OPTIMAL ALLOCATION OF COMMODITY TAXATION

IN THE SECOND BEST SITUATION

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ABSTRACT

The standard theory on the optimal commodity taxation is incomplete in the sense that it ignores the fact that taxation -as a system- is attributed with administrative and other costs. The costs could be very large even for the theoretically optimum one. In addition, the application of the standard optimum of commodity taxation requires estimations of preference and elasticities which can be unobtainable, especially for developing countries and a common practice of applying a uniform rate does not always produce better or even optimal results. Therefore, it is important to pick up the spirit of the optimal tax literature and to focus attention on how to minimise these costs. A CGE model representative to the Indonesian economy is developed to address this issue by assessing the marginal excess burden and welfare costs of the existing commodity taxation. The latter is then used as a base for designing an optimal allocation of commodity taxation. The results suggest that most sectors have already been over taxed and the existing tax system is not an efficient way for collecting revenue. The proposed commodity tax rates will give much better results for the economy, welfare and even for the government revenue.

KEYWORDS: **Optimal Commodity Tax, Tax Reform, Welfare, SAM, CGE.**

JEL CLASSIFICATION: **C68, D58, E62, L83, O53**

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1. INTRODUCTION

Two distinct quantitative dimensions of any tax system are the level and structure of taxation. In developing countries, the level of taxation (measured by its share to GDP) varies widely, and positively relates not only to per capita income level but also to other factors such as urbanisation, role of non-primary sectors, openness, literacy rate and political/institutional factors. For the structure of taxation, the role of indirect taxation becomes increasingly important[2], while that of personal income and other direct taxes remain very low. The indirect taxation, which is the main focus of this paper, is also characterised by substitution between taxes on international trade and domestic indirect taxes as the economy develops. The role of international trade taxes was usually very important in the early stage of development, but then was substituted by the domestic indirect taxes. [3]

The increasing realisation of the need to make tax system simpler (corresponding to the administrative capacity of developing countries), more transparent, less distorting and broad based as well as to raise government revenue has led the governments in developing countries to embark on tax reforms[4] (Rao 1993, World Bank 1991 and 1997). In this context, analysis of the experiences of tax reforms undertaken in countries with varied economic structures and differing stages of development can be of a great help, especially in distilling lessons and identifying the necessary and sufficient conditions for successful tax reforms. A 'best practice' approach to tax reforms includes replacing quantitative restrictions with tariffs, simplifying tax structure, broadening tax base, levying lower and uniform tax rate, and exempting taxes on intermediate inputs. A removal of quantitative restrictions avoids rent seeking activities, a simpler tax structure is easier to administer, a broader

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[2] In developing countries, revenue from indirect taxes constitutes on average almost 60% of total tax revenue, while the share of personal income taxes remains very small (Tanzi, 1988 and Rao, 1993).

[3] On the income side, tax system is usually designed to ensure vertical equity, levelling down the income of the rich and raising that of the poor. However, distortionary effects of high marginal tax rates and high degree of tax evasion/avoidance arising from complicated tax structures of the traditional tax system, have shifted the focus from vertical equity to horizontal equity (i.e. applying a broadly uniform tax for the rich and the poor while at the same time helping the poor through the welfare system or other government policy). The emphasis in recent years is therefore to collect larger revenues through applying broadly uniform taxes and to address the equity issue such as poverty alleviation through welfare system and other government fiscal policies. This can be seen from the substantial tax revenue increase as a result of tax reforms in developing countries and the adoption of various government policies for helping the poor.

[4] There have been more than 100 identifiable attempts at major tax reform since the mid 1940 in developing countries while tax ratio increased from less than 10% of GDP in mid 1960s to almost 20% of GDP by late 1980sThe reforms have also served as 'levelling of the playing field', but there have also been tax reforms merely in response of growing fiscal deficits. In fact, tax levels have in general been rising in all countries in recent years,

tax base yields larger revenues, a lower and uniform tax rate reduces unintended distortions (besides also being easier to administer) and an exemption on intermediate input taxes may encourage domestic production.

Application of optimal taxation theory to the design and reform of tax systems in developing countries has mostly been impossible due to the lack of data to estimate the demand and supply elasticities necessary for setting the optimal tax rates. In addition the optimal tax theory ignores the administration and compliance costs associated with a tax system. The best approach to a successful tax reform seems to be a pragmatic combination of theory and past reform experiences, taking into account the administrative, political and information constraints.[5] A CGE model representative to a particular economy can be developed for addressing the issue, by portraying the inter linkage relationship among economic actors in all sector of the economy and showing the economic effects and distributional consequences of any tax policy (changes) in the economy concerned. Moreover the analysis can also be conducted in the context of government maintaining income from taxation while conducting the tax reforms.

Important issues associated with tax reforms in the developing countries include: how tax (government) revenue is going to be raised[6] and what are the consequences of the options. This should be perceived in the context of the existing government subsidies, import tariffs and other taxation measures.[7] Unfortunately, the current state of optimal taxation theory is incomplete as a guide to action concerning these questions as well as for other critical issues in tax policy. Slemrod (1990) rightly noted that it is incomplete because it has not yet come to terms with taxation as a system of coercively collecting revenues from individuals who will tend to resist. The coercive nature of collecting taxes implies that the resource cost of implementing a tax system is large (not to mention the welfare loss associated to the post implementation of the tax system). Furthermore, alternative tax systems differ greatly in the resource cost of operation. Differences in the ease of administering various

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almost irrespective of income levels, economic structure, or growth rates (World Bank, World Development Report 1988).

[5] A 'good' tax reform does not merely changing the existing tax system but also includes tax administration and acceptability. These can be the key success the tax reform (Bird, 1990). Timing and sequencing are also important in designing tax reform. Most successful tax reforms (Japan in 1949/50, Korea in 1962-65 and Indonesia in 1983-86) were carried out at the later stage as an integral part of an economic reform (Rao 1993).

[6] Forexample by introducing a value-added tax, increasing income tax rates, more effectively enforcing the existing income tax, introducing more progressive income tax, or replacing the income tax with a consumption tax?)

taxes have been and will continue to be a critical determinant of appropriate tax policy. Therefore, *optimal tax formulas are either guides to action or nothing at all*[8]. The most important thing to learn from the optimal tax literature is that the efficiency costs of taxation are potentially large, and therefore it is worthwhile to focus attention on how to minimize these costs, which in many cases should also be weighed with their economy-wide effects and distributional implications. This, again, calls for the use of a more sophisticated model in the kind of general equilibrium framework.

