

In addition, the declining rate of growth in agriculture and an increasing rate in the Construction, Services, Wholesale and Retail Trade, and Transportation and Communication sectors was the most profound factor in increasing the emigration of the labour force from the Agricultural sector to these other sectors. This is because wages in these sectors were higher than in the Agriculture sector.

Finally, there is no consideration of efficiency or comparative cost in the selection of 'key' sectors by reference to multiplier indices. Although it is not a simple matter to determine where Malaysia comparative advantage lies, international trade theory can be used to suggest that LDC, in particular Malaysia, have a comparative advantage relative to DCs in labour-intensive manufactured exports. If we define 'labour-intensive' to mean the direct and indirect labour requirements per unit of output, such an activity will substitute labour for capital not only directly, but also indirectly by making little use of intermediate inputs, or importing rather than purchasing them locally; such a sector will therefore have low output multipliers and yet it is a suitable candidate for promotion [RIEDEL, 1975; 1976]. Agriculture is of course the prime example of such sector in Malaysia.

The absence of consideration of efficiency is particularly serious when we consider that much of the potential stimulus provided by expansion of a 'key' sector is translated into growth through import substitution. Multiplier analysis does not permit one to distinguish between the cases where the stimulus is sufficient or insufficient to justify the establishment of a supplying industry. In the first case, the policy should ensure that the stimulus is translated into growth, while in the second it should only do so if the protection/subsidy needed to make the activity competitive is justified in terms of some other criteria (e.g. infant industry arguments).

Multiplier analysis measures which the inducement which is offered to a sector or a group of sectors if final demand changes at the margin; it can therefore be used to see if policy is consistent with the ranking of sectors; to isolate 'enclave' sector and to help promote policies for the integration of the enclave with the national economy; or to establish a changes in sectoral interdependence over time. Furthermore, because the planners aimed to maximize the output, income and standards of living level, then they should take the sectors with high output and income multipliers. Also, they should take the sectors with high employment multipliers. These sectors are discussed in the previous section and listed in tables 2-6, where they are identified as having high ranking multipliers.

However, I feel this sort of analysis needs to consider a more fundamental set of objective than multipliers analysis. Industrialisation is not usually considered as an objective in itself, but as indication for the rise in the final demand, especially exports, which is supposed to accompany it. If, however, we consider final demand as our objective, then each investment needs to be evaluated in terms of its sectoral impact. This can be achieved by reference to triangularisation techniques, using input-output methods would be introduced in next paper.

6. Conclusions

As previously discussed, output, income and employment multipliers were calculated using simple and total multipliers. These results are presented in table 2, 3, and 5. Also, type I and type II multipliers for income and employment were calculated, and these results are shown in tables 4 and 6. The difference between simple and total multipliers is that the simple multiplier is calculated with households exogenous, while the total multiplier uses households as endogenous.

The immense amount of information provided by detailed output, income and employment multipliers is valuable for those national planners who need to know in which industries output, income and employment changes will occur. The usefulness of these detailed multipliers for policy analysis and planning is evident. Knowledge of the industry in which the output changes will occur can also be used, by transportation and communication planners, to determine changes in transportation network equipment required to meet the shifts in industries production; by investment planners to designate industries where capital replacement or expansion is needed; by energy planners to determine the impact that production, transportation and investment changes will have on energy demand, and by various others types of planners.

If some other kind of multiplier relationship were desired, such as an energy or investment multiplier, the same basic type of adjustment would be required. In the case of the investment relationship, the well known accelerator principle become more significant than of output, income and employment specified here.

In this paper, I have explored one of the input-output techniques to measure the success of economic development in Malaysia. In the next paper the technique of triangularisation input-output tables will be examined.

