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An Econometric Input-Output Model for Indonesia: Economic Impact Analysis of Budget Development Expenditure

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Abstract

This study aims (1) to construct an Econometric Input-Output Model for Indonesia, that emphasizes the linkage between sectors, and (2) to analyze the impact of budget allocation on development expenditure to Indonesian's economy in 2002.

The model, constructed by combining the advantages of an input-output model and an econometric model, is called the Indonesian Econometric Input-Output Model or "Model Input-Output Ekonometrika Indonesia" (MIENA). MIENA consists of 112 dynamic simultaneous equations which utilize secondary data from 1980-2000. The equation's parameters are estimated by using a combination of three estimation methods: (1) Ordinary Least Squares, (2) First Order of Autoregressive and (3) Second Order of Autoregressive. The model is validated by the Gauss-Siedel Method. It is then used for projections and policy impact analysis simulations on budget development expenditure and world economic conditions.

The study finds that the impact of budget reallocation for development expenditure (final demand, output, income, and sectoral employment) is better than the budget allocation for development expenditure in the National Budgetary Plan (RAPBN) for 2002. The plantation sector contributed the most to supporting output multipliers and high income. The food, beverages, and tobacco industries contributed the most to yield a high employment multiplier.

Keywords: *Econometric input output model- Budget allocation-Policy impact analysis*

JEL Classification: *R 15-R 19*

1. INTRODUCTION

Economic development is closely related to the population, employment opportunities, income distribution, output, poverty alleviation, tax revenue, and social welfare. Relationships and linkages between economic sectors are inherent in economic development. The development of a sector is directly and indirectly related to the activities in other sectors. In other words, each sector affects other sectors, either positively or negatively.

In general, each nation has leading sectors that act as the driving force behind economic activities. In the 1970s, agriculture, including farming, forestry and fisheries, contributed the most to Indonesia's economy, averaging 30% of GDP. This was followed by the mining and extraction sector and the trade, hotel and restaurant sector which contributed 19.4 per cent, respectively 16 per cent to GDP, while the manufacturing sector contributed only 9 per cent.

In the 1980s and to the early 1990s, a structural transformation occurred, where the dominant sector shifted from agriculture to manufacturing. From 1990 to 1996, the contribution of manufacturing (23.5%) to GDP was higher than that of agriculture (16.5%). Government policies directly and indirectly affected this transformation, as was seen in the government investment in the fertilizer, cement factories, and steel industries; the banking liberalization of 1983; the devaluation of the rupiah in 1986; the financial deregulation package of October 1988 (Pakto 88); and foreign investment liberalization. Government support for manufacturing was outlined in the 1992 National Guidelines for Development (GBHN), which stated that the goal of developing manufacturing by the end of the Second Phase of the Long Term Development Plan (PJP II) was to build strong and advanced industries that supported a self-sufficient and reliable economy.

When Indonesia was hit by the economic crisis in July 1997 (the rupiah depreciated against the US$ by more than 100% compared to January 1997), the manufacturing industry sector was hit the hardest. In 1996, manufacturing industries grew by 11.6%, whereas in 1997, the sector's growth decreased to 5.3% (the largest decrease of all economic sectors). The decline in manufacturing growth was directly due to the depreciation of the rupiah. Manufacturing inputs are largely imported, and thus the costs depend on the value of the rupiah to the US dollar. In 1998, the Indonesian economy contracted by -13.1% with all but one sector experiencing serious decline (the agriculture sector, including farming, forestry, and fisheries experienced the lowest rate of contraction at -1.3%). Only electricity, gas, and water grew at 3%.

When the crisis hit, the strongest and most dependable sectors emerged. Those sectors were the electricity, water, and gas sectors, and the agriculture sector (farming, forestry, and fisheries). The first group was made up of utility facilities, and the second of local economic activities important in guaranteeing food security. Agriculture (farming, forestry and fisheries) has the greatest potential to accelerate the recovery of Indonesia's economy, contrasting government policies that emphasize manufacturing. The failures of past economic policies, which had left the agriculture sectors prematurely and neglected manufacturing industries which depend on local inputs, were evidenced in the lack of comprehensive economic impact analysis of the development process which led to the failure of government policies. Indonesian development plans are usually based on predetermined goals; it is therefore important to analyze the impact of linkages between specific economic sectors in development planning.

The input-output table and social accounting matrix are used to analyze the relationships and linkages between economic sectors in regional economies. The issue with these methods is that they are static, as data are only available for the years in which input-output tables are published. Also, projections are difficult to make. To overcome these problems, an econometric model is used, which is dynamic. But there are also disadvantages to this model; as it is commonly used for aggregate data, which makes detailed models difficult to construct. Also, the econometric model cannot explain linkages between economic sectors like the input-output model. There are several methods to overcome these disadvantages: (1) time series for data analysis, (2) more detailed information on economic sectors and (3) the inclusion of economic complexities with the simultaneous combination of the input-output and econometric models. In this study the combination of those methods is called the Econometric Input-Output Model for Indonesia (MIENA).

The integration of the input-output and econometric models has been implemented at the regional level for some states and metropolitan areas in the United States. Relevant research includes: Conway's "The Washington Projection and Simulation Model (WPSM)" in 1990; Israilevich et al "The Chicago Regional Econometric Input-Output Model (CREIM)" in 1996; and Brodjonegoro (1997) "The Econometric Input-Output Model of Jakarta, Indonesia, and Its Applications for Economic Impact Analysis".

The advantages of MIENA are: (1) more detailed information on economic sectors, (2) the general equilibrium conditions, (3) the interaction between economic sectors, and (4) time series data analysis. Also, the model can be used to forecast the Indonesian economy and analyze the impact of policy decisions on economic conditions.

2. THEORETICAL REVIEW

2.1 Input-Output Model

The input–output model is often used for static analysis of economic impacts with static characteristics (based on available input-output tables). The model shows the transactions between sectors that are needed to create sector output. If X is the output vector valued at nx1, F is the final demand vector valued at nx1, Y is the value added vector valued at *nx1*, and $A = [X_{ij}/\sum_i X_{ij}]$ is the technical coefficient matrix valued at nxn, then:

$X = (I-A)^{-1}F$

and

$Y = VX$

in which:

V = diagonal matrix valued at *nxn* and contains $1 - \sum_i a_{ij}$, $j = 1,2,\ldots,n$ on the main diagonal, whereas the others are zero.

In the input-output model, the final demand vector (F) as an exogenous variable and labor number can be determined from:

$L = \Lambda X$

in which:

Λ = diagonal matrix valued at nxn as a ratio of labor to output.

Polenske (1979) stated that the duality from the input-output model is the input-output price model, which can be stated as:

$P = (I-A')^{-1}Z$

in which:

A'= transposed matrix of technical coefficient

Z = value added per unit output valued at *nx1*

Input-output prices are the cost per unit, which are exogenous.As explained earlier, the input-output model shows the interaction between supply and demand. Demand is exogenous, and supply is estimated recursively with demand. Price is the market equilibrium, but an exogenous variable, that is per unit cost.

