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The Impact of Fiscal Reform on Indonesian Macroeconomy: A CGE Framework

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Abstract

This paper aims to investigate the impact of exogenous fiscal policies on the Indonesian main macroeconomic indicators and the implications on different institutions and sectors in the economy using the static Computable General Equilibrium (CGE) analysis. Three simulations are conducted in order to analyze the expansion of exogenous public spending. The results revealed that the increase of government expenditure on goods under the adjusted government deficit and balance of payment generates the highest improvement on Indonesian GDP but resulting an increase in government deficit. In contrast, under financing scheme of either lowering subsidy rates across activities or increasing the *ad valorem* tax rates would result in lower improvement on Indonesian GDP. This is because it directly escalates the cost of production and thus increases the prices of final goods purchased by the households which result in a fall in their real consumption and in turn eventually could lead to a decrease in national income.

Keywords: fiscal, tax rates, subsidy rates, Indonesia, CGE analysis

JEL Classification: C68, D58, E60, E62, F41, F43, H20, H30, H60

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1 Introduction

The effectiveness of government intervention to improve the economy's performance is highly dependent on their fiscal sustainability. For instances, if the government increases its expenditure, then the financing schemes could be done through several channels, i.e. increasing the tax revenues, increasing the debt, reducing subsidies, or reducing transfer of payments to certain institutions'. These decisions should attain a primary objective of which it leads to the improvement of national income. In other word, the chosen fiscal policies should be well-designed to avoid adverse effects on economy's performance.

According to Indonesia's Public Expenditure Review published by The World Bank (2007), total public spending of Indonesia, in real terms, increased annually by 11% in average between the year 2001 – 2005. In the other hand, since the 1997 Asian financial crisis, the government of Indonesia faced a huge amount of both domestic and foreign debt, which rose from 25% of GDP in pre-crisis to about 100% of GDP in the year 2000 (Francis, 2012). At the revenue side, Indonesia's tax ratio is relatively low compared to other Southeast Asian countries (ASEAN). The percentage ratio of government tax revenues to Indonesia's GDP in year 2003 and 2011 was 11.9% and 12.6% respectively. Whilst, the tax ratio of some developed ASEAN and OECD countries reached more than 15% and 33.8% of their GDP in year 2009 (Francis, 2012; Ikhsan *et al.*, 2005). To overcome such burdens, the Indonesian government has been starting to implement one of their main agenda which is to achieve a gradual fiscal sustainability by either increasing *ad valorem* taxes or subsidy cuts (Amir *et al.*, 2013; Oktaviani, *et al.*, 2004; Ikhsan *et al.*, 2005).

It is usually argued that the Indonesian economy has been adversely affected by the subsidies policies. In general, the budget allocation for total subsidies is gradually growing about Rp. 72.8 trillion nominally or within the average growth rate of 4.8% annually. In the year 2014, the government spends about 29.98% of its total budget for subsidies, which regarded as the largest shares to total government expenditures (Financial Note and Indonesian Budget, 2014). These burdens are further deteriorating due to factors such as the upward trend of world oil price, the increasing rate of population, and tremendous increase in per capita domestic consumption on subsidized fuels and electricity.

Fiscal policy plays an important role in stabilizing the aggregate demand and fostering the national income (Romer, 2001; Vladimirov and Neicheva, 2008; Maipita *et al.*, 2010). In other words, it can directly intervene in correcting market failure and income distribution (Griffiths and Wall, 1997; Damuri and Perdana, 2003). Indeed, analyzing public expenditures should be conducted in a routine process (The World Bank, 2007). Fiscal policy is also useful in targeting specific agents in the economy, which experience a severe condition in a given period (Damuri and Perdana, 2003).

The instruments of fiscal policy are mainly categorized into three components: net taxes (total taxes less subsidies), government expenditure, and transfer payments which include social security payments and debt interest payments (Case *et al.*, 2012).

The government levies taxes (net of transfer benefits) and spend them to purchase goods and services. Budget deficit will occur when government spending exceeds its receipt in a given period. Thus, the government must borrow from institutions mainly by selling bonds to finance this deficit (Begg *et al.*, 2003).

This paper aims to investigate, within the context of computable general equilibrium analysis, the impact of exogenous fiscal expansions (or contractions) on Indonesia's main macroeconomic indicators and to their consequences by examining how different institutions and sectors in the economy are affected. This study seeks to provide empirical justifications for policy makers in choosing the sources of financing to cover the additional public expenditure on goods and services as these choices would influence the equilibrium output, national income, and individuals' income distribution. In this paper, we implement three scenarios to neutralize the increasing government spending on commodities: (1) the government is allowed to borrow by government saving adjustment without any changes in net taxes; (2) within a fixed budget deficit (or surplus), the subsidy rate across activities adjusts to keep the budget balance; and (3) is identical to (2) in which the *ad valorem* tax rate is assumed to be endogenous while budget deficit (or surplus) is held exogenous.

Damuri and Perdana (2003) argue that in short run, the increased spending with loan adjustment raises the level of GDP higher than the case of which loan and tax rates adjust simultaneously to balance the budget. This is because the increase in tax rates impedes the market mechanism and restrict consumer choice, which in turn, it could exacerbate the economy's performance (Griffiths and Wall 1997). However, Begg *et al.* (2003) found a different result by which the latter scheme can improve the GDP more due to the balanced budget multiplier effect. This multiplier leads to changes in autonomous demand, which in turn results in changes in equilibrium national income and output (for details see: Begg, D., Fischer, S., and Dornbusch, R. 2003. Economics, Seventh Edition. McGraw-Hill Education. New York, NY 10020). This paper, therefore, aims to investigate these contradictions by considering the two government expenditure financing sources: i.e., by allowing only borrowing to adjust, or for a simultaneous increase in both borrowing and exogenous output tax rates.