To address this issue discussed above, a Computable General Equilibrium (CGE) model representative to the Indonesian economy is developed, based on the Indonesian SAM 1993. The model is then used for measuring the welfare costs of the existing commodity taxation in each sector which consists of tariffs on imports and indirect taxes on domestic commodities.[9] The results are then used for designing an optimal allocation of commodity taxation (i.e. commodity tax reform), which is defined as the one that stimulates growth and maximises welfare, as well as maintains the level of total tax revenue accrued to the government. The proposed tax reform has, therefore, brought or guaranteed an improvement on the existing tax system, as welfare loss associated to the existing commodity tax system has been minimised and government revenue from taxation has been maintained. The improvement has, therefore, been achieved without necessarily sacrificing government revenues.[10]. In addition, a consistent tax rate scenario is also introduced in the simulation, along with the optimum allocation case, to show what would have been the results had the government been consistent in applying the tax reform policy, by maintaining the commodity tax rates applied in the tax reform period (i.e. 1985) until 1993. Both simulations should give an indication on how to increase the efficiency and at the same time to reduce collection costs of the existing taxation. More specifically, having set up the model, the analysis is conducted by setting up the appropriate simulations given the issues concerned. determining the variables concerned and then

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[7] The subsidy and import tariff are usually employed to protect domestic industry.

[8] Frank Hahn 1973 as quoted by Slemrod 1990

[9] Therefore, this is the first attempt at developing such model, as previous CGE applications on the Indonesian economy had no particular concern on welfare costs of the existing taxations.[9] This is also in line with similar works of using CGE models to assess the welfare costs of any tax taxation (see REF).

[10] In the Indonesian context, maintaining the existing revenue from tax (as it seems unrealistic to increase it now !) is very important in the current government fiscal policy,[10] especially to finance its routine expenditures such as paying wages and salaries of the civil service (not to mention for the 'development expenditure')In the Indonesian government budget, expenditures are classified into routine and development expenditures. The former includes all

developing or calculating their relevant economic indicators, comparing the counterfactual results with benchmark condition, and analysing the results based on the variables concerned.

As welfare is maximised, the economic condition should also improve, implying that the commodity tax reform proposed must be a growth enhancing one.[11] In more detail, the model is also used for analysing the economy-wide effects of tax policy changes on the various economic indicators, including on the distributional issue at the household level. Moreover, as Indonesia has long been a popular tourist destination and the foreign tourism has long been an important and integral part of the Indonesian economy (see Sugiyarto et al. 2002 for detail discussion about this issue), the consequences of the proposed commodity tax to the foreign visitors will also be examined).

The paper is organised as follows: The introduction section sets out research background, main objectives, and methodology of analysis. It puts this study in its relevant context, putting emphasis on its main motivation and new features in the existing situation and modelling applications. The next section briefly discusses the overview of the Indonesian fiscal and tax reform policies, highlighting the major development of the Indonesian tax system. It then was followed by discussion on the main features of the Indonesian CGE model developed in this study, including the SAM used. The model is then used for measuring the marginal excess burden and welfare costs of the existing commodity taxation which is then used as a base for setting up the optimal allocation of the commodity taxation. The proposed optimal rates are then simulated along with the consistent rates as an additional comparison, in which the government is assumed to maintain the tax reform spirit by consistently applying the tax rates in 1985 (period of tax reform) in the year 1993. The economic effects and distributional implications of these two policy options are examined and presented in the last section, which includes conclusions, policy implications and suggestions for further research.

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expenses for running the country while the latter is intended for investments. Most of these investment are financed by foreign funds.

[11] This differs to the traditional partial analysis of optimal taxation. The tax reform proposed in this paper has therefore taken all efficiency and costs of the existing taxation into account.

II. FISCAL POLICY AND TAX REFORM IN INDONESIA

During the first two decades since its independence in 1945, trade taxes continued to be the main source of Indonesian government revenue, leading to imposition of various devices such as multiple exchange rates and export surcharges. The adoption of 'guided economy' at that time, made government expanding controls over means of productions by imposing nationalisation of foreign companies, and introducing various quantitative restrictions. On the fiscal side, it was also common for the government to print money for financing its budget deficits. Since 1967, the new government then started to adopt a 'balance budget'[12] policy, preventing the government from printing money or issuing debt securities and instead relying on foreign sources such as foreign loans and grants. At the same time, capital account was opened, allowing private sector to get access to foreign sector. This policy has been continuously adopted until currently.

In the early 1980s, Indonesia experienced a sharp deterioration in its terms of trade and balance of payments due to the decline in world prices of oil and primary commodities, rising international interest rates and decreasing foreign capital inflows.[13] These external shocks seriously disrupted Indonesian development plans and induced extensive structural adjustment. The adjustment was firstly aimed at restoring external creditworthiness, but it then led to change in the government's development strategy from public sector led, import-substitution industry with repressed financial sector to private sector led, export-oriented with market based financial sector. The adjustments were also adopted to reduce distortionary threat of its expansionary policies inherited from previous oil boom decade.[14] These voluntary structural adjustments[15] proved successful in restoring the external condition and providing more favourable conditions for the domestic economy. The policy measures taken includes massive devaluation, trade liberalisation and tax reforms.

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[12] This 'balance budget' has a political meaning since foreign aid and loans for development were counted as government revenue rather than source of financing.

[13] These external shocks severely hit most of the highly indebted countries, which then led to the so-called International Debt Crisis in 1982.

[14] Oil price in world market increased in 1973-74 and 1978-79 that brought a substantial increase in the government revenue. This oil booms, however, led to the mis-allocation of domestic resources only to the booming sector. This 'Dutch Disease' phenomenon was then accompanied by overoptimistic prediction of oil price in the future from the government side (see Gelb et al., 1988 for the assessment of oil booms and the 'Dutch Disease' phenomenon in the oil exporting countries). This seriously affected the government-planned expenditure since more then two third of government revenues at that time were from oil.

[15] To be distinguished from structural adjustments as part of conditional loans provided by the IMF/World Bank.