2.2 Econometric Model

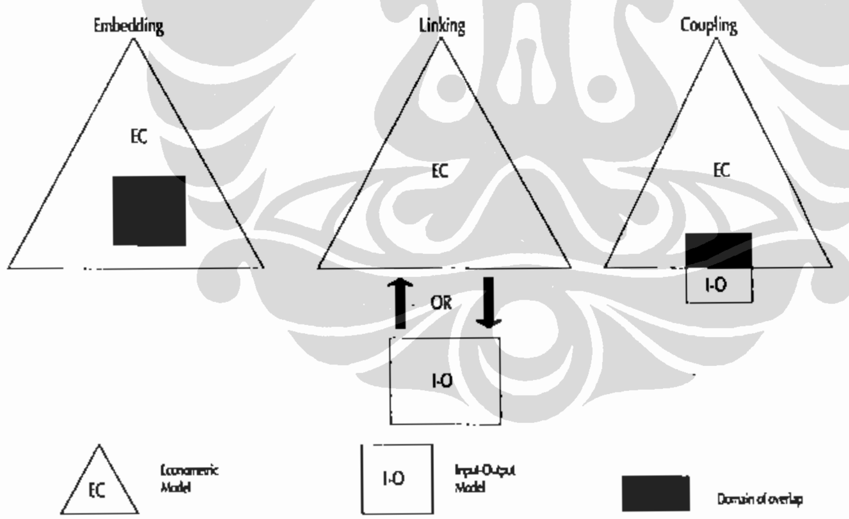
The econometric model is stochastic, non-linear, and dynamic. The model mechanism is simple; there are endogenous variables, exogenous variables and stochastic errors from the endogenous variables. The model estimates vector parameters. After the parameters are estimated, the model can be used for simulations and forecasts, assuming given exogenous variables. Econometric models usually include specific markets, i.e. money markets and commodity markets on the demand side, and production function and input markets or factors of production on the supply side.

In general the econometric model does not include detailed sectors. The econometric model asserts that the equality of demand and supply determines the price level and output level in market equilibrium. This contrasts with the input-output model, in which price is not determined from market equilibrium.

2.3 Integration of the Input-Output and Econometric Models

To overcome the limitations of the input-output and econometric models, the two can be integrated. There are three strategies to integrate the models: (1) embedding, (2) linking, and (3) coupling (see **Figure 1 below**).

Figure 1
Regional Integration Strategies



Source: Rey, 1995

The main difference between the three strategies above is in the integration regime structure, related to the basic characteristics and interaction intensity between the input-output and econometric models. Interaction may originate in a recursive or simultaneous equation. Integration structures consist of mathematical equations and optimal solution methods. The structure may be composite or modular. A composite structure means both of the models are included in linear, or non-linear, sequential equations. These equations are then solved using an iteration algorithm. A modular structure means one of the models can be run until its convergence, as a sub-sequential. The model then interacts with the other model.

Integration with embedding is dominated by the econometric model, and the input-output model only provides information for economic linkage. Therefore, the integration regime is not recursive and simultaneous, because one model is more influential than the other. Embedding employs a composite integration structure.

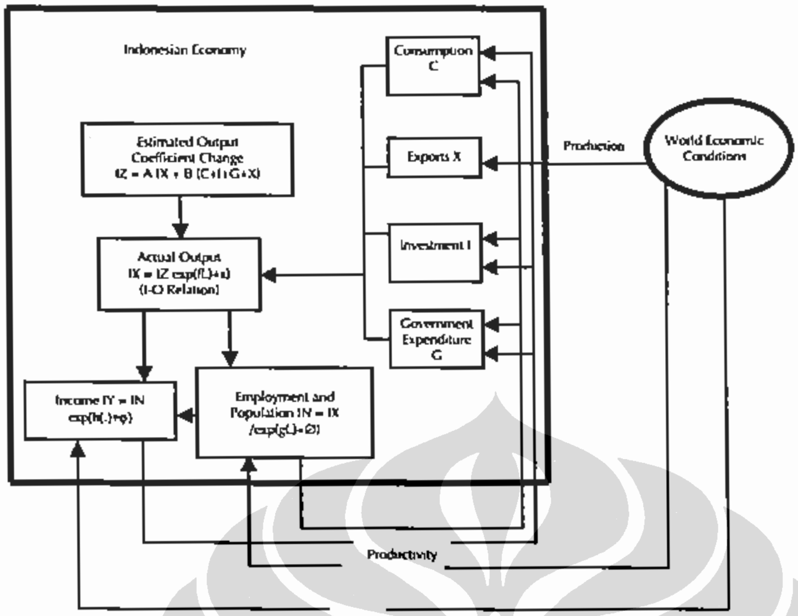
In linking, the input-output model does not depend on the econometric model. The integration regime is recursive, because one model is used as input for the other model recursively.

Meanwhile, coupling uses intense relationships and strong interaction between the input-output and econometric models. Coupling takes both of the models as a whole, and connects them through final demand. The coupling strategy uses both linking and embedding. Coupling integration is simultaneous, because of the two-way connection between the models. It is also composite in structure, as the whole model can be solved simultaneously. This study uses coupling integration as it has distinct advantages over other approaches.

3. METHODOLOGY

The MIENA structure is explained in **Figure 2**. MIENA is rooted in the economic based model, which assumes the economy of a country is stimulated by foreign exports as the basis sector, followed by domestic demand (non-basis). In MIENA the Indonesian economy is stimulated by foreign export demand which is followed with an increase in production for export. Foreign or export demand is indicated by exogenous variables that originate in world economic conditions. Increases in production expand the demand for inputs, capital goods, and intermediaries' goods through linkages between sectors in the input-output table. Because of changes in supply and demand, there are more possibilities for table coefficient input output change. This implies that adjustments are made in the relationships between sectors in Indonesia's economy. The process enables estimates for annual input-output tables and projections.

Figure 2
Econometric Input-Output Model of Indonesia Flowchart



The estimation of Indonesian output using a combination of export demand, labor productivity and wage levels can estimate the demand for labor and sector income. Total labor income combined with population can be used to estimate personal income. Increases in personal income and population likewise increase domestic demand through final demand components: consumption, investment, and government expenditure. Increases in domestic final demand, through the input-output table, creates higher production and output in all economic sectors. In short, increases in output from domestic demand will increase labor demand for production and sector income, and thus further increase final demand. This process is repetitive and is known as the multiplier effect. The multiplier will shrink with every repetition.

4. MODELLING AND PROCEDURE ANALYSIS

4.1 Indonesia Econometric Input Output Modelling

The model consists of 20 economic sectors: (01) rice, (02) spices, (03) horticulture and other food plants, (04) plantations, (05) other plants, (06) farming, (07) forestry, (08) fisheries, (09) mining, (10) tobacco, food and beverages, (11) other industries, (12) oil refineries, (13) electricity, gas, and water, (14) building, (16) hotels and restaurants, (17) transportation and communication, (18) financial services, construction, and corporate services, (19) government and defense, and (20) services.

Each economic sector has three equations (output, labor, and income). The existence of identical equations shows the linkage among economic sectors through the input-output table. This model also consists of final demand equations.

There are two output types in the model, actual output and estimated output. Actual output of a sector is the real output (GDP) of that sector. The estimated output of a sector comes from input-output estimations, in which output depends on demand in other sectors as input, and household final demand. There are four sector equations: (1) estimated output equation, (2) output correction equation (actual output), (3) productivity equation (labor), and (4) wages equation (income).