Alternatively, to ease the fiscal pressures on higher public expenditures, the government can also reduce its spending on subsidies. Subsidy is a form of government expenditure aimed to help low-income households by lowering the price of specific domestic goods relatively to the market price (Maipita *et al.*, 2010; Solaymani *et al.*, 2014). However, the effectiveness of subsidy is highly dependent to the changes of the price margins. For example, suppose the government grants subsidy in order to lower the burden stemming from the high fuel price, the producers of fuel could at the same time increase their market price. Hence, the reduced price due to subsidy is offset by the increase of producer's price, which renders the subsidy ineffective. In other words, subsidies could create adverse consequences such as inefficient distribution, misallocation of recipients, market failures and could be welfare-diminishing (Solaymani *et al.*, 2014; World Trade Reports, 2006; Karami *et* *al*., 2012; Morgan, 2007; OECD, 2005). Motivated by these implications, therefore, we also assess the impact of a 10% subsidy rates cut of all activities to increase the net government revenue. Lofgren (1995) suggested that, with a fixed government spending on commodities, the impact of this policy leads to contractions in GDP and distribution income. A reduction in specific fuel subsidies increases the domestic price and therefore reduces household consumption especially for the poor in the short run (Clements *et al*., 2007). However, in the long run, it improves the poor because subsidy removal increases government expenditure, i.e. infrastructure development, human capital investments, and social protection (Dartanto, 2013).

The rests of this paper are organized as follows: section 2 discusses the overview of CGE model including the choices of closure rules. Section 3 describes the SAM data set used to calibrate the model. Section 4 discusses the fiscal policy scenarios and results, and sensitivity analysis. Finally, section 5 presents the conclusions.

2 Literature and Motivation

A number of studies have been conducted to analyze the distributional impact of fiscal policies in Indonesia (Damuri and Perdana, 2003; Amir *et al*., 2013 and Maipita *et al*., 2010, among others) and other countries (see, for example, Solaymani *et al*., 2013 and Mabugu *et al*., 2013). These studies look at the impact of fiscal policy expansions/contractions in various scenarios by using a SAM based CGE model, which closely relates to the objectives of this research. Moreover, the simulations proposed in our current study are motivated by these literatures. In what follows, we provide a brief overview of these studies.

Damuri and Perdana (2003) analyzed the effect of fiscal expansion on income distribution and poverty in Indonesia. The model was based on a comparative static CGE model that is specifically designed by Warr *et al.* (1998) and Wittwer (1999) for Indonesia's economy (the model is called WAYANG model, which is designed closely to the family of ORANI model, a single region model for Australia's economy; for details see Warr (1998) and Witwerr (1999). The study examined the impact of a 20% increase in government expenditure with 4 different scenarios to cover the extra spending budget: (i) government deficit and balance of payments are allowed to adjust in response to the increasing level of public spending but government revenues from net taxes collection remained exogenous; (ii) income tax rate adjusts while other taxes, budget deficit, and balance of payments are fixed; (iii) *ad valorem* tax adjusts but other taxes, budget deficit and balance of payments are fixed; and (iv) as in (i) but keeping balance of payments fixed to prohibit foreign borrowing. It concluded that the impact of fiscal expansion on the Indonesian economy is highly dependent on the source of financing. They found that scenario (i) had the strongest impact on the national income. This was explained by the fact that the excess of public spending was covered by loans in current year which would be paid in future. The fixed balance of payment in scenario (iv), however, led to lower GDP level compared to scenario

(i). In scenario (ii), the income tax rate would adjust to a higher level which reduced households' disposable income, thus reducing demand on final goods. This led to a drop in Indonesia's GDP. Nevertheless, the scenario of tax income rate adjustment resulted in a higher level of GDP compared to scenario (iii) because the increased level of *ad valorem* tax rates directly increases commodities' prices. Furthermore, in terms of poverty incidence, scenarios (i) and (iv) were found to have a positive impact on poverty reduction while scenarios (ii) and (iii) generated the opposite results.
Amir *et al.* (2013) investigated the impact of income tax reform on Indonesia's economy. The study used SAM based CGE model approach that combined the framework of ORANI-G developed by Horridge (2003) and AGEFIS developed by Yusuf *et al.* (2008). Calibration was based on the Indonesian SAM in year 2005. The policy scenarios were considered under two conditions: (i) fixed budget deficit (interpreted as balanced budget); and (ii) flexible budget deficit condition (interpreted as borrowing financed budget). For each condition, the authors simulated three different scenarios: (a) a reduction in households' income tax rate; (b) a reduction in business income tax rate; and (c) simultaneous reduction in both tax rated. The magnitude of each shock was estimated according to tax returns data published by the Indonesian Financial Ministry. For business income tax rate, the authors determined a shock of -0.57%, while households' income tax rate varied for each category of 200 types of households. They concluded that the reduction of income tax rate within a fixed budget deficit immediately reduces government expenditure. The specific supply from public activity (government administration, defense, education, health, and social service sector; the author's defines public sector as the aggregated activity account of government administration, defense, education, health, and social services in the Indonesia's SAM in the year 2005) is dropped, which in turn reduces its demand for labor. Meanwhile, households' disposable income is increasing, and hence it improves their consumption on goods by 0.418%. The increased demand of goods from households' offsets the reduction of public sector production. In overall, this simulation still indicates a strong income effect that leads to higher demand on final goods, real investment, and net exports; which results in real GDP improvement. In the second scenario, of which business income tax rate is reduced under the fixed budget deficit, Amir *et al.* (2013) found that again government spending reduces. Supply production from public activity is dropped, which in turn also reduces its demand for labour. In comparison with the simulation of income tax rate reduction, this scenario does not directly affect households' disposable income. Therefore, the improvement of private consumptions on goods is smaller by only 0.018%. A reduction of business income tax rate provides lesser stimuli to real GDP growth. Furthermore, under the endogenous budget deficit condition, government expenditure does not decline although its revenue is decreasing. The government is allowed to increase their level of borrowing in order to cover the inadequate receipts, which will be paid in the future. Of all scenarios: the reduction of income and business tax rates, the national income is improving. It induces higher demand on final goods, leading to