The tax reform includes the introductions of three new tax laws in 1983, namely: *General Tax Provision and Procedures*, *Income Tax Law*, and *Value -Added Tax* (on goods and services) and *Sales Tax on Luxury Goods*.[16] The New Income Tax has been effectively implemented since the first of January 1984. The Value -Added Tax (VAT) was initiated in 1985 to replace the old and complicated sales tax system. Another new tax, Land and Building Tax was also passed in 1985 and was adopted in 1986 as part of the comprehensive tax reform. Prior to the reform, the existing tax system (inherited from the Dutch) was characterised by a narrow tax base (dependent merely on oil tax), and a very low tax enforcement (due to oil booms, very complicated tax law and shortage of competent personnel).[17] The amount of tax collected was a kind of negotiated outcome due to the negotiative nature of the tax system (Woo, et al. 1994 and Hill, 1996). [18]

The tax reform package seeks to offset the projected decline in the share of oil taxes in GDP to avoid a cut in the government spending. More particularly, the main objectives were to increase non-oil revenue, to have more effective income redistribution, to remove tax-induced incentives for waste and inefficiency, and to reduce the transaction costs of tax collection. The two proximate objective were a drastic simplification of tax structure and depersonalisation of tax administration (Gillis, 1990). [19]

Compared with other tax reforms, the Indonesian approach was quite distinctive in the way:

- It was comprehensive and conducted in a matter of years with nothing in the old system had to be retained.[20]
- Involving domestic officials, academics as well as a team of domestic and expatriate lawyer to convert tax policy decision into legislation.
- Involving training and education to establish well trained officials to operate the new tax system.

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[16] Respectively Law No 6, No 7, and No 8 in 1983.

[17] Share of oil tax to the total government revenue from tax in 1969/70 was 26 %, rose to 55 % in 1974/75 and peaked at 71 % in 1981/82.

[18] Income distribution objectives were also poorly served by the tax system. As pointed out by Gillis (1990) that although the Indonesian had adopted very high progressive rates, the effective rates were remained low. An empirical study leading up to the tax reform showed that the effective rate of income tax for the richest 5 per cent population in 1981 was only 4 percent even the nominal rate applicable to them was 50 percent.

[19] This term actually refers to avoiding as much as possible personal contacts between taxpayers and tax administrators to reduce ‘tax collection costs’.

- Including matters beyond consideration of tax reform, such as procedural, administrative and implementation issues (i.e. computerisation).
- Making technical studies on particular tax issues available to decision-makers.

Descriptive analysis on the Indonesian tax structure before and after the tax reform (i.e.1983 and 1986) shows that the result was impressive (Table 2.1). The reform has successfully maintained tax revenue[21] and even brought to a significant change in the tax structure. Share of non-oil tax nearly doubled -from 32.2 % in 1983 to 63.7 % in 1986, while its share to GDP increased from 6.7 % to 9.1 %.

Despite the progress, some problems remained. There has been a reluctant attitude towards economic reform on the government side as most major policy changes in Indonesia have always been linked to major political and economic crises. It seemed that only the crises can trigger the necessary political will to embark on economic reform. Furthermore, most of the changes have also been generated by the fall in petroleum price, so that policy reforms in Indoneasia can be thought as an overall restructuring strategy in response to falling petroleum prices rather than being motivated by the benefits of economic reform (Pangestu 1996, Hill 1996). In many instances, trade and industrial policy would be back to protective and distorted once there was no problem in the oil price (Sugiyarto 2000). Export earnings and government revenue were still highly vulnerable to changes in prices of oil and primary commodities in the world markets. Progress on removing the existing barriers and other distortions in the domestic market has not been quite so successful and straightforward. Up to mid July 1997 (just before the crisis started), for example, both

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[20] It took more than 6 years from technical studies to implementation.

[21] Revenue was increased to about 15 trillion rupiah even though its share to GDP was decreased from 20.8 % to 14.3 % as a result of higher increase in the GDP.

price and non-price controls were still prevalent, especially on transport services, public utilities, fuel products and other basic and strategic commodities.

A further examination on the government sources of income reveals that over the period of 1985-1993, the government was in fact increasingly reliant on the commodity taxation (see Table 2.2.). Revenue from this taxation contributed to 15 % of government income in 1985 which then doubled to 30 % in 1990 and further increased to 36 % in 1993. More than a quarter of those revenues were derived from import tariff, implying that the foreign trade became more protective while the domestic industry was increasingly distorted. Detail information on the structure and level of commodity taxation presented in Table 2.3 further reveals that not only did the tax rate increase but also its dispersion. This was applied for both domestic commodity and import taxation. Notice that all tax and tariff as well as their dispersion increased over the periods of 1985-90, 1990-1993 and 1985-93, except for import tariff dispersion between 1985-90. Therefore there is a clearly strong case for proposing a new tax reform, especially for better raising tax revenue and most importantly to increase the efficiency of tax system. Compared to the neighbouring countries, ratio of tax revenue to GDP for Indonesia is still low. In 1994, for instance, it was only 14.7%, compared with 33% for Malaysia and 17% for both Singapore and Thailand.

Table 2.1: Indonesian Tax Structure Before and After Tax Reform.

Types of tax	Before (1983)			After (1986)		
	Billions of rupiah	% of total tax revenue	% of GDP	Billions of rupiah	% of total tax revenue	% of GDP
(1)	(2)	(3)	(4)	(5)	(6)	(7)
Sales/VAT*)	830	5.4	1.1	2942	19.2	2.8
Excise	775	5.1	1.1	991	6.5	0.9
Stamp Duties	65	0.4	0.1	196	1.3	0.2
Import Duties	557	3.6	0.8	820	5.4	0.7
Export Duties	104	0.7	0.9	65	0.4	0.1
Oil/LNG tax	10398	67.9	14.1	5559	36.4	5.2
Income	1785	11.7	2.4	2189	14.3	2.0
Interest, Dividendand Royalty	148	0.9	0.2	271	1.8	0.3
Land and Building	132	0.9	0.2	238	1.6	0.2
Non Tax Revenues	520	3.4	0.7	2022	13.2	1.9
TOTAL REVENUES	15134	100.0	20.8	15293	100.0	14.3
Non-Oil Tax Revenues	4916	32.2	6.7	9734	63.7	9.1

*). Sales tax and VAT are terms used for before and after reform years, respectively

Sources: Ministry of Finance, Republic of Indonesia (Quoted from Gillis, 1990b)

Table 2.2. Government Income by Source

Source of Income	1985		1990		1993	
	Value (mill. Rp)	Share (%)	Value (mill. Rp)	Share (%)	Value (mill. Rp)	Share (%)
1. Factor Income/ Capital payments	66.9	0.4	1937.8	4.7	4249.8	6.9
2. Taxation on						
• Households	1817.7	9.7	1997.8	4.8	3848.4	6.2
• Firms/Corporate	13998.3	74.9	24845.3	59.9	31014.8	50.1
• Commodity/Sector	2789.9	14.9	12269.4	29.6	22355.8	36.1
- Domestic	2029.2	10.9	9204.5	22.2	15963.7	25.8
- Import Tariff	760.6	4.1	3064.9	7.4	6392.1	10.3
3. Rest of the world	29.7	0.2	464.9	1.1	398.5	0.6
Total	18702.4	100.0	41515.2	100.0	61867.2	100.0

Source: Calculated from the Indonesian SAMs in 1985, 1990 and 1993.