4.2. Estimated Output Equation

This is an identity equation formed from the input-output table; the coefficients in the correlated row are included in this equation:

$$IZ_i = \sum_{j=1}^{20} (A_{ij} IX_j) + \sum_{k=1}^{4} (B_{ik} FD_k)$$

in which:

IZ_i = estimated output for the ith sector ($i = 1, 2, \ldots, 20$)

IX_j = actual output for jth sectors ($j = 1, 2, \ldots, 20$)

FD_k = the value of k from final demand (C, I, G dan X), $k = 1, 2, 3, 4$

A_{ij}, B_{ik} = proportion of output from *i*th sector sold to jth sector as an intermediate input or final demand component of a final product.

Estimated output explains where the output of a sector is sold. It also explains the usage of a sector as an input for other sectors, and the contribution of the ith sector to final demand components estimated inside the model. The equation is deterministic and usually the estimated output differs from actual output. The Indonesia input-output table is based on data and observations from 1995 and thus the estimated output in 1995 is the same as the actual output for this year only.

4.1.2 Output Correction Equation (Actual Output)

This equation explains historical relationships between actual output and estimated output and aims to eliminate estimation errors. The output correction estimation is often called the sector technological change equation. Technological change depends on time, economic growth, and other important national and international variables. The correction output equation is estimated which is then normalized. Therefore the actual output variable for the ith sector will be on the left side of the equation.

$$\log(IX_i/IZ_i) = f(.) + \varepsilon_i$$

$$IX_i = IZ_i * \exp(f(.) + \varepsilon_i)$$

in which:

f(.) = a group of independent variables that are exogenous or endogenous and which significantly affect the output correction process for ith

ε_i = estimated equation error

Linkage between estimated output and actual output reveals systematic errors in the input-output table predictions, except for 1995. The output correction estimation is used to eliminate these systematic errors.

4.1.3 Productivity Estimation Equation (Labor)

This equation explains the linkage between the total output of a sector and labor, through productivity change over time. Change of productivity depends on working hours, unemployment levels, income, and output levels. First, the level of productivity is estimated, which is then normalized. Labor is on the left hand side of the equation:

$$\log(IX_i/IN_i) = g(.) + \phi_i$$

$$IN_i = IX_i / \exp(g(.) + \phi_i)$$

in which:

IN_i = number of workers in the ith sector

g(.) = a group of independent variables that are exogenous or endogenous and which significantly affect productivity for ith

ϕ_i = estimated equation error

4.1.4 Wages Equation (Income)

This equation explains the relationship between labor and income per sector, through average wage changes and per capita salary. This is an econometric equation, where change in wages is influenced by variables such as compensation levels, total working hours, total production, relative unemployment levels, and economic growth. As in the previous equations, the results of the average wage estimations are normalized, and therefore labor income is on the left hand side of the equation:

$$\log(IY_i/IN_i) = h(.) + \varphi_i$$

$$IY_i = IN_i * \exp(h(.) + \varphi_i)$$

in which:

IY_i = total income of workers in ith sector

$h(.)$ = a group of independent variables, exogenous or endogenous, which significantly affects the wages for ith

φi = estimated equation error

4.1.5 Final Demand Equation

There are ten components of final demand estimated in the model: GDP, two types of consumption (food and non-food), total investments, government expenditure, three types of export (oil and gas, manufacturing, and primary goods + others), and three types of import (input goods, capital goods, and consumption goods).

GDP, the value added of all sectors, is heavily influenced by personal income not only included in wages and salary, but also in other income and transfers. Consumption is influenced by per capita income or population growth. Investments changes are analyzed from value added changes, world economic trends, and population. Government expenditure is heavily influenced by changes in per capita income and population. Export is influenced by the exchange rate of the rupiah to the US dollar and economic conditions in export markets. Meanwhile, import is influenced by the exchange rate of the rupiah to the US dollar, and Indonesia's economic conditions. The characteristics of Indonesia's econometric input-output model are explained in the table below.

Table 1
Characteristics of Indonesia's Econometric Input-Output Model

Type of Model	Simultaneous, Dynamic and Double-log
Historical Data	1980-2000
Projection Period	2001-2005
Model Size (numbers of variables and equations)	
• Endogenous Variables	112
• Exogenous Variables	12
• Lag Endogenous Variables	103
• Behavioral Equations	75
• Identity Equations	37
Model specifications (number of endogenous variables)	
• Final Demand	24
• Output: - Actual Output	21
- Predicted Output	20
• Income	23
• Labor	24

4.2 ANALYSIS PROCEDURES

4.2.1 Estimation Methods

The Time Series Processor (TSP) Version 4.3 was used in estimating this model. The ability of the model to forecast the behavior of endogenous variables depends on the estimation method employed (Pindyck, 1991). This research uses three combinations of estimation methods: (1) Ordinary Least Square (OLS), (2) First Autoregressive (AR1), and (3) Second Autoregressive (AR2). AR1 method is used to treat autocorrelation problems in the time series data. There are three criteria for best equations: (1) economic criteria (sign and value), (2) statistics criteria (R2, F-statistics, and t-statistics), and (3) econometric criteria (multicollinearity and autocorrelation).

4.2.2 Model Validation

After the parameters are estimated, simulations using the Gauss-Seidel method are performed. If the simulation results are explosive, the model equation will be replaced with alternative equations to ensure that the model is stable and valid.

The model validity for alternative policy, or non-policy, simulation and projection requires model validation to analyze how well the model fits real conditions. Four statistical criteria are employed in validation: (1)

Root Mean Square Error (RMSE), (2) Mean Absolute Error (MAE), (3) Mean Error (ME), and (4) Theil's Inequality Coefficients (U-Theil).

This study emphasized the U-Theil value. The U-Theil coefficient ranges from between 0 and 1. If the U-Theil= 0, then the model estimation is perfect; if the U-Theil = 1, then the model is naïve. Therefore, the smaller the U-Theil value, or the closer the U-Theil value to zero, the better the model estimation.

4.2.3 Policy Simulation

This study simulated budget allocation for development expenditure in 2002. Before the simulation, the study attempted to find the sectors that most affect the economy. A sensitivity study was used to find those sectors. The impacts of the sensitivity study in the form of output, income, and employment multipliers were then analyzed for each sector.

Table 2

Sensitivity by Sector based on Output, Income and Labor Multipliers for 2002

Output		Income		Labor	
Sector	Multiplier	Sector	Multiplier	Sector	Multiplier
04	2.4313	04	1.9618	10	2.0133
16	2.4189	10	1.9541	16	2.0127
20	2.4165	06	1.9526	11	2.0032
19	2.4161	11	1.9525	14	2.0025
10	2.4158	16	1.9524	13	2.0023
11	2.4158	12	1.9521	18	2.0021
14	2.4151	13	1.9515	12	2.0014
06	2.4145	14	1.9514	09	2.0011
17	2.4145	09	1.9498	17	2.0004
13	2.4141	07	1.9491	06	1.9996
18	2.4115	03	1.9490	04	1.9979
12	2.4112	02	1.9487	07	1.9974
05	2.4107	01	1.9480	19	1.9968
08	2.4107	15	1.9480	08	1.9929
09	2.4105	05	1.9476	15	1.9856
15	2.4092	08	1.9475	20	1.9830
07	2.4091	18	1.9470	05	1.9806
01	2.4084	17	1.9454	01	1.9547
02	2.4068	20	1.9446	02	1.9535
03	2.4064	19	1.9420	03	1.9427

The results demonstrated that plantations (04), hotels and restaurants (16), and the services (20) sector most affect output. The sectors with the highest impact on income were plantations (04), food, beverages, and tobacco (10), and husbandry (06). The sectors with the highest impact on employment were food, beverages, and tobacco (10), hotels and restaurants (16), and other industries (11). So, budget allocation for development expenditure in 2002 should reduce budget allocation from sectors with the least impact, to sectors with the highest impact on the economy (04, 06, 10, 11, 16, and 20).