References

- BEKHET, H.A., and Abdullah, A. (2010). Energy Use in Agriculture Sector: Input-Output Analysis, *International Business research*, Vol.3 No.3. pp.
- BEKHET, H.A. (2010). Ranking sectors changes of the Malaysian Economy: Input-output Approach, *International Business research*, Vol.3 No.1, pp.107-130.
- BEKHET, H.A. (2009). Decomposition of Malaysian Production Structure: Input-Output Approach, *International Business Research*, Vol.2, No.4, pp.129-139.
- BEKHET, H.A.(2009). "Assessing Economic Connectedness Degree of the Malaysian Economy: Input-Output Model Approach," *International Journal of Economics and Finance*, Vol.1, No. 2, pp.134-143.
- BEKHET, H.A. (2009). *Mathematical Models and Assessing the Success of the Development Policies for Malaysian Economy*, Professorial lecture series, PLS3, Universiti Tenaga Nasional (UNITEN), Malaysia.
- BILLINGS, R.B. (1969). "The mathematical Identity of the Multipliers Derived from the Economic Base Model and the Input-Output Model," *Journal of regional Science*, Vol.9, pp.471-473.
- BRADLEY, I., and GANDER, J. (1969). "Input-Output Multipliers: Some Theoretical Comments," *Journal of Regional Science*, Vol.9, No.2, pp.309-317.
- BULMER-THOMAS, V. (1982). *Input-Output Analysis in Development Countries: Sources and Methods*, John Wiley, London.
- CHING, P.W. (2006). *The Development of Malaysia Economy*, Sixth Edition, Pearson-Prentice Hall, Malaysia.
- DEMESNARD, L. (2002). "Note about the concept of net multipliers," *Journal of Regional Science*, Vol. 42, pp. 545-548.
- Department of Statistics, Malaysia, (1988), *Malaysia Input-Output Table 1983*.
- Department of Statistics, Malaysia, (1994), *Malaysia Input-Output Table 1987*.
- Department of Statistics, Malaysia, (2002), *Malaysia Input-Output Table 1991*.
- Department of Statistics, Malaysia, (2005), *Malaysia Input-Output Table 2000*.
- DIETZENBACHER, E. (2005). More on multipliers, *Journal of Regional Science*, Vol. 45, pp. 421-426.
- GIM HU, K.K. (1998). The general relation between two different notions of direct and indirect input requirements, *Journal of Macroeconomic*, Vol.20, PP. 199-208.
- GIM HU, K.K. (2005). "The decomposition by factors in direct and indirect requirements: with applications to estimating the pollution generation," *Korean Economic Review*, Vol. 21, pp. 309-325.
- HARRIGAN, F.J. (1982). The estimation of input-output type output multipliers when no input-output model exists: a comment, *Journal of Regional Science*, Vol.22, pp.375-381.
- HEWINGS, G. (1985). *Regional input-output analysis*, Beverly Hills: Sage Publications.
- JENSEN, R.C. and HEWINGS, G.J.D. [1985], "Shortcut "input-output" multipliers: the resurrection problem (a reply)," *Environment and Planning A*, Vol.17, No.11, pp.1551-1552.
- JENSEN, R.C. and HEWINGS, G.J.D.(1985). Shortcut "Input-Output" Multipliers: a requiem, *Environment and Planning A*, Vol.17, No.6, pp.747-759.
- JENSEN, R.C. and WEST, G.R. (1980). The Effects of Relative Coefficient Size on Input-Output Multipliers, *Environment and Planning A*, Vol.12, No.6, pp.659-670.
- JEONG, K.J. (1984), "The relation between two different notions of direct and indirect input requirements," *Journal of Macroeconomic*, Vol. 6, pp. 473-476.
- JUN, M-J. (2004). A metropolitan Input-Output Model: Multisectoral and Multispatial relations of production, income formation, and consumption, *The Annals of Regional Science*, Vol. 38, No. 1, pp.131-147.
- KATZ, J.L. (1980). The Relationship between Type I and Type II Income Multipliers in an Input-Output Model, *International Regional Science Review*, Vol. 5, No. 1, pp.51-56.
- KATZ J.L. and BURFORD, R.L. (1981). "A comparison of estimators of output multipliers from incomplete input-output data," *The Annals of Regional Science*, Vol.15, No.2, pp.39-54.
- KATZ J.L. and BURFORD, R.L.(1982). "The estimation of input-output type output multipliers when no input-output model exists: a reply," *Journal of Regional Science*, Vol.22, pp.383-387.
- KATZ J.L. and BURFORD, R.L.(1985). Shortcut formulas for output, income and employment multipliers, *The Annals of Regional Science*, Vol.19, No.2, pp.61-76.
- LENZEN, M. (2001). A generalized input-output multiplier calculus for Australia, *Economic System Research*," Vol. 13, pp. 65-92.