the increased level of output volumes and prices. The author's concluded that under both conditions: exogenous and endogenous budget deficits, the reduction of income and business tax rates have a positive impact on Indonesia's economy. The aggregate supply and demand are increasing.

Mabugu *et al.* (2013) constructed a dynamic CGE model to simulate the expansion of government spending effect on South Africa's economy. The model is based on PEP standard CGE model developed by Decaluwé *et al.* (2010). It is calibrated from the South African SAM in the year 2005. The study simulates about 6% increase of government expenditure and assumes that this magnitude of shock will be levelled off to initial level in the future. Three scenarios are proposed to finance the increased level of public expenditure: (i) income tax rate adjusts to compensate the additional expenditure but other tax rates and budget deficit are exogenous; (ii) output tax rate adjusts to compensate the additional expenditure but other tax rates and budget deficit are exogenous; and (iii) All taxes are fixed but budget deficit adjusts to finance the additional expenditures. The author's concluded that in scenario (i), income tax rate increases by 2.65% in short run. However, this increase would decline accordingly to the inter-temporal magnitude of government expenditures. If the government decides scenario (ii) to compensate the additional spending, the output tax rate would increase by 1% for all commodities. Of all scenarios, the increased expenditure has slightly improved the GDP in short run. However, in the long run, because of the effects on investment are higher, it thus induces GDP to increase more sharply. The impact on investment is stronger under the scenario (i) and (iii). This is because the endogenous income tax rate and budget deficit would give greater effect to increase the households and government savings respectively.

Maipita *et al.* (2010) investigated the impact of fiscal policies on Indonesia's economy and its poverty rate. The study is based on CGE model developed by Lofgren *et al.* (2002) from the International Food Policy Research Institute (IFPRI). By using Cross-Entropy method, the author's first updated the Input-Output table for Indonesia in the year 2003 to 2005 to calibrate the model. Three simulations are covered in this study: (i) a contraction of fiscal policy by increasing the *ad valorem* tax rate by 10%; (ii) an expansion of fiscal policy by increasing subsidy rates in all activities by 10%; and (iii) the increase of government transfer payment to rural households by Rp. 100,000. In addition, of all scenarios, government deficit is endogenous and all net taxes rates are fixed. The study concluded that the increased output tax rate in scenario (i) has a negative impact on GDP. This is due to the decline of its components such as private consumption, government consumption, and net exports. In sector specific, all activities indicate an improvement in output volumes, excluding manufacturing and trade, hotel, and restaurant activities. Nevertheless, all prices of activity output are increased. Labor demand in manufacturing and trade, hotel, and restaurant activities are declined. Furthermore, higher prices of output lead to the reduction of households' real income excluding rural agricultural labor and rural agricultural entrepreneur types, due to the decline of their purchasing power. Maipita

et al. (2010) distinguished the households' into 8 groups: rural agricultural labor; rural agricultural entrepreneur; rural low-income non-agricultural labor; rural non-labor force and undefined group; rural high-income non-agricultural labor; urban low-income non-agricultural labor; urban non- labor force and undefined group; and urban high-income non-agricultural labor. Thus, it leads to the increasing level of poverty incidence. In contrast, the increased subsidy rate across activities in scenario (ii) has a positive impact on GDP. It favors producers to lower the output price; which in turn increases private and government consumptions. Households' real income increases. Hence, it influences the decline of poverty particularly among households' in the rural area. Finally, in scenario (iii), for which the government increases its transfer of payments to rural households', real GDP slightly decreases by 0.002%. In sector specific, this scenario has a positive impact mostly on sectors that produce basic needs such as agriculture, public utilities (electricity, gas, and water), transportation, and telecommunication. It improves the labor demand to these sectors. Other sectors indicate a contraction result. This scenario immediately increases the real income among rural households'. Thus, it only reduces poverty incidence among these groups. Since fiscal policy aims to improve the country's economy performance as a whole, the authors' argued that this scenario cannot appropriately be implemented.
In summary, the above literatures show that the changes of fiscal policy can affect equilibrium national income and output. The effectiveness of government intervention to improve economy's performance is highly dependent on their fiscal sustainability. For instances, if the government increases its expenditure, then the financing could be done by initiating the following: increasing the tax revenues; increasing the debt; reducing subsidies, or reducing transfer of payments to certain institutions'. These decisions should attain a primary goal: it enables to boost the national income. In other word, the implementation of fiscal policies should be well-designed to avoid adverse effects on the economy's performance.