Sectors 16 and 20 were not included in the 2002 National Budget Allocation Plan (RAPBN). Sector 11 was not included in the simulation because it was represented in Sector 10. This leaves three sectors which should have received additional budget for development expenditure: plantations (04), food, beverages, and tobacco (10), and farming (06).

Three considerations were used to reduce the budget allocated to development expenditure in certain sectors:

1. Sectors that least support economic activities

   Indicated by low multipliers for output, income, and labor
2. Sectors insensitive to unemployment

   Sectors that have high capability to absorb labor should not be reduced. Agriculture has the highest capability for labor absorption. Sectors that are closely related to agriculture are paddy (01), staple foods (02), and horticulture and other foods (04).
3. Sectors that are not high risk toward food availability

   Closely related to Indonesian staple foods: rice (01), other staple foods, horticulture and other foods (04)

   Based on the above criteria, three sectors emerged which should have lower development expenditure allocation, namely government and defense, transportation and communication, and trade.

The alternative scenarios for budget reallocation (SK01-SSK19) reflected reduction in RAPBN 2002 in those three sectors: government and defense by 2.5%; transportation and communication by 1.5%; and trade by 2.5%. In addition, MIENA analyzed 19 different scenarios for reallocating the development budget from the three sectors above to the three "highest impact" sectors: plantations (04), food, beverages, and tobacco (10), and farming (06).

Table 3
Development Expenditure Budget Reallocation Scenarios (Percentage)

Scenario	Reallocation to Plantations	Reallocation to Food, Beverages, and Tobacco	Reallocation to Farming
SK01	20	30	50
SK02	10	15	75
SK03	0	0	100
SK04	20	50	30
SK05	30	50	20
SK06	10	75	15
SK07	15	75	10
SK08	0	100	0
SK09	50	30	20
SK10	50	20	30
SK11	75	10	15
SK12	75	15	10
SK13	100	0	0
SK14 *	100	0	0
SK15 **	100	0	0
SK16 *	75	10	15
SK17 **	75	10	15
SK18 *	0	100	0
SK19 **	0	100	0

* : additional reallocation from 5% budget reduction of government and defense sector

** : additional reallocation from 10% budget reduction of government and defense sector

The development expenditure budget allocation simulation only covered 92% of the total RAPBN 2002 development expenditure budget. Two sectors in the RAPBN 2002 could not be included in MIENA sector classification, namely employment and natural resources.

Table 4

Development Expenditure Allocation (1993 constant prices) based on 2002 Simulation Scenario (in billions of Rp.)

Scenario	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	Total
RAPBN 2002	120.7	67.2	125.1	117.6	11.3	187.2	55.3	259.5	12.0	224.5	192.5	31.8	1012.3	1962.0	43.5	0.0	1177.0	307.4	982.1	0.0	6889.0
SK01	120.7	67.2	125.1	126.2	11.3	200.2	55.3	259.5	12.0	246.1	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK02	120.7	67.2	125.1	121.9	11.3	193.7	55.3	259.5	12.0	256.9	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK03	120.7	67.2	125.1	117.6	11.3	187.2	55.3	259.5	12.0	267.7	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK04	120.7	67.2	125.1	126.2	11.3	208.8	55.3	259.5	12.0	237.4	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK05	120.7	67.2	125.1	130.5	11.3	208.8	55.3	259.5	12.0	233.1	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK06	120.7	67.2	125.1	121.9	11.3	219.7	55.3	259.5	12.0	230.9	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK07	120.7	67.2	125.1	124.0	11.3	219.7	55.3	259.5	12.0	228.8	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK08	120.7	67.2	125.1	117.6	11.3	230.5	55.3	259.5	12.0	224.5	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK09	120.7	67.2	125.1	139.2	11.3	200.2	55.3	259.5	12.0	233.1	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK10	120.7	67.2	125.1	139.2	11.3	195.9	55.3	259.5	12.0	237.4	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK11	120.7	67.2	125.1	150.0	11.3	191.5	55.3	259.5	12.0	230.9	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK12	120.7	67.2	125.1	150.0	11.3	193.7	55.3	259.5	12.0	228.8	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK13	120.7	67.2	125.1	160.8	11.3	187.2	55.3	259.5	12.0	224.5	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	957.5	0.0	6889.0
SK14	120.7	67.2	125.1	185.4	11.3	187.2	55.3	259.5	12.0	224.5	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	933.0	0.0	6889.0
SK15	120.7	67.2	125.1	234.5	11.3	187.2	55.3	259.5	12.0	224.5	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	883.9	0.0	6889.0
SK16	120.7	67.2	125.1	168.4	11.3	194.0	55.3	259.5	12.0	234.6	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	933.0	0.0	6889.0
SK17	120.7	67.2	125.1	205.3	11.3	198.9	55.3	259.5	12.0	242.0	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	883.9	0.0	6889.0
SK18	120.7	67.2	125.1	117.6	11.3	187.2	55.3	259.5	12.0	292.3	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	933.0	0.0	6889.0
SK19	120.7	67.2	125.1	117.6	11.3	187.2	55.3	259.5	12.0	341.4	192.5	31.8	1012.3	1962.0	42.4	0.0	1159.3	307.4	883.9	0.0	6889.0

Table 5

Composition of Development Expenditure Allocation (1993 constant price) based on 2002 Simulation Scenario (%)

SCENARIO	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18	19	20	Total
RAPBN 2002	1.75	0.98	1.82	1.71	0.16	2.72	0.80	3.77	0.17	3.26	2.79	0.46	14.69	28.48	0.63	0.00	17.08	4.46	14.26	0.00	100.00
SK01	1.75	0.98	1.82	1.83	0.16	2.91	0.80	3.77	0.17	3.57	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK02	1.75	0.98	1.82	1.77	0.16	2.81	0.80	3.77	0.17	3.73	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK03	1.75	0.98	1.82	1.71	0.16	2.72	0.80	3.77	0.17	3.89	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK04	1.75	0.98	1.82	1.83	0.16	3.03	0.80	3.77	0.17	3.45	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK05	1.75	0.98	1.82	1.89	0.16	3.03	0.80	3.77	0.17	3.38	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK06	1.75	0.98	1.82	1.77	0.16	3.19	0.80	3.77	0.17	3.35	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK07	1.75	0.98	1.82	1.80	0.16	3.19	0.80	3.77	0.17	3.32	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK08	1.75	0.98	1.82	1.71	0.16	3.35	0.80	3.77	0.17	3.26	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK09	1.75	0.98	1.82	2.02	0.16	2.91	0.80	3.77	0.17	3.38	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK10	1.75	0.98	1.82	2.02	0.16	2.84	0.80	3.77	0.17	3.45	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK11	1.75	0.98	1.82	2.18	0.16	2.78	0.80	3.77	0.17	3.35	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK12	1.75	0.98	1.82	2.18	0.16	2.81	0.80	3.77	0.17	3.32	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK13	1.75	0.98	1.82	2.33	0.16	2.72	0.80	3.77	0.17	3.26	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.90	0.00	100.00
SK14	1.75	0.98	1.82	2.69	0.16	2.72	0.80	3.77	0.17	3.26	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.54	0.00	100.00
SK15	1.75	0.98	1.82	3.40	0.16	2.72	0.80	3.77	0.17	3.26	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	12.83	0.00	100.00
SK16	1.75	0.98	1.82	2.44	0.16	2.82	0.80	3.77	0.17	3.41	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.54	0.00	100.00
SK17	1.75	0.98	1.82	2.98	0.16	2.89	0.80	3.77	0.17	3.51	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	12.83	0.00	100.00
SK18	1.75	0.98	1.82	1.71	0.16	2.72	0.80	3.77	0.17	4.24	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	13.54	0.00	100.00
SK19	1.75	0.98	1.82	1.71	0.16	2.72	0.80	3.77	0.17	4.96	2.79	0.46	14.69	28.48	0.62	0.00	16.83	4.46	12.83	0.00	100.00