- LIEW, C.J. (2005). "Dynamic variable input-output (VIO) model and price-sensitive dynamic multipliers, *Annals of regional Science*, Vol. 39, PP. 607-627.
- MIERNYK, W.H.(1967). *The Elements of input-Output Analysis*, Random House, New York.
- MIERNYK, W.H.(1976). "Comments on recent developments in regional input-output analysis," *International Regional Science Review*, Vol.1, pp.47-55.
- MIERNYK, W.H., et al(1967). *Impact of the Space Program on a Local Economy: An Input-Output Analysis*, McClain, Morgantown, West Virginia.
- MILLER, R.E. and BLAIR, P.D.(1985). *Input-output Analysis: Foundations and Extensions*, Prentice-Hall, New Jersey.
- OOSTERHAVEN, J. (2007). "The net multiplier is a new key sector indicator: reply to de Mesnard's comment," *Annals of Regional Science*, Vol. 41, pp. 273-283.
- OOSTERHAVEN, J., and STELDER, D. (2002). "Net multipliers avoid exaggerating impacts: with a bi-regional illustration for the Dutch transportation sector," *Journal of Regional Science*, Vol. 42, PP533-543.
- PIBBS, P.J., and HOLSMAN, A.J.(1982). "Estimating Input-Output Multipliers: A New Hybrid Approach," *Environment and Planning*, Vol.14, pp.335-342.
- PIBBS, P.J., and HOLSMAN, J.H.(1981). "An evaluation of the Burford Katz short-cut technique for deriving input-output multipliers," *Annals of Regional Science*, Vol.15, pp.11-19.
- PIGOZZI, B.W., and HINOJOSA, R.C. (1969). "Regional Input-Output Inverse Coefficient Adjusted from National Tables," *Growth and Change*, Vol.16, pp.8-12.
- PLEETER, S. [1980]. *Economic Impact Analysis: Methodology and Applications*, Martinus Nijhoff, Amsterdam.
- RICHARDSON, H.W. (1985). "Input-Output and economic base multipliers: looking backward and forward," *Journal of Regional Science*, Vol.25, pp.607-661.
- RICHARDSON, H.W.(1972). *Input-Output and Regional Economics*, Wiley, New York.
- SANDOVAL, A.D. (1967). "Constant Relationship between Input-Output Multipliers," *Review of Economics and Statistics*, Vol.49, No.4, pp.599-600.
- SCHAFFER, W.A. (1976). *On the Use of input-Output Models for regional Planning*, Martinus Nijhoff, Amsterdam.
- SHUJA, N.; WAH, Y.; and LAZIM, M.A. (2007). "Identify the Key Sector of Malaysian Economy: an Input-Output Approach," *Proceeding of the 9th Islamic Countries conference of statistical science*, 12-14 Dec, Shah Alam, Malaysia, 1340-1354.
- SONIS, M.; HEWINGS, G.J.D.; GUO, J. (2000). "A new image of classical key sector analysis: minimum information decomposition of the Leontief inverse," *Economic System Research*, Vol. 12, PP. 401-423.
- SZYRMER, J.M. (1992). "Input-Output Coefficients and Multipliers from a Total Flow Perspective," *Environmental and Planning A*, Vol. 24, pp. 921-937.

Table 1. Aggregation of sectors:

No.	Sectors Names	Input-Output Tables	
		1991 & 2000	1983 & 1987
1	Agriculture products other	1, 4, 5	1
2	Rubber primary products	2	2
3	Oil palm primary products	3	3
4	Livestock breeding, etc	6	4
5	Forestry, logging product	7	5
6	Fishing, etc	8	6
7	Crude oil, Gas, Mining, Quarrying Product	9, 10, 11	7
8	Foods Production other	12-15, 17-21	8-9, 11-13
9	Oils and Fats product	16	10
10	Animal Feeds product	22	14
11	Beverages & Tobacco product	23-24, 25	15-16
12	Textile Products	26, 27, 28	17
13	Wearing Apparel	29, 30, 31	18
14	Wooden Products	32, 33	19
15	Furniture & Fixtures	34	20
16	Paper & Printing Products	35, 36	21
17	Industrial Chemicals	37	22
18	Paints, Lacquers & Other Chemical Product	38-41	23-24
19	Petroleum, Coal Product	42	25
20	Processed Rubber & Rubber Product	43-44	26-27
21	Plastic Products	45	28
22	China, Glass, Clay, cement & Other Non-met Mineral Products	46-49	29-31
23	Basic Metal & Other Metal Product	50-54	32-33
24	Non-Electricity and Electricity Machinery	55-59	34-35
25	Motor Vehicle Manufacturing	61	36
26	Other Transport Equipment	60, 62, 63	37
27	Other Manufacturing Products	64-65	38
28	Electricity & Gas	66	39
29	Water works and supply	67	40
30	Building & Construction	68	41
31	Wholesale & Retail Trade	69	42
32	Hotel & Restaurants	70	43
33	Transport	71	44
34	Communication	72	45
35	Banks, Financial & Insurance	73-75	46-47
36	Real estate & Ownership dwellings	76-77	48
37	Education	79-80	50, 56
38	Health	81-82	51, 57
39	Other Services	78, 83-94	49, 52-55, 58-60

Source: Malaysian Input-Output Tables for 1983, 1987, 1991 and 2000.

Table 2. Simple and Total Output Multipliers.