3 Model Description

We develop a CGE model based on a modified version of Decaluwé, *et al* (2012) and Hosoe, *et al* (2010), so that it can be appropriately calibrated to the Indonesian SAM in year 2008. This model, shortly, is a system of equations that features the economy's transactions including the behavior of the economic representatives' that related to their receipt and consumption budget; the structure of industry's output production; transfers of income (and payment) among institutions'; investment and savings; and trade aggregations (treatment of imported and exported goods).
In developing countries, CGE models have been commonly used for medium and long-term impact of a certain policy analysis such as development strategies on economy growth, resource allocation for exhaustible goods, income distribution and tariff reform (De Melo, 1988). CGE models are used as the answers to overcome the lack or insufficient time series database in econometric model, which is identified as

a major problem for a standard economic analysis in the countries. The model is able to describe the economy system within the equations structures along with the comprehensive database that is consistent with the equations model (Resosudarmo, *et al.*, 2009). CGE models are typically a static general equilibrium that consists of demand input of industry factor production; commodity supply; demand input for capital determination; household demand; export demands; government demands; basic value relationship between production costs and producer prices; market clearing condition for commodities and primary factors; and several macro economy variables and price index (Horridge, 2000).

3.1 Production of Gross Domestic Output

Each industry produces gross domestic output by utilizing the inputs of production factors (types of labor and capital) and intermediate commodities. This industry is assumed to minimize the cost of inputs subject to its production technology, and is operated in a perfectly competitive market (price takers). At top stage, gross domestic output j (QA_j) is produced from the combination between value added (VA_j) and intermediate commodities in fixed coefficients (Leontief) function. The level of subsidy rate across industries – expressed as the multiplication between the average subsidy across industries $subAArate$ and to activity specific $subArate_j$, $subA\_rate_j = subAArate\ (subArate_j)$ – is added to the price of gross domestic output (eq. 1). We assume a one-to-one relationship between output production and commodity supply by which each activity produces one type of relevant commodity (eq. 2).

$$(1 + (subAArate)\ (subArate_j))\, p_j^{QA} = p_j^{VA} ava_j + \sum_{i \in C} p_i^Z ax_{i,j},\ j \in A \tag{1}$$

$$Q_i = \sum_{j \in A} TRANS_{Coef\,j,i} QA_j,\ i \in C \tag{2}$$

$$P_j^{QA} = \sum_{i \in C} TRANS_{Coef\,j,i} P_i^Q,\ j \in A \tag{3}$$

where QA_j be the gross domestic output of j-th industry; i be the element of all intermediate inputs (C) used in j-th industry; $X_{i,j}$ be the intermediate input of i-th commodity used by j-th industry; $ax_{i,j}$ be the coefficient of minimum requirements of i-th intermediate input for one unit of QA_j; ava_j be the coefficient of minimum requirements of the VA_j for one unit of QA_j; p_j^{VA} be price of VA_j; and p_i^Z be the price of i-th final (composite) goods; $TRANS\_Coef_{j,i} = \frac{QQ_{j,i}}{QA_j}$, is the Input-Output coefficients; $QQ_{j,i}$ is output of the j-th activity for the i-th commodity. so $TRANS\_Coef_{j,i} = 1$, $i = j$ and $TRANS_{Coef\,j,i} = 0$, $i \neq j$.
At second stage, each industry minimizes the input cost combination of composite

labor and capital within a Cobb-Douglas production function to produce value added. At bottom stage, each industry minimizes the input cost of labor types.

3.2 Government Behavior

The government gains income from institutions' transfers ($TR_{gov,in}$) and tax collections on households' income, enterprise income, output production, and imports. The revenues are then used for purchasing public goods and services, institutions' transfer payments, and subsidies across industries and commodities. The public spending is adjusted to its initial expenditure on final goods. While the government transfer payment to households' is assumed to be measured in real terms – linked via CPI-indexed. The remainder between government revenue and expenditure is therefore regarded as savings (budget surplus or deficit).

3.3 Households Behavior

The households' preferences on output bundles are described from their Cobb-Douglas utility function that is maximized subject to their budget income constraint, where total income is earned from its endowed factors (labor and capital) to j-th industry; and institutions' transfers ($TR_{h,in}$). Households' disposable income is obtained from total income less income taxes and transfer payments. The representative households' is motivated to save some portions of their disposable income according to the constant average propensities for savings of which these portions are allowed to adjust endogenously (eq. 4).

$$SH_h = sh\_ratio_h ADIH_h,\ h \in H \tag{4}$$

$$sh\_ratio_h = sh\_rin_h \left(1 + sh\_dum_h sh\_adj\right), \tag{5}$$

where:
SH_h be the savings of the h-th type of households; sh_ratio_h be the adjusted average propensity for savings of the h-th type of households; sh_rin_h be the initial value of average propensity for savings of the h-th type of households; sh_dum_h: 0, if sh_ratio_h=sh_rin_h, i.e. no change in saving ratio; and sh_dum_h: 1, if sh_ratio_h is allowed to adjust, in which case sh_adj is the endogenous adjustment of sh_ratio_h. The available budget of households' consumption on final goods is then obtained from their disposable income less savings.

3.4 Enterprise Behavior

The enterprise receipt is obtained from its capital endowment to j-th industry and institutions' transfers. IBK is determined from enterprise shares of capital supply. Government collects income taxes from enterprise income, which is represented as business transfer payment to government. It yields the enterprise disposable income.

Since enterprise does not purchase any goods, the enterprise saving is simply equal with the enterprise disposable income.

3.5 Rest of World (ROW)

The ROW total outflow is estimated from total import, institutions' transfers to ROW, and ROW endowments of factors supply to domestic. Whilst, the ROW total inflow is determined from total of exports, ROW transfers to institutions', payments to the labor and capital employed by ROW. ROW savings (balance of payments) is then determined equivalently from the current account deficit or residual between ROW outflow and inflow.