4.3 Sources and Types of Data

The study used secondary data from 1980-2000 from the following sources: (1) BPS (Central Statistics Bureau) for the 1980, 1983, 1985, 1990, 1995, and 1998 Input-Output Tables; GDP by expenditure and sector for 1980-2000; Export and Import Trade Statistics for 1986-1998; Between-Census Population Surveys for 1985 and 1995; Large and Medium Industry Statistics for 1980-2000; Indonesian Economic and Finance Statistics; and Economic Indicators for 1980-2000; (2) Economic Intelligence Unit- London for macroeconomic data on the U.S. and Japan, and (3) CEIC.

To obtain the exogenous variables assumptions for 2001-2005, the study employed: (1) Danareksa, (2) Economic Intelligence Unit-London, (3) Asia Pacific Consensus, (4) BPS, (5) International Monetary Fund, and (6) World Bank.

5. MIENA ESTIMATION RESULTS

The principle behind the MIENA model is that causal relationships are consistent with basic economic principles. This is reflected in the sign and value of the coefficients (estimated parameters) in every equation. **Table 6** shows the values for coefficient determination (R^2), F- statistics test, t-statistic test, and Durbin Watson test (DW) or Durbin h (Dh). The MIENA results fit according to the coefficient of determination and are as follows: 35 equations (46.7 %) have R^2 above 95%; 20 equations (26.7%) have R^2 between 90% and 95%; 18 equations (24%) have R^2 between 80% and 90%; and only 2 equations have R^2 below 80% (electricity, gas, and water at 74%; construction at 60%). Therefore, in general the results show that the explanatory variables in the behavioral equation can explain the endogenous variables.

All the equations have high F statistic values, which range from 19.5 to 2224.3. Hence, explanatory variables in every behavioral equation influence the endogenous variables significantly.

Table 6
Coefficient Estimation Method, R^2 (Adjusted), F-test Statistic, t-test statistic and DW/D_h

Variable	Estimat Method	k	R^2 (Adj)	F test	t-test significance (α) 1	5	10	15	>15	DW/D_h
Final Demand										
PDB	OLS	4	0.9979	2 224.3	3	1	-	-	-	-0.50
CONS	OLS	3	0.9908	681.0	2	1	-	-	-	1.53
I	OLS	3	0.9431	105.9	1	2	-	-	-	-0.57
G	AR1	2	0.9632	-	1	1	-	-	-	1.56
CNM	OLS	2	0.9903	973.1	1	1	-	-	-	0.82
XMGS	OLS	4	0.9676	143.1	4	-	-	-	-	1.61
XMNF	OLS	4	0.9952	985.2	3	-	-	-	1	-0.03
XPRM	AR2	5	0.9666	-	3	1	-	-	1	1.83
MBB	AR2	4	0.9637	-	4	-	-	-	-	2.26
MBM	AR2	5	0.9225	-	4	1	-	-	-	1.57
IHKINA	AR2	4	0.9974	-	3	-	-	-	1	2.27
XDEF	OLS	2	0.9807	484.5	2	-	-	-	-	1.94
MDEF	OLS	2	0.9894	883.9	2	-	-	-	-	1.52
Actual Output										
IX01	OLS	5	0.9903	390.1	3	1	1	-	-	-0.06
IX02	AR2	4	0.9553	-	2	1	1	-	-	1.92
IX03	AR2	3	0.9154	-	1	2	-	-	-	1.64
IX04	AR1	2	0.9214	-	-	-	1	-	1	2.30
IX05	AR2	3	0.9219	-	3	-	-	-	-	1.72
IX06	AR2	4	0.8752	-	3	1	-	-	-	2.19
IX07	AR1	1	0.9091	-	1	-	-	-	-	1.58
IX08	OLS	2	0.8971	83.9	2	-	-	-	-	-0.64
IX09	OLS	2	0.9048	91.3	2	-	-	-	-	-1.58
IX10	AR2	3	0.9179	-	2	1	-	-	-	2.13
IX11	AR1	2	0.8270	-	1	1	-	-	-	1.92
IX12	AR2	6	0.9731	-	5	1	-	-	-	2.74
IX13	AR2	5	0.7473	-	4	-	-	-	1	2.54
IX14	AR1	2	0.5943	-	-	2	-	-	-	1.55
IX15	OLS	4	0.8629	30.9	3	1	-	-	-	-1.25
IX16	AR1	2	0.8111	-	-	2	-	-	-	2.07
IX17	AR2	6	0.8102	-	5	1	-	-	-	2.00
IX18	AR2	4	0.9442	-	2	1	1	-	-	1.60

IX19	OLS	3	0.8908	52.7	2	1	-	-	-	-1.36
IX20	AR2	3	0.8439	-	2	1	-	-	-	2.13
Income										
IY01	OLS	2	0.9395	148.4	2	-	-	-	-	-1.10
IY02	OLS	2	0.9632	249.7	2	-	-	-	-	0.54
IY03	AR2	4	0.9875	-	3	1	-	-	-	1.59
IY04	OLS	3	0.9733	231.5	3	-	-	-	-	0.17
IY05	AR2	4	0.9600	-	4	-	-	-	-	1.62
IY06	OLS	3	0.9609	156.5	3	-	-	-	-	1.26
IY07	OLS	3	0.9792	298.4	3	-	-	-	-	1.13
IY08	OLS	3	0.9827	361.1	2	1	-	-	-	0.65
IY09	OLS	3	0.9424	104.6	3	-	-	-	-	-0.35
IY10	OLS	2	0.9782	427.7	2	-	-	-	-	1.10
IY11	OLS	4	0.9857	329.3	2	1	1	-	-	0.58
IY12	AR2	3	0.9794	-	3	-	-	-	-	1.75
IY13	OLS	3	0.9764	262.7	3	-	-	-	-	1.01
IY14	OLS	3	0.9595	151.1	2	1	-	-	-	0.78
IY15	AR1	2	0.9574	-	1	1	-	-	-	1.63
IY16	OLS	2	0.9833	561.1	2	-	-	-	-	1.57
IY17	OLS	4	0.9885	409.2	3	-	-	1	-	1.14
IY18	OLS	3	0.9373	95.7	2	-	-	1	-	1.28
IY19	OLS	2	0.9607	233.5	2	-	-	-	-	0.55
IY20	OLS	3	0.9017	59.1	3	-	-	-	-	1.28
IYOTH	OLS	3	0.9754	252.6	2	-	-	-	1	-1.26
Labor										
IN01	AR1	3	0.9417	-	2	1	-	-	-	2.46
IN02	AR1	3	0.9577	-	2	1	-	-	-	1.65
IN03	OLS	2	0.8751	67.6	1	1	-	-	-	1.12
IN04	OLS	3	0.8826	48.6	2	1	-	-	-	-0.77
IN05	AR2	4	0.8337	-	3	-	-	-	1	1.91
IN06	OLS	5	0.8613	24.6	4	1	-	-	-	0.80
IN07	OLS	4	0.8343	24.9	3	1	-	-	-	-0.07
IN08	AR1	3	0.9540	-	1	1	1	-	-	1.97
IN09	OLS	3	0.8193	29.7	2	1	-	-	-	-0.62
IN10	AR2	3	0.9369	-	3	-	-	-	-	2.18
IN11	AR2	4	0.9427	-	4	-	-	-	-	2.10
IN12	AR2	5	0.9922	-	5	-	-	-	-	1.58
IN13	OLS	5	0.8295	19.5	3	-	1	1	-	-0.03