Sector	Simple Output Multipliers, m .								Total Output Multipliers, $\bar{m}$.							
	1983		1987		1991		2000		1983		1987		1991		2000	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
1	1.161	35	1.221	32	1.268	33	1.287	29	1.232	38	1.294	33	1.347	34	1.411	35
2	1.130	39	1.092	39	1.123	37	1.106	39	1.290	34	1.263	37	1.289	35	1.332	37
3	1.209	32	1.247	31	1.115	39	1.305	28	1.329	32	1.370	30	1.246	37	1.511	31
4	1.969	3	1.972	3	2.134	2	2.183	2	2.027	3	2.031	3	2.189	2	2.369	2
5	1.258	31	1.136	37	1.134	36	1.208	35	1.391	29	1.284	35	1.284	36	1.424	34
6	1.135	37	1.189	33	1.330	31	1.623	11	1.245	36	1.299	32	1.437	30	1.831	19
7	1.197	33	1.115	38	1.155	35	1.111	38	1.235	37	1.153	39	1.194	38	1.167	39
8	1.987	2	2.000	2	1.962	5	1.922	3	2.050	2	2.068	2	2.028	5	2.141	5
9	2.824	1	2.691	1	2.691	1	2.966	1	2.919	1	2.779	1	2.784	1	3.172	1
10	1.691	10	1.719	10	1.581	13	1.461	24	1.733	13	1.763	11	1.616	19	1.566	28
11	1.479	18	1.566	15	1.597	12	1.575	20	1.546	21	1.633	19	1.659	15	1.744	22
12	1.813	7	1.578	13	1.445	22	1.580	19	1.876	9	1.649	16	1.502	27	1.786	20
13	1.482	17	1.386	24	1.347	28	1.591	18	1.549	20	1.454	27	1.411	31	1.847	18
14	1.776	8	1.809	7	1.963	4	1.866	5	1.878	8	1.926	7	2.094	3	2.178	4
15	1.904	4	1.835	5	1.833	6	1.718	7	2.009	4	1.948	6	1.946	7	2.014	9
16	1.418	22	1.452	18	1.415	25	1.591	17	1.510	25	1.537	22	1.505	25	1.871	17
17	1.467	20	1.629	12	1.476	20	1.896	4	1.513	24	1.677	15	1.514	24	2.048	6
18	1.625	14	1.570	14	1.498	17	1.594	16	1.691	16	1.638	18	1.559	21	1.777	21
19	1.627	13	1.766	9	2.012	3	1.616	13	1.649	19	1.795	10	2.051	4	1.667	26
20	1.854	5	1.885	4	1.828	7	1.703	8	1.983	5	2.028	4	1.949	6	1.965	11
21	1.478	19	1.381	26	1.561	14	1.437	25	1.546	22	1.451	28	1.626	17	1.666	27
22	1.612	15	1.551	16	1.625	11	1.689	9	1.692	15	1.647	17	1.716	12	1.922	13
23	1.686	11	1.697	11	1.640	9	1.498	22	1.734	11	1.756	12	1.697	13	1.676	25
24	1.352	27	1.253	30	1.375	26	1.280	30	1.387	30	1.285	34	1.407	32	1.381	36
25	1.307	28	1.419	19	1.439	23	1.554	21	1.333	31	1.465	26	1.484	28	1.694	23
26	1.267	30	1.484	17	1.452	21	1.613	14	1.328	33	1.575	20	1.550	22	1.888	15
27	1.450	21	1.344	28	1.430	24	1.475	23	1.526	23	1.410	29	1.474	29	1.693	24
28	1.656	12	1.295	29	1.511	16	1.389	27	1.703	14	1.353	31	1.572	20	1.514	30
29	1.603	16	1.418	20	1.492	18	1.618	12	1.682	17	1.519	25	1.619	18	1.875	16
30	1.737	9	1.788	8	1.634	10	1.652	10	1.853	10	1.903	9	1.750	10	2.036	7
31	1.374	24	1.385	25	1.360	27	1.232	34	1.510	26	1.528	23	1.504	26	1.474	32
32	1.852	6	1.809	6	1.766	8	1.749	6	1.955	6	1.913	8	1.868	9	2.025	8
33	1.390	23	1.404	21	1.535	15	1.605	15	1.498	27	1.527	24	1.656	16	1.912	14
34	1.162	34	1.152	35	1.282	32	1.275	32	1.275	35	1.276	36	1.406	33	1.473	33
35	1.290	29	1.386	23	1.345	29	1.241	33	1.480	28	1.574	21	1.535	23	1.559	29
36	1.145	36	1.148	36	1.122	38	1.194	37	1.159	39	1.161	38	1.136	39	1.222	38
37	1.131	38	1.159	34	1.209	34	1.204	36	1.915	7	1.951	5	1.937	8	2.312	3
38	1.374	25	1.355	27	1.344	30	1.275	31	1.733	12	1.713	13	1.678	14	1.930	12
39	1.374	25	1.395	22	1.477	19	1.412	26	1.657	18	1.702	14	1.750	11	2.002	10

Sectors Names: as shown in Table 1.

Source: Malaysian Input-Output Tables for 1983, 1987, 1991 and 2000.

Table 3. Simple and Total Household Multipliers.