Table 2.3a. Structure and Level of Indirect Commodity Taxation in Indonesia In 1985, 1990 and 1993

Continued

Sector/Commodity	1985			1990			1993			Change in tax rate (%)		
	Dom-com	Revenue	Tax Rate	Dom-com	Revenue	Tax Rate	Dom-com	Revenue	Tax Rate	1985-1990	1990-1993	1985-1993
	(Million Rp)		(%)	(Million Rp)		(%)	(Million Rp)		(%)			
Food Crops	14511.83	97.99	0.68	28510.7	201.23	0.71	35644.84	250.83	0.70	0.03	0.00	0.03
Other Agriculture	13861.25	75.05	0.54	24273.88	200.11	0.82	40866.67	359.4	0.88	0.28	0.06	0.34
Mining	16706.27	20.94	0.13	28375.57	244.44	0.86	35429.98	319.89	0.90	0.74	0.04	0.78
Food Processing	15837.01	677.36	4.28	35298.07	2964.19	8.40	63452.83	6208.18	9.78	4.12	1.39	5.51
Textile	3403.43	32.16	0.94	47156.23	781.87	1.66	80964.1	1363.63	1.68	0.71	0.03	0.74
Construction	20188.33	273.03	1.35	13984.44	191.44	1.37	20336.52	277.75	1.37	0.02	0.00	0.01
Papers and Metals	6504.99	130.84	2.01	20962.82	736.22	3.51	32990.27	1164.09	3.53	1.50	0.02	1.52
Chemical	19385.74	-682.93	-3.52	40365.52	-484.28	-1.20	61641.1	-771.36	-1.25	2.32	-0.05	2.27
Utilities	1801.91	0.71	0.04	4487.62	19.42	0.43	8252.973	42.92	0.52	0.39	0.09	0.48
Trades	14319.47	877.31	6.13	30874.61	2505.63	8.12	54570.79	3769.46	6.91	1.99	-1.21	0.78
Restaurant	4688.9	135.92	2.90	12028.01	521.78	4.34	18428.32	799.43	4.34	1.44	0.00	1.44
Hotel	933.91	34.82	3.73	2146.18	91.42	4.26	3452.167	147.04	4.26	0.53	0.00	0.53
Land Transport	5614.39	67.12	1.20	11017.22	180.55	1.64	18835.54	313.18	1.66	0.44	0.02	0.47
Other Trans & Com.	3124.32	11.65	0.37	8892.87	74.13	0.83	17047.07	125.76	0.74	0.46	-0.10	0.36
Bank and Insurance	3102.45	17.48	0.56	11420.34	96.69	0.85	19394.18	161.07	0.83	0.28	-0.02	0.27
Real estate	4831.42	147.71	3.06	9476.41	457.16	4.82	17239.76	802.9	4.66	1.77	-0.17	1.60
Public services	10547.63	44.58	0.42	18347	194.38	1.06	26128.04	304.26	1.16	0.64	0.11	0.74
Personal services	5030.62	67.48	1.34	11497.83	228.12	1.98	16939.4	325.22	1.92	0.64	-0.06	0.58
Total	164393.9	2029.22	1.23	359115.3	9204.5	2.56	571614.5	15963.65	2.79	1.33	0.23	1.56
Standard Deviation (%)			2.08			2.62			2.68			

Table 2.3b. Structure and Level of Import Tariff in Indonesia In 1985, 1990 and 1993

Sector/Commodity	1985			1990			1993			Change in tariff rate (%)		
	Import	Revenue	Tariff rate	Import	Revenue	Tariff rate	Import	Revenue	Tariff rate			
	(Million Rp)		(%)	(Million Rp)		(%)	(Million Rp)		(%)	1985-1990	1990-1993	1985-1993
Food Crops	421.97	6.92	1.64	632.82	16.26	2.57	1425.18	55.47	3.89	0.93	1.32	2.25
Other Agriculture	391.38	6.62	1.69	198.82	0.85	0.43	449.85	47.51	10.56	-1.26	10.13	8.87
Mining	1157.49	9.53	0.82	2567.25	3.59	0.14	2414.61	38.47	1.59	-0.68	1.45	0.77
Food Processing	211.57	17.86	8.44	1302.65	24.58	1.89	2614.25	310.47	11.88	-6.55	9.99	3.43
Textile	148.82	15.04	10.11	37.77	1.34	3.55	87.37	20.06	22.96	-6.56	19.41	12.85
Construction	3.53	0.57	16.15	2599.68	226.98	8.73	4901.88	278.18	5.67	-7.42	-3.06	-10.47
Papers and Metals	6393	505.2	7.90	23330.13	2202.88	9.44	34970.91	3359.83	9.61	1.54	0.17	1.71
Chemical	3797.24	195.73	5.15	12317.4	575.91	4.68	18873.12	2242.4	11.88	-0.48	7.21	6.73
Public services	717.54	0.58	0.08	1587.09	0.07	0.00	2867.21	0.71	0.02	-0.08	0.02	-0.06
Personal services	246.38	2.48	1.01	964.61	12.46	1.29	1796.2	39	2.17	0.29	0.88	1.16
Total	13488.92	760.53	5.64	45538.22	3064.92	6.73	70400.58	6392.1	9.08	1.09	2.35	3.44
Standard Deviation (%)			5.27			3.41			6.86			