IN14	OLS	3	0.8707	43.6	2	-	-	1	-	-1.48
IN15	AR2	4	0.9010	-	1	-	1	-	2	2.21
IN16	OLS	3	0.9590	223.0	3	-	-	-	-	0.09
IN17	AR1	2	0.9222	-	2	-	-	-	-	2.19
IN18	OLS	3	0.8786	46.8	2	1	-	-	-	1.46
IN19	AR2	4	0.9046	-	1	-	-	-	3	1.96
IN20	AR2	4	0.8601	-	1	1	1	1	-	2.17
UNEMP	AR1	2	0.9125	-	2	-	-	-	-	1.82

Notes:

k	=	number of parameters, not including constant
OLS	=	Ordinary Least Square
AR1	=	first level Autoregressive
AR2	=	second level Autoregressive
R2 (Adj)	=	R^2 Adjusted
DW	=	Durbin Watson, applied for the AR1/AR2 estimation method
D_h	=	Durbin h, applied for the OLS estimation method
-	=	not available

The t- statistics in the model show that almost all the explanatory variables significantly affect the endogenous variables. The Durbin-Watson or Durbin h statistics show that the equations do not suffer from autocorrelation problems, except in the oil refineries sector (IX12), which has a statistic DW value of 2.74 DW.

6. 2002 IMPACT OF BUDGET ALLOCATION ON DEVELOPMENT EXPENDITURE

6.1 Model Validation

Before impact is analyzed, the model has to be statistically validated. Model validation showed 41 endogenous variables (36.6%) with U-Theil values less than 0.05, 47 endogenous variables (42.0%) with U-Theil values between 0.05 and 0.10, 16 endogenous variables (14.3%) with U-Theil values between 0.10 and 0.15, four endogenous variables (3.6%) with U-Theil values between 0.15 and 0.20, and four endogenous variables (3.6%) with U-Theil values of more than 0.20. The last group is made up of export manufacture variables (XMNF), import consumption goods (MBK), other agricultural income (IY05), financial institution income, and construction and corporate services (IY18), with respective values of 0.20, 0.23, 0.24, and 0.20. This proves that the model is reliable in simulation, as nearly all of the U-Theil values are close to zero.

6.2 Impact of Budget Allocation on Development Expenditure

The multiplier results of budget allocation policy on development expenditure are shown in **Table 7**. The impacts of reallocation (SK01-SK19) are better than in the RAPBN 2002 allocation. The output, income and labor multipliers for reallocation schemes are always greater than or equal to the RAPBN 2002 allocation.

The RAPBN 2002 budget expenditure allocation provides output, income, and labor multiplier values of 2.4145, 1.9489, and 1.9984 respectively. In allocation policy, there are two important aspects, namely economic growth and labor absorption. Economic growth is closely related with high output and income multipliers, while labor absorption is closely linked to the labor multiplier.

If the government emphasizes economic growth, then the SK13 scenario for budget allocation is the most appropriate scenario, because it has the highest output and income multipliers at 2.4285 and 1.9649 respectively. These high multiplier values come from the plantation sector, which is export oriented. Increases in income push domestic demand and increases in domestic demand stimulate increases in production through output.

If the government emphasizes labor absorption, then the SK03 scenario for budget allocation is the most appropriate scenario, because it has the highest labor multiplier, 2.0118. This high labor multiplier is generated by food, beverages, and tobacco which are labor intensive sectors and which generate higher demand in the agriculture sector, another labor intensive sector.

Table 7
Output, Income, and Labor Multipliers for 2002

SCENARIO	Output	Income	Labor
RAPBN 2002	2.4145	1.9489	1.9984
SK01	2.4174	1.9591	2.0055
SK02	2.4162	1.9586	2.0086
SK03	2.4150	1.9581	2.0118
SK04	2.4171	1.9589	2.0031
SK05	2.4185	1.9596	2.0018
SK06	2.4155	1.9579	2.0015
SK07	2.4162	1.9582	2.0008
SK08	2.4138	1.9569	1.9999
SK09	2.4214	1.9612	2.0015
SK10	2.4215	1.9613	2.0027
SK11	2.4250	1.9631	2.0005
SK12	2.4250	1.9631	1.9999
SK13	2.4285	1.9649	1.9984
SK14	2.4361	1.9749	1.9989
SK15	2.4511	1.9953	2.0000
SK16	2.4306	1.9721	2.0023
SK17	2.4417	1.9903	2.0058
SK18	2.4149	1.9643	2.0201
SK19	2.4146	1.9768	2.0367

Tables 8 and **Tables 9** provide budget allocation for development expenditure based on the RAPBN 2002 and SK13 scenario, in which SK13 generates higher output and income growth than the others. The SK13 scenario has consistent results, as the highest allocation goes to plantations, which increases output in agriculture, farming, forestry, and fisheries, valued at 51.33 billion rupiah. The allocations for government and defense, and transportation and communication are decreased, which causes their output to decrease the most by 24.33 and 10.35 billion rupiah respectively. One interesting result is that the decrease in trade sector allocation does not cause a decrease in the output of trade, hotels, and restaurants. Rather, output in these sectors increases by 8.80 billion rupiah.

The impact of SK 13 development expenditure allocation on sectoral income is similar to its impact on sectoral output. Sectors with the largest increase in allocation have the largest increase in output and vice versa.