3.6 Investment

In the static version of a CGE model, the behaviour of investment does not involve with its dynamic factors. We allow the case if the investment is kept fixed or otherwise is treated as endogenous to allow investment to adjust. Hence, the total investment demand equals to total institutions' savings. To check Walras' law identity, we apply a specification in which $WALRASRES$ should be zero in the equilibrium state (eq. 5).

$$WALRASRES = \sum_{h \in H} SH_h + +SB + SG + SROW - \sum_{i \in C} P_i^Z CINV_i \tag{6}$$

3.7 The Armington's Aggregations

In open economy model, we adopt Armington's assumption to differentiate between a country's domestically produced and exported (imported) commodities. We assume that the industry combines its inputs (imported and domestic-produced goods) by a CES production function to produce composite goods. The exported goods are produced from the transformation of gross domestic output sold for domestic and export sales by a CET (Constant Elasticity of Transformation) production function, where industry will maximize its profit subject to this function. The isoquants of CET function are actually the mirror images of CES function (Hosoe, 2004). For the sake of simplification, we assume no simultaneous cross hauling: export and import for the same goods.

3.8 The Choices of Closures

In order to square the model and obtain a solution, we specify the closure rules as follows. We assume flexible exchange rate regime, where balance of payment ($SROW$) is fixed and exchange rate adjusts to ensure $SROW = 0$. This closure setting is selected to reflect the real condition of Indonesia's economy regime of which they follow a floating exchange rate regime since 1977 (Bank of Indonesia, 2014). Also,

the model is investment-driven in which the actual investment goods ($CINV_i$) and enterprise saving (SB) are exogenous while households' saving (SH_h) and government saving (SG) adjust to obtain the saving-investment balance.
We assume that capital stock is mobile across activities. Thus, both capital rent of activity specific and distorted rent of capital across activities ($PDIST\_K_j$) are fixed; while stock of capital (K_j) adjusts to ensure clearing of each j-th activity. Here we assume no excessive capital (fully employed capital). Similarly, labor are also mobile inter-industries with fixed wages. Therefore, the adjusted wage of labor types across activities ($PDIST\_L_{o,j}$) and average wage of labor types (P_o^L) are exogenous; whilst, both employed labor used across activities ($L_{o,j}$) and labor composite (LAB_j) are endogenous to clear the labor market. Hence, the labor market is cleared through the adjusted unemployment rates. This setting follows the fact that Indonesia currently faces a massive labor surplus (Yusuf, *et al* (2008).

4 The data set

The Indonesian SAM 2008 is used to calibrate the initial equilibrium condition and compare its shifting state induced by changing exogenous variables (Yusuf, 2006). The official Indonesian SAM is published by the Centre of Statistic Agency usually every five years. Its most recent SAM publication is at the year 2008. The overview of national income accounts for Indonesia's economy based on the macro-SAM in the year 2008 is presented in Table 1.
The Indonesian SAM in the year 2008 distinguishes 24 accounts for each activity, commodity, and imported commodity classification. There are two main groups for the production factors namely: labor and non-labor (capital) account. The labor is further classified into 16 groups based on their skills, work status (casual/formal), and location (rural/urban), while the capital account only has a single account. In the institution accounts, the official SAM distinguishes four main groups: household, firm, government, and ROW. Each group is further classified as follows: The household account is disaggregated into 8 classifications according to their occupation area (urban/rural), type (agricultural/non-agricultural), and status (employee/employer/unidentified occupation).
The framework structure of Indonesian SAM in the year 2008 is principally similar to the traditional SAM. However, the differences are mainly in the way it distinguishes imported commodity account separately (from activity and commodity accounts), and in providing two additional accounts, trade and transportation margins.

Table 1: Indonesia's Macro-Economy Indicators Based on The Macro-SAM 2008 (Trillion Rp)

Macro-economy Indicator	Approach			
	Income side		Expenditure side	
GDP at market price	GDP at factor cost or total value added	5,156.94	Households consumption	3,318.10
	Output tax	237.10	Investment	294.57
	Import Tariff	107.84	Government consumption	1,508.83
	Subsidy	−240.89	Export Import	1,487.24 5,260.98
	Total	5,260.99	**Total**	5,260.99
GNP	GDP at market price	5,260.99	Household consumption	3,318.10
	Households transfer to ROW	63.51	Investment	294.57
	Firm transfer to ROW	24.18	Government consumption	1,508.83
	Government transfer to ROW	2.29	Investment to abroad	36.68
	Labour used in ROW	1.71		
	Capital used in ROW	6.66		
	ROW transfer to household	−19.29		
	ROW transfer to firm	−56.50		
	ROW transfer to government	−28.70		
	ROW labour	−5.42		
	ROW capital	−91.23		
	Total	5,158.19	**Total**	5,158.19
Saving-Investment	Households saving	325.44	Investment	1508.83
	Firm saving	990.60		
	Government saving	229.47		
	ROW saving	36.68		
	Total	1,508.83	**Total**	1,508.83
ROW transaction	Export		Import	1,347.77
	Households transfer to ROW	63.51		
	Firm transfer to ROW	24.18		
	Government transfer to ROW	2.29		
	Labour used in ROW	1.71		
	Capital used in ROW	6.66		
	ROW transfer to household	−19.29		
	ROW transfer to firm	−56.50		
	ROW transfer to government	−28.70		
	ROW labour	−5.42		
	ROW capital	−91.23		
	Investment to ROW	36.68		
	Total	1,347.77	**Total**	1,347.77