III. MAIN FEATURES OF THE MODEL

A. Production/Supply Side

Production activities are classified into 18 categories and the commonly used assumption of one sector produces only one good is adopted, so that classifications for sector and commodity are exactly the same. Therefore, there are 18 sectors (and commodities for both domestically produced and imported), 8 types of labour, 5 kinds of capital, 10 categories of household, and economic institutions such as firms, the government, and the rest of the world (ROW). Categorisation of labour based on a combination of sector, type of workers, and job status,[22] while categorisation of capital based on ownership and nature of the capital.[23] Households are classified according to income sources, area of residence, and job status.[24] Firstly, households are divided into agriculture and non-agriculture. The former is then split into employee (land-less farmer), small farmer (land size < 0.5 hectare), medium farmer (between 0.5-1.0 hectare) and large farmer (>1.0 hectare). For the non-farmer, the disaggregation is based on area of residence (urban and rural), level of income, and a combination of occupation and job status such that the non-farmer in each area is classified into low, dependent and high-income groups.[25] The household classification has been developed based on 'real' variables, which can easily be identified for policy targeting as commonly suggested in the development of a SAM. The categorisation turns out to be very useful for developing income distribution indicators, since the income ratio between groups in each sector or across sector can be used as a proxy of income inequality index.

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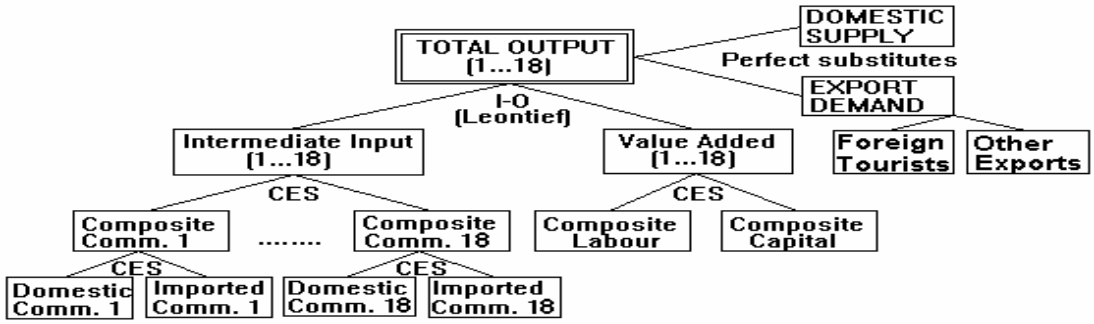
[22] i.e. wage and non-wage. The wage term refers to employee while the non-wage category includes employers, self employed and family workers. In the Indonesian economy context, the former tends to be associated with higher wage income group as most of the latter consists of self employed and unpaid family workers. In the original SAM, the workers were then further disaggregated into those who live in urban and rural areas. However for modelling purposes it seems no justifiable reason (i.e. distinctive differences) for splitting the two since the area of residence does not affect the behaviour of workers in the production function. In any case, the urban and rural feature will be captured in the household categorisation. See the detailed SAM available from the CBS.

[23] Land and other agriculture capital, for instance, were combined into one category, while private domestic capital was divided into two, owned by corporate and non-corporate institutions. The other two categories of capital are government and foreign capital.

[24] The economic status refers to the household head or the highest income earner.

[25] The dependent household refers to the households whose head or highest income earner in the household does not work anywhere (i.e. not in the labour force), relying instead on transfer incomes (from relative, government etc). The household classification has been developed based on 'real' variables, which can easily be identified for policy targeting as commonly suggested in the development of a SAM. The categorisation turns out to be very useful for developing income distribution indicators, since the income ratio between groups in each sector or across sector can be used as a proxy of income inequality index. This method seems justifiable for measuring direction of changes in the income inequality, especially in the lack of other inequality indicator such as the Gini Coefficient.

Production is specified as two-level nesting of CES functions and total production is allocated to domestic demand and exports, which are then allocated for foreign tourists and other exports. Producers are assumed to be indifferent between selling domestically and exporting -as they receive the same price, [26] while the 'small country' assumption is adopted for imports. Detail nesting in the production functions and output allocation in the model can schematically be presented as follows:



Domestic output is a Leontief function of intermediate inputs (CES aggregation of domestically produced and imported commodities) and value added (CES function of composite labour and capital) and exports are split into two categories: Services (S), and Agriculture & Manufacturing (A & M). The former is assumed to be consumed by foreign tourists, while the latter is for other exports.[27] Foreign tourist is therefore treated as an economic institution, which consumes certain kinds of exported commodities (i.e. Services).[28] This treatment is in line with the World Tourism Organisation (WTO) recommendations on the Tourism Satellite Account (TSA) that some parts of the exports should be attributed to the foreign tourism.

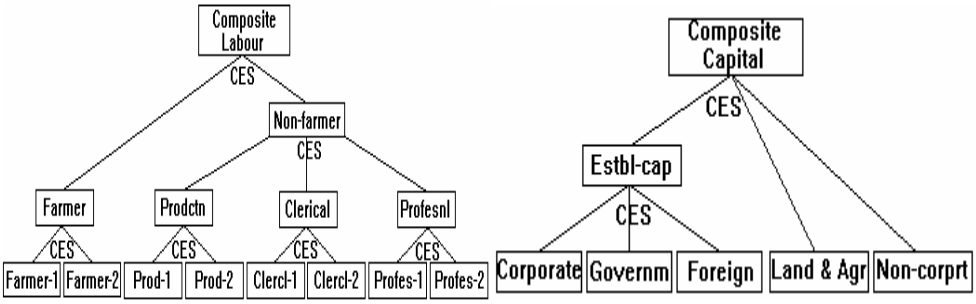
A detailed CES nesting is employed to form composite labour and capital. At the lowest stage, similar types of labour (i.e. farmers, production workers, clerical, and professional) and capital (i.e. corporate capital) are respectively aggregated. Production, clerical and professional workers are aggregated to form 'non-farmer worker', which is then combined with farmer to form composite labour. On the capital side, the aggregated 'corporate capital' (consists of foreign, government, and

[26] By employing this specification, it is possible to introduce some elasticity in the export demand of domestic products in the world market.

[27] The assumption and treatment of foreign tourism seem to be the best one, considering that the main concern of a CGE counterfactual analysis is more on the general equilibrium effects or direction of changes. Fluctuations in the actual foreign tourist consumption should be reflected in the fluctuations of service exports, as most of the service exports are actually consumed by foreign tourists. For a better treatment, a more refined method for estimating foreign tourist consumption should be used prior the development of the CGE model.