Table 8
2002 Impact of Development Expenditure Budget Allocation Policy on Output

Sector	Base		RAPBN 2002			SK13			Difference in Change
	Value	Proportion	Changes		Proportion	Changes		Proportion	SK13 to RAPBN 2002
	(Billion Rp)	(%)	(Billion Rp)	(%)	(%)	(Billion Rp)	(%)	(%)	(Billion Rp)
Agriculture, Livestock, Forestry and Fisheries	112 757.89	12.92	1 868.96	1.66	11.24	1 920.29	1.70	11.48	51.33
Manufacturing Industry	345 804.37	39.63	4 580.67	1.32	27.54	4 630.45	1.34	27.68	49.78
Mining and Quarrying	60 313.23	6.91	961.66	1.59	5.78	978.47	1.62	5.85	16.80
Trade, Hotel and Restaurant	111 144.24	12.74	1 205.79	1.08	7.25	1 214.60	1.09	7.26	8.80
Financial and Real Estate	37 354.01	4.28	932.20	2.50	5.60	935.25	2.50	5.59	3.05
Construction	67 883.34	7.78	2 666.91	3.93	16.03	2 667.63	3.93	15.94	0.73
Electricity, Gas, and Water	10 851.24	1.24	1 262.77	11.64	7.59	1 263.16	11.64	7.55	0.38
Other Services	38 338.20	4.39	274.80	0.72	1.65	275.16	0.72	1.64	0.36
Transportation and Communication	61 624.01	7.06	1 840.83	2.99	11.07	1 830.48	2.97	10.94	-10.35
Government and Military	26 533.00	3.04	1 039.18	3.92	6.25	1 014.84	3.82	6.07	-24.33
Total	872 603.54	100.00	16 633.77	1.91	100.00	16 730.32	1.92	100.00	96.56

Notes:
Base = base simulation that does not include the development expenditure budget allocation
RAPBN 2002 = development expenditure budget allocation based on RAPBN 2002
SK13 = the respective reduction in total development expenditure budget, added to the plantation sector

Table 9
2002 Impact of Development Expenditure Budget Allocation Policy on Income

Sector	Base		RAPBN 2002			SK13			Difference in Change
	Value	Proportion	Changes		Proportion	Changes		Proportion	SK13 to RAPBN 2002
	(Billion Rp)	(%)	(Billion Rp)	(%)	(%)	(Billion Rp)	(%)	(%)	(Billion Rp)
Agriculture, Livestock, Forestry and Fisheries	9 945.30	7.95	173.63	1.75	6.64	181.39	1.82	6.93	7.77
Manufacturing Industry	32 487.01	25.98	445.43	1.37	17.04	450.82	1.39	17.22	5.40
Mining and Quarrying	5 775.67	4.62	92.09	1.59	3.52	93.70	1.62	3.58	1.61
Trade, Hotel and Restaurant	14 914.92	11.93	193.92	1.30	7.42	195.13	1.31	7.45	1.20
Financial Institution and Real Estate	7 525.13	6.02	191.23	2.54	7.31	191.85	2.55	7.33	0.62
Construction	13 903.33	11.12	110.50	0.79	4.23	110.65	0.80	4.23	0.14
Electricity, Gas, and Water	8 901.76	7.12	336.31	3.78	12.86	336.39	3.78	12.85	0.08
Other Services	985.23	0.79	115.44	11.72	4.41	115.47	11.72	4.41	0.04
Transportation and Communication	19 204.21	15.36	518.08	2.70	19.81	514.80	2.68	19.66	-3.28
Government and Military	11 415.00	9.13	438.14	3.84	16.76	427.67	3.75	16.34	-10.47
Total	125 057.55	100.00	2614.76	2.09	100.00	2 617.86	2.09	100.00	3.10

Notes:
Base = base simulation that does not include the development expenditure budget allocation
RAPBN 2002 = development expenditure budget allocation based on RAPBN 2002

Table 10 shows budget allocation on the development expenditure based on the RAPBN 2002 and SK03, where SK03 generates the highest labor increases. There is an interesting result found in the SK03 scenario. Although food, beverages, and tobacco have the highest additional budget allocation, it does not absorb the most labor. Rather, the biggest labor absorption comes from agriculture, farming and fisheries (5,690 jobs), followed by manufacturing (1,610 jobs), and trade, hotels, and restaurants (300 jobs).

As previously mentioned, the simulations not only impact output, income, and labor, but also final demand components. These are depicted in **Tables 11** and **Table 12**. **Table 11** shows the value and the percentage change on final demand components due to reallocation from the base simulation. In this table the SK13 scenario generates the highest increase in GDP, per capita GDP, consumption, investment, government expenditure, export, and import.

The SK14 and SK15 scenarios have similar development expenditure allocation as the SK13 scenario. The only difference is a decrease in the government and defense budget. The SK14 scenario has a higher output impact than the SK13 scenario; and the SK15 has a higher impact than the SK14. This occurs because the total budget for plantations is higher in SK15 than in SK14 (second highest) and SK13. Likewise, the SK18 and SK19 scenarios have similar development expenditure allocations as the SK03 scenario. The only difference is a decrease in the government and defense budget. One interesting result from the SK18 and SK19 scenarios is that the impacts on income and labor are better in these scenarios than in the SK03, but the output impact is worse. It is probable that this results from the simulation having more value added and being more labor oriented.

Table 10

2002 Impact of Development Expenditure Budget Allocation Policy on Workers

Sector	Base		RAPBN 2002			SK03			Difference In Change SK03 to RAPBN 2002
	Value	Proportion	Changes		Proportion	Changes		Proportion	
	(Thousands of Workers)	(%)	(Thousands of Workers)	(%)	(%)	(Thousands of Workers)	(%)	(%)	(Thousands of Workers)
Agriculture, Livestock, Forestry and Fisheries	38 882.70	43.17	524.64	1.35	42.11	530.33	1.36	42.47	5.69
Manufacturing Industry	12 147.86	13.49	146.13	1.20	11.73	147.73	1.22	11.83	1.61
Mining and Quarrying	15 882.69	17.63	113.70	0.72	9.13	114.00	0.72	9.13	0.30
Trade, Hotel and Restaurant	966.41	1.07	15.41	1.59	1.24	15.41	1.59	1.23	0.00
Financial Institution and Real Estate	171.07	0.19	19.82	11.58	1.59	19.81	11.58	1.59	-0.01
Construction	434.92	0.48	10.85	2.50	0.87	10.83	2.49	0.87	-0.02
Electricity, Gas, and Water	2 801.48	3.11	104.95	3.75	8.42	104.81	3.74	8.39	-0.14
Other Services	11 773.93	13.07	84.39	0.72	6.77	83.89	0.71	6.72	-0.50
Transportation and Communication	3 917.58	4.35	107.35	2.74	8.62	106.22	2.71	8.51	-1.13
Government and Military	3 090.65	3.43	118.63	3.84	9.52	115.75	3.75	9.27	-2.88
Total	90 069.30	100.00	1 245.86	1.38	100.00	1 248.77	1.39	100.00	2.92

Notes:

Base = base simulation that does not include the development expenditure budget allocation

RAPBN 2002 = development expenditure budget allocation based on RAPBN 2002

SK03 = the respective reduction in total development expenditure budget, added to the industrial, food, beverages and tobacco sector