5 Fiscal Policy Scenarios and Results

5.1 Scenarios

Three different simulations are conducted under the same magnitude of shock: the effect of a 10% increase in government expenditure. The differences of these scenarios are in the way to finance the increased expenditure. In addition, public deficits and balance of payments are assumed endogenous. Simulation-1 is a 10% increase in government expenditure; and the government can only borrow to finance the extra expenditure without having any changes in tax revenue. Simulation-2 is a 10% increase in government expenditure under the adjustment of subsidy rate across activities. Here, we expect that the subsidy rate to activities increases under the fixed budget deficit (or surplus) condition. By reducing the subsidy expenditures, the net tax revenue can be escalated without having any increase in taxes rates. Finally, simulation-3 is a 10% increase in government expenditure under the adjustment of *ad valorem* tax rate. In this simulation, we compensate the additional public expenditures by increasing the *ad valorem* tax rate such that the burden of budget deficit could be relaxed. Increasing the tax rates without additional public spending on good reduces economy's income (Begg *et al.*, 2003). However, the simultaneous increase of both the tax rates and government spending may lead to higher equilibrium output and income although the impact would be less than the prior scenarios due to crowding out effect.

5.2 Results

Table 2 presents the macroeconomic impact of all scenarios. In simulation 1, the shock directly increases the aggregate demand side, forcing the level of GDP positively adjusts. These results are consistent to Keynes postulation, which stated that the government has a pivotal role in rapidly increasing the aggregate demand towards achieving full employment level (Maipita *et al.*, 2010). Therefore, the increased level of factor returns influences the improvement of private consumption as well as net exports.

Simulation-1 immediately increases the level of output production which leads to an increase in factors cost across all activities. This is reflected from the increase of GDPFC by 2.42% due to the increase of its total wage bill component by 4.63% while total capital bill only slightly increases by 0.01%. The slight change of capital bill is due to the choice of capital closures. The model assumes that the rent of capital is fixed, capital is fully employed, and stock of capital is mobile inter-industries. This assumption would generate a negligible change on total capital bill because the changes of capital stock in some activities would be offset by the changes of stock in others. In the other hand, at labor factor closures, there are two main distinctions: closure on labor types and labor composite. For labor type closure, the model has a similarity with capital for which wage of each labor is exogenous, and employment is mobile inter-industries. However, for composite labor closure, both of its activity specific wage and average wage to all industries are endogenously determined. Thus, simulation-1 only induces the GDPFC component of total wage bill to increase strongly.

GDP at market price (GDPMP1 and GDPMP2) improves higher than GDPFC because of the effect on factors return to households' which in turn increases their demand on final goods. Table 2 summarizes that GDPMP1 and GDPMP2 are increased higher by 2.67% and 2.56% respectively. The respective components of GDPMP1 such as households' and government consumption; investment; and net export are increased largely excluding investment by 3.02%, 8.54%, 0.26%, and 3.92%. This is because in the model, investment of goods ($CINV_i$) is fixed, thus the slight increase of total real investment (0.26%) is determined from the rise of final goods price index (P_i^Z). Total investment on goods is obtained from the following relationship:

$$INVEST = \sum_i P_i^Z CINV_i,\ i \in C$$

The increased demand in public goods also leads to a sharply rise of net indirect tax (9.32%). This indicates that raising final demand causes aggregate supply to increase in order to clear the market which in turn increases the net taxes receipts to government. The expansion of government expenditure leads to an increase of its budget deficit by 5.59%.

Table 2: The Impact of All Simulations on Macroeconomic Account

Variables	**Sim-1**	**Sim-2**	**Sim-3**
	% CHANGE	% CHANGE	% CHANGE
GDP at factor costs (GDPFC)	2.42	1.27	-1.97
GDPGAP	2.71	11.06	19.61
GDP at market prices from income side (GDPMP1)	2.67	2.18	-0.46
GDP at market prices from expenditure side (GDPMP2)	2.56	1.75	-1.21
Total private consumption	3.02	1.02	-2.47
Total investment	0.26	1.66	-1.07
Total government consumption	8.54	10.62	11.91
Total export	0.68	1.80	0.01
Total import	0.35	1.86	0.08
Net export	3.92	1.21	-0.67
Net indirect tax	9.32	25.54	36.10
Total payment to all workers (WAGEBILL)	4.63	2.44	-3.81
Total payment to capital (CAPBILL)	0.01	-0.02	0.05
SG	-5.59		

Simulation-2 results in a less improvement on Indonesia's GDP compared to simulation-1 although the budget deficit remains unchanged. Table 2 shows that simulation-2 increases GDP at factor cost (GDPFC) only by 1.27%, which is dominated from the increase of its component, total wage bill, by 2.44% while capital bill declines negligibly by -0.02%. In other hand, GDP at market price from income side (GDPMP1) and expenditure side (GDPMP2) improve slightly higher by 2.18% and 1.75% respectively. The components of GDPMP1 such as households' and government consumption, investment, and net export are increased by 1.02%, 10.62%, 1.66%, and 1.21%. The increasing level of total investment 1.66% is due to the increased level of composite goods price index (P_i^Z). In summary, simulation-2 improves the Indonesia's macroeconomic performance. However, by comparing results, we found that the strongest effect of fiscal expansion is obtained from simulation-1. Simulation-2 leads to a less improvement of GDPFC, GDPMP1, and GDPMP2 because it leads to the increase of aggregate composite prices (P_i^Z) by 1.97%. Thus, it implies a reduction in total private purchasing power that is reflected from a drop of private consumption improvement by only 1.02%.