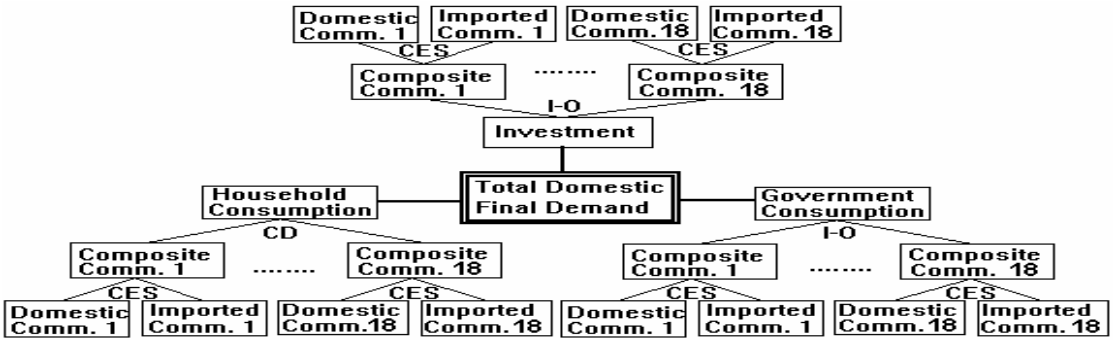
[28] In reality, foreign tourists consume nearly all kinds of commodities (see for instances TSA for Canada, New Zealand, Norway and USA). However, in the case of lacking for such information the assumption adopted in this study seems very reasonable.

corporate), is combined with 'non-corporate capital' to form the composite capital.[29] Schematically, the nesting can be presented as:



B. Demand Side

Total final demand (derived from composite commodities) consists of consumption (household and government) and investment, which is generated by the aggregated saving-investment account. Fixed and 'planned'[30] consumption patterns are respectively assumed for households and the government, which makes government saving residual. Aggregate investment is accordingly fixed to reflect the 'investment driven' nature of the economy.[31] Schematically, it can be presented as follows:



The government and domestic firms have access to foreign borrowing for balancing its budget deficit,[32] contributing to the total foreign loans.[33] In addition, there are

[29] This specification allows for substitution between different types of labour with similar characteristics, different types of labour and capital with different characteristics and between labour and capital in general. The degree of substitution decreases as the similarity between labour and/or capital decreases. This is reflected by a decrease in the degree of substitution (i.e. the elasticity values used) as we move from the lowest level to highest level of the nesting.

[30] It is not affected by commodity prices and the government's income.

[31] This specification was chosen to reflect the fact that the Indonesian government (i.e. the main economic actor) has always set its budget and other macroeconomic targets at the beginning of year, which in turn affects the economic behaviour of both firms and households.

[32] Since 1967, the Indonesian government has continuously adopted a 'balanced budget' principle, where its deficits can only be financed by foreign funds (regarded as revenues) and not by government's domestic debt securities or printing money.

[33] Therefore exchange rate is fixed and balance of payments deficits become a residual.

transactions (i.e. direct taxes and other transfers) among institutions (i.e. the ROW, government, firms and households) that should be portrayed in the models. This adds a new feature of the model, which is very crucial for income distribution issue.[34] In addition to the main functional specifications for production and final demand above, there are other equations in the model to define prices (i.e. for activities, commodities, and factors), incomes and expenditures (i.e. for institutions), and to balance the model.

[34] Unfortunately, this issue was neglected by the previous CGE applications in the Indonesian economy (except Sugiyarto 2000).

IV. Welfare Costs and Optimum Commodity Taxation

4.1. Near Marginal Tax Incidence

Literature on the marginal tax incidence (Newbery and Stern 1997 and Ahmad and Stern 1991) concerns on how a very small change in a tax has impacts on welfare (W) and tax revenue (T). Define λ as the ratio changes between the two:

$$\lambda = \frac{dW}{dT}$$

It then follows that a positive λ means that welfare can still be improved by increasing tax, and vice versa. Accordingly, the value of λ can be used as an indicator whether a particular sector or commodity is already over or still under taxed. A positive λ means that the sector/commodity is still under tax, and vice versa. In CGE context this 'near marginal' concept can be simulated by introducing a small increase in the tax rate while maintaining fiscal neutrality by offsetting transfers to ensure a constant real government consumption. As the marginal increase in the welfare was compared to the marginal increase in the tax revenue, the value of λ also reflects the marginal excess burden (MEB) per additional unit of tax revenue collected. Table 3.1 summarises the result of this simulation (i.e. introducing 1 % increase in the tax rate) which was then ranked by the value of λ.

The result shows that nearly all sector/commodity has already over taxed, except for utility sector, implying that the existing tax system has generated distorted industry and domestic market. The result also highlights the costly method of collecting and possibly raising revenue through taxation as any increase in the tax rate will reduce welfare. The distortions are very significant such that every unit of revenue collected from the commodity taxation actually creates more welfare loss. Value of λ in the utility sector (consists of electricity water and gas) should be interpreted carefully as there is a lot of direct government provision and intervention in this sector. The same caution should also be applied for chemical sector, which is a net subsidised sector. Table 3.1 also shows that the negative values of λ vary from 32 (Mining) to 203 (Food Crops) percents, implying that any project should produce benefits of at least 1.32 per unit cost if the project is to be welfare improving.[35]

[35] Ballard et al. 1985 found that the MEB for the US is in the range of 17 to 56 cents per dollar extra revenue.

Table 4.1. Near-Marginal Tax Incidence

Sector/Commodity	Marginal Change in		
	Welfare	Tax Revenue	l
Food Crops	-4.262	2.092	-2.037
Food Processing	-95.57	47.301	-2.020
Other Agriculture	-4.402	3.020	-1.458
Restaurant	-9.375	6.468	-1.449
Personal services	-3.400	2.735	-1.243
Real estate	-7.629	6.780	-1.125
Chemical	6.823	-6.584	-1.036
Construction	-2.203	2.170	-1.015
Papers and Metals	-9.313	9.361	-0.995
Public services	-2.607	2.672	-0.976
Trades	-26.87	29.631	-0.907
Land Transport	-2.192	2.664	-0.823
Bank and Insurance	-1.105	1.407	-0.785
Hotel	-0.761	1.199	-0.635
Textile	-6.686	11.103	-0.602
Other Trans & Com.	-0.565	1.096	-0.516
Mining	-0.875	2.698	-0.324
Utilities	0.116	0.401	0.289
Total	-180.429	125.518	-1.437

4.2. Welfare costs of the existing commodity taxation

A further elaboration for analysing a tax system in CGE context is to calculate the welfare costs or welfare loss of the existing commodity taxation. This can be done for both indirect taxation on the domestic commodities and tariff on imports (see Shoven and Whalley 1984 and Ballard et al. 1985 for detail discussion on this topic). The result of conducting these simulations is summarised in Table 4.2 which is then compared to the sectoral outputs and tax revenues.