Table 11

2002 Impact of Development Expenditure Budget Allocation Policy Alternatives to Final Demand

A. Value of Change Rp billion)

Scenario	PDB	CONS	I	G	X	M	PDBKAP
RAPBN 2002	1 732.28	378.44	476.51	66.50	848.22	37.37	8.142
SK01	1 724.75	376.78	474.43	66.21	862.42	55.12	8.107
SK02	1 723.94	376.63	474.20	66.18	857.38	50.45	8.103
SK03	1 723.13	376.44	473.98	66.15	852.33	45.77	8.099
SK04	1 724.34	376.72	474.31	66.20	861.41	54.29	8.105
SK05	1 725.44	376.94	474.63	66.24	867.20	59.58	8.110
SK06	1 722.69	376.34	473.86	66.14	854.31	47.97	8.097
SK07	1 723.25	376.47	474.02	66.16	857.22	50.61	8.100
SK08	1 721.03	375.97	473.41	66.07	847.23	41.64	8.090
SK09	1 728.09	377.53	475.35	66.34	879.86	70.98	8.123
SK10	1 728.31	377.59	475.41	66.35	880.36	71.40	8.124
SK11	1 731.31	378.25	476.24	66.47	895.39	85.04	8.138
SK12	1 731.22	378.22	476.21	66.46	895.14	84.83	8.137
SK13	1 734.34	378.91	477.07	66.58	910.44	98.68	8.152
SK14	1 734.41	378.97	477.09	66.59	945.45	133.69	8.152
SK15	1 734.56	379.06	477.14	66.59	1 015.48	203.70	8.153
SK16	1 729.69	377.91	475.80	66.40	921.89	112.31	8.130
SK17	1 726.44	377.25	474.90	66.28	974.88	166.87	8.115
SK18	1 716.88	375.06	472.25	65.91	854.41	50.78	8.070
SK19	1 704.31	372.34	468.79	65.43	858.56	60.80	8.011

B. Percentage of Change (%)

Scenario	PDB	CONS	I	G	X	M	PDBKAP
RAPBN 2002	0.40993	0.13107	0.63114	0.21205	0.59411	0.03227	0.40994
SK01	0.40815	0.13050	0.62839	0.21113	0.60406	0.04760	0.40815
SK02	0.40796	0.13044	0.62809	0.21103	0.60052	0.04357	0.40796
SK03	0.40777	0.13038	0.62780	0.21093	0.59699	0.03953	0.40777
SK04	0.40806	0.13048	0.62823	0.21108	0.60335	0.04689	0.40806
SK05	0.40831	0.13055	0.62864	0.21122	0.60741	0.05146	0.40832
SK06	0.40766	0.13035	0.62763	0.21088	0.59838	0.04143	0.40766
SK07	0.40780	0.13039	0.62784	0.21095	0.60041	0.04371	0.40780
SK08	0.40727	0.13022	0.62703	0.21068	0.59342	0.03596	0.40727

SK09	0.40894	0.13076	0.62961	0.21154	0.61627	0.06131	0.40895
SK10	0.40899	0.13078	0.62969	0.21157	0.61662	0.06167	0.40900
SK11	0.40970	0.13101	0.63079	0.21194	0.62715	0.07345	0.40971
SK12	0.40968	0.13100	0.63074	0.21192	0.62697	0.07326	0.40968
SK13	0.41042	0.13123	0.63188	0.21230	0.63769	0.08523	0.41042
SK14	0.41044	0.13126	0.63191	0.21232	0.66221	0.11546	0.41044
SK15	0.41047	0.13129	0.63198	0.21234	0.71127	0.17593	0.41048
SK16	0.40932	0.13089	0.63020	0.21174	0.64571	0.09700	0.40932
SK17	0.40855	0.13066	0.62901	0.21134	0.68282	0.14412	0.40855
SK18	0.40629	0.12990	0.62550	0.21017	0.59844	0.04386	0.40629
SK19	0.40332	0.12896	0.62091	0.20864	0.60135	0.05252	0.40332

Table 12
Impact of Development Expenditure Budget Allocation Policy Alternatives compared to RAPBN 2002 to Final Demand (Rp billion)

Scenario	PDB	CONS	I	G	X	M	PDBKAP
SK01	-7.531	-1.656	-2.078	-0.289	14.203	17.750	-0.035
SK02	-8.344	-1.813	-2.305	-0.320	9.156	13.078	-0.039
SK03	-9.156	-2.000	-2.523	-0.352	4.109	8.406	-0.043
SK04	-7.938	-1.719	-2.195	-0.305	13.188	16.922	-0.037
SK05	-6.844	-1.500	-1.883	-0.262	18.984	22.211	-0.032
SK06	-9.594	-2.094	-2.648	-0.367	6.094	10.602	-0.045
SK07	-9.031	-1.969	-2.492	-0.346	9.000	13.242	-0.042
SK08	-11.250	-2.469	-3.102	-0.432	-0.984	4.273	-0.053
SK09	-4.188	-0.906	-1.156	-0.160	31.641	33.617	-0.020
SK10	-3.969	-0.844	-1.094	-0.152	32.141	34.031	-0.019
SK11	-0.969	-0.188	-0.266	-0.037	47.172	47.672	-0.005
SK12	-1.063	-0.219	-0.297	-0.041	46.922	47.461	-0.005
SK13	2.063	0.469	0.563	0.078	62.219	61.313	0.010
SK14	2.125	0.531	0.586	0.082	97.234	96.320	0.010
SK15	2.281	0.625	0.633	0.088	167.266	166.336	0.011
SK16	-2.594	-0.531	-0.711	-0.100	73.672	74.945	-0.012
SK17	-5.844	-1.188	-1.609	-0.225	126.656	129.500	-0.027
SK18	-15.406	-3.375	-4.258	-0.592	6.188	13.414	-0.073
SK19	-27.969	-6.094	-7.719	-1.072	10.344	23.438	-0.131

7. CONCLUDING REMARKS

Based on the model estimation and policy simulation of the 2002 development expenditure budget allocation, it is clear that the impact on development expenditure budget reallocations are better for the Indonesian economy than the allocations outlined in the RAPBN 2002. These budget reallocations have greater impacts on final demand, output, income, and labor. The plantation sector, in particular, is the biggest generator of higher output and income multipliers. This sector also increases GDP, GDP per capita, consumption, investment, government expenditure, export and import. Another agriculture related sector, the food, beverages, and tobacco industries, generates the highest labor multiplier. Additional budget allocation to the plantation sector will affect most agricultural sectors, i.e. farming, forestry, and fishery. Interestingly, additional budget allocation to food, beverages, and tobacco will not affect the manufacturing industry, but will affect agriculture, farming, forestry, and fisheries.

These results suggest that the government should pay more attention to agriculture, forestry, and fisheries, as these sectors have the best ability to absorb labor. To develop these sectors, special incentives should be given to manufacturing activities that utilize significant input s from the agricultural sectors. However, the best way to push economic growth would be to reduce development expenditure in other sectors and reallocate this to the plantation sector (as in the SK13 scenario). This gives the highest output and income multiplier. Meanwhile, the best method to create equality is to reduce the development expenditure budget allocations from other sectors, and reallocate these to the food, beverages, and tobacco industries (as in the SK03 scenario). This gives the highest labor multiplier.

Despite some interesting findings, the model has some weaknesses that need to be addressed in further research. One of the main weaknesses is that the RAPBN 2002 and the MIENA model still have different sector specifications. Therefore, adjustment between the two must proceed cautiously. To avoid sector classification errors, RAPBN 2002 data must be broken down to programs and activities/projects. Another concern is that some MIENA sectors should be analyzed in more detail. These include the plantation sector (palm coconut, coffee, tea, and cloves), the manufacturing sector (textile, chemicals, urea and pesticides, and machinery), the financial institutions sector, construction and corporate services, and transportation and communication. To create a more comprehensive and probably more accurate model, MIENA should be merged with more comprehensive macroeconomic models including the monetary block, regional financial block, and fiscal block.

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