In simulation-3, we found that higher taxes on output production create higher distortion in their relative prices. It influences producers to lower the production volumes and thus creating a lower income at the national level (Damuri and Perdana, 2003). It implies labor market adjustments that could lead to a negative effect on households' income and expenditure (Damuri and Perdana, 2003). Simulation-3 leads to negative effect on Indonesia's economy performance. GDP at factor cost falls by -1.97% whilst both GDP at market prices, from income and expenditure side, are dropped by -0.46% and -1.21% respectively. The reason is obvious: The *ad valorem* tax rate is embodied in the output price system. Hence, the increase in *ad valorem* tax has a direct effect on output prices which in turn leads to higher prices of goods in final market. As a result, the equilibrium output falls. However, this effect may be offset by the injection of government spending on goods and services that shifts up the aggregate demand. The decline in GDP at factor cost (GDPFC) is strongly due to the fall of its component, total wage bill, by -3.81% while capital bill increases negligibly by 0.05%. It implies that simulation-3 depresses the industry demand on labor employment which would reduce the factors return to households'. Hence, this effect indirectly leads to a reduction in total private purchasing power which is reflected from a drop of private consumption by -2.47%. The rest components of GDPMP1 such as investment and net export are also declined by -1.07%, and -0.67% respectively.

Table 3 presents the effects on gross domestic output. As discussed in above, the increase in public consumption leads to higher aggregate demand of commodities. This implies that producers optimize their revenue by reallocating the input resources constraint such as factors and intermediate inputs. As a result, those sectors that have increased their gross output are due to lower costs of value added input although the constraints of intermediate input flows inter-industries would also induce the changes of activity gross output.

In simulation-1, there are 4 sectors that indicate a reduction in their output production, namely fisheries (-18.47%); forestry products (-0.39%); other agricultural (-6.57%); restaurant (-3.21%); and woods products (-1.67%). The gross output price increases substantially (excluding woods sector) which are 58.65%, 0.48%, 32.83%, 11.22%, and 0.10% respectively. The decline output volumes are strongly related to higher value added cost per unit (excluding woods sector). The percentage changes of value added cost per unit of the above sectors are 2.24%, 18.21%, 12.98%, 12.57%, and -3.27% respectively. In contrast, the sector of supporting service for transportation and hotel indicate the highest improvement on their output volumes by 61.90% and 29.53%. Other sectors such as textiles, agricultural, petrochemical products, fossils mining, and electricity-city gas-clean water are also improved by 14.13%, 3.55%, 2.85%, 5.41%, and 6.34% respectively. This improvement is due to a reduction in their value added cost which are -16.35%, -8.44%, -8.81%, -5.08%, and -7.25%.

In Simulation-2, the overall output production is improved although the changes are less than that of Simulation-1. This is due to the effect of a reduction in subsidy rates across activities which eventually raises the aggregate price index of output (PQA_j) by 2.36%. However, in contrast, PQA_j declines by 0.49% in Simulation-1. Hence, it leads to a less improvement of total gross output production (1.62%) compared to Simulation-1 (2.25%). Specifically, there are 9 sectors which indicate a declination on output production, namely: air and sea communication (-2.90%); cattle products (-0.77%); petrochemical products (-0.69%); fossils mining (-2.91%); fisheries (-3.71%); households' and other services (-1.55%); other mining (-7.20%); restaurant (-7.84%); and supporting services for transportation (-2.89%) respectively. These are strongly correlated with a higher price of their output production which are 3.04%, 1.53%, 0.24%, 0.26%, 7.48%, 7.88%, 48.69%, 10.68%, and 3.80% respectively. A higher price of output production could be related to either the changes cost of its value added or intermediate input. Excluding the sector of petrochemical products, the increased price of output is positively due to higher cost of value added by 5.23%, 7.64%, -1.09%, 0.35%, 14.42%, 17.12%, 76.77%, 26.13%, 6.03% respectively. In contrast, there are several sectors which indicate an increase in their output production, where hotel sector improves the most by 17.80% followed by: bank and insurances (4.65%); real estate's (1.94%); electricity, city gas and clean water (4.31%); government services (3.81%); and land transportation (5.06%). These improvements are due to a fall on their value added cost which are -4.91%, -8.69%, -2.00%, -17.24%, -0.10%, -1.65%, and -17.85% respectively. Compared to Simulation-1 results, these sectors, excluding bank and insurances, are less improving. The reduction of subsidy rates induces a negative effect in increasing the cost of production.

In Simulation-3, the increase in output tax rate has negative effect on aggregate sectors. It attributes to the raise in cost of production that leads to a contraction in production volumes. Table 3 shows that the total output production declines by -0.98% while its aggregate price (PQA_j) increases by 1.90%. Nevertheless, by looking at specific industry, there are 6 sectors which indicate an improvement on output production, namely textiles (28.22%), hotel (28.39%), households' and other services (12.54%), and real estates (6.75%) sector indicate the highest expansion. Meanwhile, public services and construction sector are only improved slightly about 0.08%. Rests of sectors are contracted where sector of supporting services for transportation suffers