Sector	Simple Household Multipliers, $\bar{n}_i$								Total Household Multipliers, $\bar{\Pi}_i$							
	1983		1987		1991		2000		1983		1987		1991		2000	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
1	0.062	22	0.062	22	0.068	22	0.088	34	0.066	22	0.066	22	0.073	22	0.102	34
2	0.140	5	0.145	5	0.143	5	0.161	18	0.149	5	0.155	5	0.153	5	0.186	18
3	0.105	9	0.105	10	0.113	8	0.146	23	0.112	9	0.112	10	0.121	8	0.169	23
4	0.051	30	0.050	31	0.047	31	0.132	27	0.054	30	0.053	31	0.051	31	0.152	27
5	0.116	7	0.126	6	0.129	6	0.153	21	0.124	7	0.135	6	0.138	6	0.177	21
6	0.096	12	0.093	15	0.092	16	0.147	22	0.102	12	0.100	15	0.098	16	0.170	22
7	0.033	35	0.032	36	0.034	34	0.040	37	0.035	35	0.034	36	0.036	34	0.046	37
8	0.055	28	0.057	27	0.057	24	0.156	19	0.059	28	0.061	27	0.060	24	0.180	19
9	0.083	17	0.075	20	0.081	19	0.146	25	0.088	17	0.080	20	0.086	19	0.168	25
10	0.036	34	0.037	35	0.030	37	0.075	35	0.038	34	0.040	35	0.032	37	0.086	35
11	0.059	25	0.057	28	0.053	26	0.120	30	0.063	25	0.061	28	0.057	26	0.139	30
12	0.055	27	0.060	23	0.049	29	0.146	24	0.059	27	0.064	23	0.053	29	0.169	24
13	0.059	24	0.058	25	0.056	25	0.182	14	0.063	24	0.062	25	0.059	25	0.210	14
14	0.089	16	0.100	12	0.113	9	0.222	6	0.095	16	0.107	12	0.121	9	0.256	6
15	0.091	14	0.096	14	0.097	15	0.210	8	0.097	14	0.102	14	0.104	15	0.243	8
16	0.081	18	0.073	21	0.077	21	0.199	9	0.086	18	0.078	21	0.082	21	0.229	9
17	0.040	33	0.041	33	0.033	36	0.108	31	0.043	33	0.044	33	0.035	36	0.124	31
18	0.058	26	0.057	26	0.052	28	0.130	28	0.061	26	0.061	26	0.056	28	0.150	28
19	0.019	38	0.024	38	0.034	35	0.036	38	0.020	38	0.026	38	0.036	35	0.042	38
20	0.113	8	0.121	8	0.104	12	0.186	12	0.120	8	0.129	8	0.111	12	0.215	12
21	0.059	23	0.059	24	0.057	23	0.163	17	0.063	23	0.063	24	0.060	23	0.188	17
22	0.071	19	0.081	18	0.079	20	0.165	16	0.075	19	0.087	18	0.084	20	0.191	16
23	0.042	31	0.050	30	0.049	30	0.126	29	0.044	31	0.053	30	0.052	30	0.145	29
24	0.031	36	0.027	37	0.027	38	0.072	36	0.033	36	0.029	37	0.029	38	0.083	36
25	0.023	37	0.039	34	0.039	32	0.099	32	0.025	37	0.042	34	0.041	32	0.115	32
26	0.053	29	0.077	19	0.085	18	0.195	11	0.056	29	0.082	19	0.091	18	0.225	11
27	0.066	21	0.056	29	0.038	33	0.155	20	0.071	21	0.060	29	0.040	33	0.179	20
28	0.041	32	0.049	32	0.052	27	0.089	33	0.044	32	0.052	32	0.056	27	0.102	33
29	0.070	20	0.086	17	0.110	10	0.182	13	0.074	20	0.092	17	0.117	10	0.210	13
30	0.101	10	0.097	13	0.100	14	0.273	4	0.108	10	0.104	13	0.106	14	0.315	4
31	0.119	6	0.122	7	0.125	7	0.172	15	0.127	6	0.130	7	0.133	7	0.198	15
32	0.090	15	0.088	16	0.087	17	0.196	10	0.096	15	0.094	16	0.093	17	0.226	10
33	0.094	13	0.104	11	0.104	13	0.218	7	0.100	13	0.111	11	0.111	13	0.251	7
34	0.098	11	0.105	9	0.107	11	0.140	26	0.105	11	0.112	9	0.114	11	0.162	26
35	0.166	4	0.160	4	0.164	4	0.226	5	0.177	4	0.171	4	0.175	4	0.260	5
36	0.013	39	0.012	39	0.012	39	0.020	39	0.013	39	0.012	39	0.012	39	0.023	39
37	0.686	1	0.673	1	0.628	1	0.787	1	0.731	1	0.719	1	0.669	1	0.907	1
38	0.314	2	0.304	2	0.288	2	0.465	2	0.335	2	0.324	2	0.307	2	0.537	2
39	0.230	3	0.261	3	0.236	3	0.419	3	0.245	3	0.279	3	0.251	3	0.484	3

Sectors Names: as shown in Table 1.

Source: Malaysian Input-Output Tables for 1983, 1987, 1991 and 2000.

Table 4. Type I and 2 Income Multipliers.