A comparison of sectoral output and tax revenue shows that some sectors are relatively much more distorted than the others. For example, there are three sectors contributing more than 10 percent of total output, namely Textile (14.2%), Food Processing (11.1%) and Chemical (10.8%), but their contribution to the tax revenue was recorded at 38.9%; 8.54% and even –4.83% (for Chemical sector is net subsidised sector). Another sector contributing nearly 10% of output but has significant contribution in term of tax revenue is trade sector, with its output share is about 9.6% but contributing to 23.6% of total indirect tax from domestic commodity. This sectoral imbalance in the tax revenue is made worse by its impacts o the welfare loss. It can be seen that more than a half of the welfare loss (i.e. 51.8%) was originated from food processing industry and about 15 % from trade sector. The sectoral imbalance is also recorded on the import side, as most government revenue from tariff was collected from Papers & Metal products (about 53%) and Chemical (35%). The latter is clearly as part of protecting the domestic industry (in addition to collecting revenue off course) as the sector is net subsidised sector.[36] However, there is a significant difference in terms of its impacts on welfare as the amount of sectoral tariff revenue and welfare loss are in line with the value of sectoral imports. The sectoral effects of tariff is therefore more predictable.

The value of welfare loss associated with the commodity taxation shows that the existing indirect tax and tariff system generates relatively high distortions in the economy. The former generates 1.3 unit of loss for every unit of revenue collected, while for the import the ratio is 0.8. This suggests that the existing tax system is not an efficient mechanism for collecting revenues. Sectors with ratio of welfare cost to revenue collected more than unity are Food Crops, Other Agriculture, Food Processing, Construction, Utilities, Restaurant, Bank and Insurance, Real estate Public

and Personal services. On the import side, the relatively most distortionary tariffs are the ones on Food processing and Construction, (i.e. 118% and 101%, respectively). Moreover, the Food processing is also among the most highly taxed in the domestic market, amounting to around 39 % of the total tax on the domestic commodities.[37] Furthermore using ratio of sectoral welfare loss to revenue of a half as a cutting point for possibility of raising tax to increase revenue, it seem that this can only be done through increasing taxation in two sectors, namely: mining and textile industry. On the import side, this can be made possible with increasing tariffs on food crops and textile products.

Total welfare loss associated with the implementation of indirect taxation on domestic commodity is nearly 4 % of the total production. The actual welfare loss could be much higher should the subsidy is treated differently. On the import side, the total welfare loss is more than 7 % of total import value.

[36] In 1993, the net subsidy to this sector amounted to 771 million rupiah or about 5 % of total revenue from indirect taxation on domestic commodities.

[37] The food processing contributes to around 11 % of the total output in 1993 (the CBS 1995).

Table 4.2. Welfare Costs of the Existing Commodity Taxation, 1993

Indirect Taxation

Sector / Commodity	Output		Tax Revenue		Welfare Costs		Welfare Costs as % of			
	Value	(%)	Value	(%)	Value	(%)	Sector Output	Total Output	Sector Tax	Total Tax
Food Crops	35644.8	6.24	250.8	1.57	485.8	2.41	1.36	0.08	193.66	3.04
Other Agriculture	40866.7	7.15	359.4	2.25	499.6	2.48	1.22	0.09	139.00	3.13
Mining	35430.0	6.20	319.89	2.00	145.9	0.72	0.41	0.03	45.62	0.91
Food Processing	63452.8	11.10	6208.18	38.89	10427.7	51.75	16.43	1.82	167.97	65.32
Textile	80964.1	14.16	1363.63	8.54	741.3	3.68	0.92	0.13	54.37	4.64
Construction	20336.5	3.56	277.75	1.74	282.2	1.40	1.39	0.05	101.61	1.77
Papers and Metals	32990.3	5.77	1164.09	7.29	1018.8	5.06	3.09	0.18	87.52	6.38
Chemical	61641.1	10.78	-771.36	-4.83	-620.2	-3.08	-1.01	-0.11	80.41	-3.89
Utilities	8253.0	1.44	42.92	0.27	45.7	0.23	0.55	0.01	106.46	0.29
Trades	54570.8	9.55	3769.46	23.61	2959.4	14.69	5.42	0.52	78.51	18.54
Restaurant	18428.3	3.22	799.43	5.01	1025.1	5.09	5.56	0.18	128.23	6.42
Hotel	3452.2	0.60	147.04	0.92	138.5	0.69	4.01	0.02	94.18	0.87
Land Transport	18835.5	3.30	313.18	1.96	279.8	1.39	1.49	0.05	89.34	1.75
Other Trans & Com.	17047.1	2.98	125.76	0.79	114.4	0.57	0.67	0.02	90.94	0.72
Bank and Insurance	19394.2	3.39	161.07	1.01	168.6	0.84	0.87	0.03	104.70	1.06
Real estate	17239.8	3.02	802.9	5.03	839.2	4.16	4.87	0.15	104.52	5.26
Public services	26128.0	4.57	304.26	1.91	322.6	1.60	1.23	0.06	106.04	2.02
Personal services	16939.4	2.96	325.22	2.04	401.5	1.99	2.37	0.07	123.45	2.52
Total	571614.5	100.0	15963.7	100.0	20151.1	100.0	3.53	3.53	126.23	126.23

Imports

Sector / Commodity	Imports		Tariff Revenue		Welfare Costs		Welfare Costs as % of			
	Value	(%)	Value	(%)	Value	(%)	Sector Import	Total Import	Sector Tariff	Total Tariff
Food Crops	1425.2	2.02	55.47	0.87	13.93	0.28	0.98	0.02	25.11	0.22
Other Agriculture	449.9	0.64	47.51	0.74	40.12	0.80	8.92	0.06	84.44	0.63
Mining	2414.6	3.43	38.47	0.60	30.97	0.61	1.28	0.04	80.50	0.48
Food Processing	2614.2	3.71	310.47	4.86	365.03	7.24	13.96	0.52	117.57	5.71
Textile	87.4	0.12	20.06	0.31	2.70	0.05	3.09	0.00	13.45	0.04
Construction	4901.9	6.96	278.18	4.35	280.93	5.58	5.73	0.40	100.99	4.39
Papers and Metals	34970.9	49.67	3359.83	52.56	2408.84	47.81	6.89	3.42	71.70	37.68
Chemical	18873.1	26.81	2242.4	35.08	1870.88	37.13	9.91	2.66	83.43	29.27
Total	70400.6	100.0	6392.1	100.0	5038.63	100.0	7.16	7.16	78.83	78.83