Table 3: The Impacts on Activity Gross Domestic Output

Activity	Volume of Gross Domestic Output (QA_j)			Price of Gross Domestic Output (PQA_j)		
	Sim-1	**Sim-2**	**Sim-3**	**Sim-1**	**Sim-2**	**Sim-3**
Agriculture for Crops	3.55	1.76	−0.09	−3.68	0.93	−6.47
Air, Sea and Communication Transportation	1.27	−2.90	−0.09	−0.92	3.04	−1.43
Bank and Assurance	0.27	4.65	−7.42	5.07	−6.99	21.97
Cattle and Outcomes	0.36	−0.77	−0.23	3.16	1.53	−2.00
Chemical, Fertilizer, Clay and Cement Products	2.85	−0.69	−4.07	−3.65	0.24	1.84
Coal, Metals, and Oil Mining	5.41	−2.91	−1.35	−4.89	0.26	−1.11
Construction	0.53	0.21	0.08	2.10	2.88	−1.72
Real Estate and Private Services	6.75	1.94	6.75	−7.63	−1.20	−10.82
Electricity, Gas and Drinkable Water	6.34	5.06	−3.62	−6.32	−7.39	10.76
Fishery	−18.47	−3.71	−1.17	37.98	7.48	−3.06
Food, Drink, and Tobacco	0.73	4.25	−6.07	−0.64	−2.66	1.89
Forestry and Hunting	−0.39	0.66	−4.74	1.98	8.53	22.24
Government Services nd Defences	5.74	4.31	0.08	−1.06	−0.10	3.16
Hotel	29.53	17.80	28.39	−6.21	−2.96	−4.48
Households and Other Services	5.18	−1.55	12.54	−4.56	7.88	−23.92
Land Transportation	1.61	3.81	−4.38	2.32	−5.83	10.47
Agriculture for Non-Crops	−6.57	2.02	−4.63	20.51	1.24	5.09
Other Minings	3.43	−7.20	−2.14	−17.30	48.69	10.18
Paper Products	2.50	4.06	−2.21	−3.84	−2.59	1.24
Restaurant	−3.21	−7.84	−5.35	6.39	10.68	3.73
Textile Products	14.13	12.74	28.22	−5.85	−3.97	−7.00
Supporting Services for Transportation	61.90	−2.89	−15.39	−35.25	3.80	22.17
Trade	1.09	2.34	−1.91	10.49	−4.06	−11.47
Wood Products	−1.67	3.71	−4.91	0.10	−3.13	3.92
TOTAL	2.25	1.62	−0.98	−0.49	2.36	1.90

the most. For examples, the decline in output production of agricultural (-7.34%); air and sea communication (-5.02%); fossils mining (-1.21%); and fisheries (-1.27%) sectors also indicate a fall in their value added costs. In other words, the contraction of these outputs could be related to the variation of intermediate input inter-industries. The sectoral effects can also be influenced by the complex interaction of the changes in aggregate demand, and constraint shifts of intermediate input prices inter-industries. Furthermore, Table 4 summarizes the effects on households' disposable income. Consistent to that results of Damuri and Perdana (2003), the injections indicate positive impact on all types of households' actual disposable income. The level of improvements is correlated with their types of occupation status either workers or unclear job, which in turn affect their factor returns. The worker types of households' have tendencies on higher disposable income relatively to those of unclear occupation

types.
In Simulation-2, households' income is improved for all categories but lower than that of Simulation-1. A reduction of subsidy rates to activities influences the reduction of output production. Clearly, the reduction of subsidies tends to depress the income of richest households' (represented as those who have higher wages and lived in urban areas) higher than poor households'. In other words, these results imply that subsidies are mostly benefited by households' who have a lower level of income.

Table 4: The Impacts on Households' Distribution Income and Expenditure

Households' Types	**Households' Disposable Income (% Change)**		
	Sim-1	**Sim-2**	**Sim-3**
Agricultural households' with unskilled labour	3.52	2.63	−1.67
Agricultural-households' with unclear occupation type	1.94	2.83	−2.25
Non-agricultural-rural households' with low wages	4.27	1.50	−3.75
Non-agricultural-rural households' with unclear occupation type	1.08	2.67	−0.83
Non-agricultural-rural households' with high wages	3.17	2.29	−2.34
Non-agricultural labour-urban households' with low wages	1.47	0.86	−1.31
Non-agricultural-urban households with unclear occupation type	3.13	0.94	−2.94
Non-agricultural labour-urban households' with high wages	5.64	1.05	−4.40

In contrast to Simulation-1 and Simulation-2, Simulation-3 leads to a negative effect on households' disposable income because of two main reasons. First, a higher output tax rates indirectly increases the prices of final goods purchased by the households' which result in a fall in their real consumption. Second, it induces the cost of productions to increase. This triggers producers to lower the wage bills and thus reducing the private income.

5.3 Sensitivity Analysis

Finally, since the parameters used in the model are taken from other studies, it is necessary to investigate the robustness of simulation results with respect to parameters uncertainty (Yusuf, 2008). This is done by implementing a sensitivity analysis of CES or CET parameters and examining the changes of endogenous variables. In this exercise, we choose to vary the import elasticity (CES trade parameters) by 25% decrease and increase (between 1.5 and 2.5) and then check the reliability of results. Under high and low elasticity, SIM-1 generates a consistent direction (positive) across all endogenous variables excluding the negative sign of capital bill which is considered negligible. Nevertheless, for both high and low elasticity, the simulations generate a variation of values although the differences are small. Nganou (2005) stated that the robustness of simulation results in CGE model is confirmed in two conditions: the small impact differential results of post shock and its consistent signs. The model is confirmed to be consistent when the differential effect is small.

6 Conclusions

In this chapter we employ the CGE model to examine the impact of implementing specific fiscal policies on Indonesia's main macroeconomic indicators and to their consequences by examining how different institutions and sectors in the economy are affected a result. The results show that the increase in public expenditure shifts up the equilibrium output. Simulation-1 generates the strongest impact due to the static nature of the model for which it does not consider the deficit payment in the future. The financing scheme of lowering subsidy rates to activities given in simulation-2 resulted in less improvement on Indonesia's GDP. This is because a subsidy cut directly increases the cost of production which in turn reduces national income. We also found that fiscal expansion with higher output tax revenue under simulation-3 gives the most contractions on national income; the sectors were pressurized by higher taxes which creates deindustrialization, low employment, and thus reduces equilibrium national income and output.

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