Sector	Type I Income Multipliers, y_i								Type I Income Multipliers, $\bar{y}_i$							
	1983		1987		1991		2000		1983		1987		1991		2000	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
1	1.135	33	1.204	31	1.366	29	1.336	29	1.209	33	1.286	31	1.456	29	1.541	29
2	1.050	38	1.033	38	1.046	38	1.051	38	1.118	38	1.104	38	1.115	38	1.212	38
3	1.104	35	1.124	34	1.047	37	1.194	32	1.176	35	1.200	34	1.116	37	1.376	32
4	2.997	7	2.755	8	3.232	10	2.531	4	3.193	7	2.943	8	3.444	10	2.919	4
5	1.147	31	1.134	32	1.105	35	1.126	36	1.222	31	1.211	32	1.178	35	1.299	36
6	1.054	37	1.106	36	1.177	33	1.391	27	1.123	37	1.181	36	1.254	33	1.604	27
7	1.516	25	1.346	28	1.481	27	1.474	24	1.615	25	1.437	28	1.579	27	1.700	24
8	4.164	5	4.529	5	4.352	5	2.004	6	4.436	5	4.837	5	4.638	5	2.311	6
9	43.069	1	35.263	2	34.476	2	6.383	1	45.877	1	37.662	2	36.737	2	7.360	1
10	7.604	3	7.913	3	11.098	3	1.985	7	8.100	3	8.451	3	11.826	3	2.288	7
11	2.207	16	2.256	15	2.363	14	1.816	11	2.351	16	2.410	15	2.518	14	2.094	11
12	2.469	12	1.922	17	1.895	19	1.554	19	2.630	12	2.053	17	2.020	19	1.792	19
13	1.681	19	1.613	24	1.527	24	1.547	21	1.790	19	1.722	24	1.627	24	1.784	21
14	2.816	8	3.680	6	4.464	4	1.916	9	3.000	8	3.930	6	4.757	4	2.210	9
15	2.209	14	2.271	14	2.276	15	1.659	15	2.353	14	2.426	14	2.425	15	1.913	15
16	1.511	26	1.724	21	1.572	23	1.554	20	1.610	26	1.841	21	1.675	23	1.791	20
17	2.208	15	2.321	13	2.437	12	2.322	5	2.352	15	2.479	13	2.597	12	2.677	5
18	2.567	11	2.510	11	2.397	13	1.728	13	2.735	11	2.681	11	2.554	13	1.993	13
19	41.883	2	38.397	1	72.720	1	4.772	3	44.614	2	41.009	1	77.489	1	5.503	3
20	4.495	4	5.902	4	4.097	6	1.774	12	4.788	4	6.304	4	4.366	6	2.046	12
21	1.680	20	1.675	22	2.037	18	1.364	28	1.790	20	1.789	22	2.170	18	1.573	28
22	1.671	21	1.626	23	1.746	21	1.571	18	1.779	21	1.736	23	1.860	21	1.811	18
23	2.680	10	2.694	9	2.635	11	1.593	17	2.854	10	2.877	9	2.807	11	1.837	17
24	2.694	9	2.506	12	3.534	8	1.635	16	2.870	9	2.677	12	3.766	8	1.885	16
25	1.928	18	2.571	10	2.210	16	1.923	8	2.054	18	2.746	10	2.355	16	2.218	8
26	1.345	27	1.762	19	1.467	28	1.547	22	1.433	27	1.881	19	1.563	28	1.783	22
27	1.657	22	1.741	20	3.909	7	1.461	25	1.765	22	1.860	20	4.166	7	1.684	25
28	2.278	13	1.584	25	2.091	17	1.885	10	2.427	13	1.692	25	2.228	17	2.174	10
29	1.531	24	1.360	26	1.602	22	1.676	14	1.631	24	1.453	26	1.707	22	1.932	14
30	1.634	23	1.777	18	1.482	26	1.312	30	1.741	23	1.898	18	1.580	26	1.513	30
31	1.261	29	1.290	29	1.239	31	1.188	33	1.343	29	1.377	29	1.320	31	1.370	33
32	1.968	17	1.979	16	1.787	20	1.538	23	2.096	17	2.113	16	1.904	20	1.773	23
33	1.338	28	1.356	27	1.486	25	1.447	26	1.425	28	1.449	27	1.583	25	1.669	26
34	1.114	34	1.115	35	1.258	30	1.250	31	1.187	34	1.190	35	1.340	30	1.441	31
35	1.168	30	1.264	30	1.235	32	1.159	35	1.244	30	1.350	30	1.316	32	1.336	35
36	3.802	6	3.510	7	3.486	9	5.540	2	4.050	6	3.748	7	3.715	9	6.388	2
37	1.011	39	1.016	39	1.021	39	1.034	39	1.077	39	1.085	39	1.088	39	1.193	39
38	1.087	36	1.093	37	1.088	36	1.086	37	1.158	36	1.168	37	1.159	36	1.252	37
39	1.139	32	1.133	33	1.153	34	1.164	34	1.213	32	1.210	33	1.228	34	1.342	34

Sectors Names: as shown in Table 1.

Source: Malaysian Input-Output Tables for 1983, 1987, 1991 and 2000.

Table 5. Simple and Total Employment Multipliers.