4.2. Consistent and Optimum Commodity Taxation

Two types of scenarios are simulated here, namely: consistent and optimum commodity taxation. Consistent scenario is to capture what would have been the results if the government consistently adopted the tax reform spirit, i.e. reflected by maintaining tax rate level in 1985 in the year 1993.[38] On the optimum scenario, the simulation is conducted to examine what would be the results if the optimum commodity tax rates are implemented instead. The optimum rates were calculated by taking the sectoral welfare loss associated with the existing tax system into account while maintaining the government revenue from commodity taxation. The two set of tax rates introduced in the simulation are in line with the common practice of tax reform policies especially in the developing countries (See Ahmad and Stern 1991, Bird 1992, Bird and Oldman 1990, Gillis 1989, Newbery and Stern 1988 and Rao 1993). The reform may include simplifying tax structure, broadening tax base, levying lower and uniform tax rates and exempting taxes on intermediate inputs. The broadening tax base and lowering tax rate usually involve reductions in the level of indirect taxation on domestic commodities which were clearly reflected in the two set of tax rates introduced in the simulations which are lower and less disperse. In addition, the optimum rates will also guarantee that the welfare loss is minimised. Table 4.3 shows the complete sets of indirect taxes and tariffs for both consistent and optimum taxation scenarios which can be compared with the benchmark level. Notice that over the period of 1985 to 1993, the indirect tax on domestic commodity was more than doubled while tariff increase more than 60%.

The results of introducing the two scenarios are then analysed by examining their effects on key variables such as macroeconomic aggregates, external performance, welfare, household income and consumption, and foreign tourist consumption. Descriptions and measurements of these economic indicators are summarised in **Table 4.4. Table IV.2** presents the indicators, which are calculated as percentage changes from the benchmark data, except for the terms of trade (TOT), which is calculated as: TOT = exports at current price/import price deflator) – export at constant price. A positive TOT indicates export prices are relatively higher than import prices and vice versa. By definition, TOT at the benchmark equals zero, since import and export price deflators are equal. Given the way the TOT was calculated, it

[38] Recall that despite government's efforts in reducing tariffs, for instance, revenue from import tariff contributed to 4.1% of total government income in 1985. This amount was then more than doubled to 10.3% in 1993.

is possible to construct a Gross Domestic Income (GDI), which is equal to GDP at market price + TOT. Some authors argue that GDI is actually a better economic indicator than GDP at constant price because it includes positive and negative benefits of changes in prices in the surrounding world. In most cases, a positive number reflects an increase or improvement, and vice versa, except for income distribution indicators, where positive numbers reflect an increase in income inequality (worsening of income distribution). Percentage changes in balance of payments (BOP) deficits and trade balances should also be calculated and interpreted carefully since the absolute (actual) numbers can switch from negative to positive.

Table 4.3: Simulation of Applying Consistent and Optimum Commodity Taxation

Sector/Commodity	**Benchmark Rates**	**Consistent Rate**	**Optimum Rate**
	(%)	(%)	(%)
Food Crops	0.70	0.68	0.37
Other Agriculture	0.88	0.54	0.65
Mining	0.90	0.13	2.04
Food Processing	9.78	4.28	5.99
Textile	1.68	0.94	3.19
Construction	1.37	1.35	1.38
Papers and Metals	3.53	2.01	4.15
Chemical	-1.25	-3.52	-1.60
Utilities	0.52	0.04	0.50
Trades	6.91	6.13	9.05
Restaurant	4.34	2.90	3.48
Hotel	4.26	3.73	4.65
Land Transport	1.66	1.20	1.91
Other Trans & Com.	0.74	0.37	0.83
Bank and Insurance	0.83	0.56	0.82
Real estate	4.66	3.06	4.58
Public services	1.16	0.42	1.13
Personal services	1.92	1.34	1.60
Total	2.79	1.23	2.28

Import

Sector/Commodity	Benchmark Rates	Consistent Tariff	Optimum Tariff
	(%)	(%)	(%)
Food Crops	3.89	1.64	11.73
Other Agriculture	10.56	1.69	9.46
Mining	1.59	0.82	1.50
Food Processing	11.88	8.44	7.64
Textile	22.96	10.11	129.09
Construction	5.67	16.15	4.25
Papers and Metals	9.61	7.90	10.14
Chemical	11.88	5.15	10.77
Public services	0.02	0.08	0.03
Personal services	2.17	1.01	2.58
Total	9.08	5.64	8.71

Table 4.4: Economic and Distributional of Applying Consistent and Optimum Commodity Taxation (%)

Economic Indicators	Consistent Tax Rate	Optimum Tax Rate
A. Macroeconomic Performance		
1.GDP	0.991	0.238
2.Employment	2.039	0.490
3.Consumer Price Index (CPI)		
a. Household	-0.520	-1.015
b. Government	0.476	0.219
c. Total	-0.408	-0.874
B. External Condition		
1. Foreign Trade		
a. Real Export	-1.012	-0.926
b. Real Import	2.765	0.337
c. Trade Balance	-44.170	-15.350
2. BOP Deficit		
a. Government	2346.438	-154.395
b. Firm	-78.542	23.276
c. Total	22.644	15.863
C. Welfare and Distribution		
1.Domestic Absorption	2.030	0.659
2.Household Income and Consumption		
a. Total Income	3.092	0.705
• **Farmer**	3.000	0.602
• **Rural Households**	2.908	0.780
• **Urban Households**	3.281	0.739
b. Real Consumption	3.604	1.729
c. Equivalent Variations (Million Rp.)	8814.173	4227.407
• **Farmer**	3109.299	1504.880
• **Rural Households**	2237.490	1198.293
• **Urban Households**	3426.369	1501.567
3. Foreign Tourist Consumption		
a. Hotel and Restaurant	1.980	2.655