Sector	Simple Employment Multipliers, $\frac{1}{\lambda}$								Total Employment Multipliers, $\frac{1}{\lambda}$							
	1983		1987		1991		2000		1983		1987		1991		2000	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
1	0.284	1	0.254	1	0.134	2	0.096	2	0.287	1	0.258	1	0.136	2	0.098	2
2	0.211	3	0.186	2	0.148	1	0.145	1	0.219	3	0.194	2	0.152	1	0.148	1
3	0.062	15	0.064	14	0.048	10	0.043	3	0.068	15	0.070	14	0.052	11	0.046	4
4	0.046	22	0.044	22	0.018	28	0.015	22	0.049	22	0.046	24	0.019	28	0.018	22
5	0.027	32	0.018	34	0.019	25	0.005	37	0.033	31	0.025	32	0.023	21	0.008	35
6	0.057	19	0.068	13	0.051	8	0.029	8	0.062	19	0.073	13	0.054	9	0.031	9
7	0.012	37	0.007	39	0.005	39	0.002	39	0.014	37	0.009	39	0.006	39	0.003	39
8	0.091	8	0.094	7	0.041	12	0.027	10	0.093	9	0.097	9	0.043	12	0.030	11
9	0.065	14	0.053	16	0.036	15	0.028	9	0.069	13	0.057	16	0.038	15	0.031	10
10	0.031	31	0.031	29	0.014	32	0.008	30	0.033	32	0.033	29	0.014	32	0.010	32
11	0.042	26	0.049	17	0.020	23	0.016	20	0.045	27	0.052	17	0.021	25	0.018	21
12	0.059	18	0.039	25	0.018	27	0.010	27	0.062	18	0.042	25	0.019	27	0.013	28
13	0.171	4	0.105	6	0.051	9	0.026	12	0.174	4	0.108	7	0.052	10	0.030	12
14	0.062	16	0.046	19	0.038	14	0.021	17	0.067	16	0.051	20	0.041	13	0.025	16
15	0.224	2	0.162	3	0.084	3	0.024	14	0.229	2	0.167	3	0.087	3	0.028	15
16	0.045	24	0.043	23	0.021	19	0.016	21	0.049	24	0.047	23	0.023	22	0.020	20
17	0.013	35	0.011	37	0.006	38	0.008	32	0.015	35	0.013	36	0.007	38	0.010	31
18	0.046	23	0.035	27	0.014	30	0.008	31	0.049	23	0.038	28	0.015	31	0.011	30
19	0.009	39	0.011	36	0.009	37	0.003	38	0.010	39	0.012	37	0.009	37	0.004	38
20	0.133	5	0.127	5	0.074	4	0.036	6	0.139	5	0.134	5	0.077	5	0.040	6
21	0.044	25	0.035	26	0.020	21	0.009	28	0.047	26	0.039	26	0.022	24	0.012	29
22	0.041	27	0.034	28	0.019	26	0.011	26	0.044	28	0.039	27	0.022	23	0.014	25
23	0.023	33	0.026	30	0.016	29	0.012	24	0.025	33	0.029	31	0.017	29	0.014	26
24	0.033	30	0.022	32	0.012	34	0.006	35	0.035	30	0.024	34	0.013	34	0.008	36
25	0.013	36	0.022	33	0.009	36	0.007	33	0.014	36	0.024	33	0.010	36	0.009	34
26	0.060	17	0.086	9	0.014	31	0.019	18	0.063	17	0.090	10	0.016	30	0.023	17
27	0.065	13	0.048	18	0.038	13	0.011	25	0.069	14	0.051	18	0.039	14	0.014	24
28	0.023	34	0.016	35	0.013	33	0.006	36	0.025	34	0.018	35	0.014	33	0.008	37
29	0.086	9	0.044	21	0.021	20	0.013	23	0.090	10	0.049	21	0.024	20	0.017	23
30	0.056	20	0.054	15	0.025	18	0.023	15	0.061	20	0.060	15	0.028	18	0.029	14
31	0.074	12	0.079	11	0.029	16	0.026	11	0.080	12	0.086	12	0.033	16	0.030	13
32	0.129	6	0.145	4	0.064	5	0.040	5	0.134	7	0.150	4	0.066	6	0.043	5
33	0.048	21	0.045	20	0.027	17	0.017	19	0.053	21	0.051	19	0.030	17	0.022	19
34	0.036	29	0.024	31	0.010	35	0.006	34	0.041	29	0.030	30	0.013	35	0.009	33
35	0.040	28	0.040	24	0.020	24	0.009	29	0.048	25	0.048	22	0.024	19	0.013	27
36	0.011	38	0.010	38	0.020	22	0.021	16	0.012	38	0.010	38	0.020	26	0.022	18
37	0.098	7	0.092	8	0.062	6	0.041	4	0.135	6	0.129	6	0.079	4	0.057	3
38	0.083	10	0.072	12	0.048	11	0.025	13	0.100	8	0.089	11	0.056	8	0.034	8
39	0.075	11	0.085	10	0.054	7	0.032	7	0.087	11	0.099	8	0.060	7	0.040	7

Sectors Names: as shown in Table 1.

Source: Malaysian Input-Output Tables for 1983, 1987, 1991 and 2000.

Table 6. Type I and 2 Employment Multipliers.

Sector	Type I Employment Multipliers, $\underline{t}$								Type II Employment Multipliers, $\bar{t}$							
	1983		1987		1991		2000		1983		1987		1991		2000	
	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank	Value	Rank
1	1.027	39	1.037	38	1.049	37	1.099	36	1.039	39	1.051	39	1.064	38	1.119	38
2	1.028	38	1.018	39	1.017	39	1.005	39	1.064	38	1.061	38	1.044	39	1.027	39
3	1.147	34	1.152	35	1.040	38	1.063	38	1.249	33	1.255	35	1.106	37	1.134	37
4	3.647	7	2.787	8	2.858	9	2.473	11	3.857	7	2.958	9	3.067	9	2.898	12
5	1.458	21	1.515	23	1.183	31	1.448	25	1.789	17	2.077	14	1.398	29	2.308	18
6	1.067	36	1.149	36	1.116	35	1.259	31	1.162	36	1.233	36	1.171	35	1.387	34
7	1.914	13	2.027	11	2.294	11	2.956	9	2.196	13	2.513	11	2.712	10	4.283	6
8	4.167	6	3.971	6	4.205	6	3.200	6	4.301	6	4.102	6	4.363	6	3.560	8
9	12.691	1	11.843	3	12.646	1	16.245	1	13.545	1	12.742	3	13.419	1	17.897	1
10	10.251	2	12.649	2	8.762	3	4.858	4	10.876	2	13.460	2	9.286	3	5.701	3
11	3.389	8	5.307	5	3.009	8	3.062	7	3.642	8	5.642	5	3.232	8	3.516	10
12	2.124	12	1.801	15	1.592	20	1.847	15	2.228	12	1.950	16	1.712	21	2.362	17
13	1.134	35	1.184	34	1.162	32	1.333	30	1.154	37	1.220	37	1.197	34	1.515	32
14	1.532	19	1.625	19	1.806	16	1.387	28	1.648	22	1.817	20	1.954	17	1.681	27
15	1.177	32	1.252	29	1.358	27	1.450	24	1.202	35	1.292	34	1.401	28	1.703	26
16	1.528	20	1.615	20	1.532	25	1.653	22	1.674	20	1.764	22	1.688	25	2.061	24
17	8.914	4	6.448	4	5.872	4	8.422	2	10.345	4	7.798	4	6.792	4	10.582	2
18	1.760	14	1.990	13	2.381	10	2.378	12	1.877	14	2.165	13	2.624	11	3.108	11
19	5.154	5	2.775	9	3.269	7	4.511	5	5.720	5	3.107	8	3.619	7	5.639	4
20	10.183	3	16.988	1	9.261	2	5.104	3	10.639	3	17.859	1	9.618	2	5.618	5
21	1.435	22	1.517	22	1.575	21	1.821	16	1.536	23	1.654	24	1.696	23	2.460	15
22	1.576	18	1.704	17	1.751	18	1.777	19	1.720	19	1.922	17	1.944	18	2.307	19
23	2.289	11	2.466	10	2.087	12	1.705	20	2.508	11	2.721	10	2.265	13	2.071	23
24	1.700	16	1.781	16	1.816	15	2.088	13	1.783	18	1.896	18	1.927	19	2.557	14
25	2.796	9	3.174	7	4.219	5	2.964	8	3.069	9	3.477	7	4.738	5	3.810	7
26	1.204	30	1.420	25	1.750	19	1.563	23	1.260	32	1.489	29	2.044	16	1.877	25
27	1.363	26	1.402	26	1.265	29	1.790	17	1.437	29	1.490	28	1.300	33	2.282	20
28	2.435	10	2.024	12	1.916	13	2.709	10	2.668	10	2.359	12	2.128	14	3.517	9
29	1.198	31	1.329	28	1.853	14	1.865	14	1.249	34	1.469	30	2.122	15	2.376	16
30	1.667	17	1.635	18	1.537	24	1.357	29	1.827	16	1.793	21	1.703	22	1.672	28
31	1.212	29	1.208	33	1.297	28	1.146	35	1.316	31	1.309	33	1.447	27	1.293	35
32	1.406	23	1.332	27	1.542	22	1.429	26	1.458	28	1.376	32	1.599	26	1.568	30
33	1.384	24	1.502	24	1.531	26	1.690	21	1.528	24	1.688	23	1.692	24	2.106	21
34	1.158	33	1.244	31	1.772	17	1.780	18	1.325	30	1.540	25	2.290	12	2.559	13
35	1.368	25	1.544	21	1.541	23	1.388	27	1.671	21	1.879	19	1.893	20	2.082	22
36	1.754	15	1.836	14	1.123	34	1.152	34	1.858	15	1.953	15	1.141	36	1.173	36
37	1.066	37	1.089	37	1.082	36	1.070	37	1.458	27	1.517	26	1.382	30	1.470	33
38	1.227	28	1.235	32	1.162	33	1.168	33	1.473	26	1.515	27	1.350	31	1.602	29
39	1.272	27	1.245	30	1.204	30	1.227	32	1.477	25	1.453	31	1.348	32	1.547	31

Sectors Names: as shown in Table 1.

Source: Malaysian Input-Output Tables for 1983, 1987, 1991 and 2000.