

Tax counterbalancing in developing countries the case of Indonesia

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Abstract: *This research is devoted to test the feasibility of tax counterbalancing policy in developing country with focus on Indonesia. This research is motivated by the fact that the corporate income tax rate in Indonesia is relatively high compared to other south east Asian countries. The method uses the (quadratic) almost ideal demand system which has been widely used to analyze the demand system simultaneously. The estimation uses seemingly unrelated regression estimation approach with quarterly data during the period of 2001-2016. The result presents that tax counterbalancing policy can be implemented in the short term. The reduction in corporation income tax rate imposed on the primary sectors can be substituted by the increase in tax rate in services sector. By removing informal sector, tax counterbalancing policy will potentially address not only the soundness of state budget but also promote the economic development. Eventually, fiscal policy could play an important role both in stimulation and stabilization in the long run.*

Keywords: Corporate Income Tax, Value Added Tax, Services Tax, Tax Counterbalancing, Government Revenue

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Introduction

After math of global financial crisis in the late of 2008, fiscal austerity has drawn considerable attention in both developed and developing countries. Taking in the form of government spending cuts or tax increases or both, fiscal austerity is devoted to address the high indebtedness induced by excessive budget deficit. However, reducing excessive budget deficit has obviously an adverse impacts. Budget deficit in developing countries is typically rather pro-cyclical to promote economic growth than counter-cyclical to stabilize macroeconomic condition as in developed countries (Kaminsky, Reinhart, and Végh, 2004).

While the magnitude of tax and government expenditure multiplier will be theoretically the same, the empirical results are quite mixed (Batini et al., 2014).

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Krugman (2012), for example, strongly rejects the budget cuts during recession. He believes that the only way to stimulate the aggregate demand is the increase of government spending rather than its reduction. He suggests spending more to fix the economy especially the spending for public investment in order to stimulate the economy by spillover effects of growth.

On the other hand, Blanchard and Perotti (2002) argued there is a non-mutually exclusive explanation for a successful fiscal stabilization. Expansionary fiscal consolidations are more likely and sustainable if they are relying primarily on spending cuts instead of increasing taxes symmetrically. Hence, there seems to be an agreement on the long-term benefits of government debt reductions, there is no unified view on the short-term effects of fiscal austerity.

With regard the short-term impact, strengthening fiscal space is essential to develop an environment that is conducive to economic growth. Low-income countries have low tax revenue to GDP ratio. The average tax to GDP ratio in low income countries is 15 percent compared to that of 30 percent in advanced economies (Peralta-Alva et al., 2018). Meanwhile, these countries are also those that are in most need of fiscal space for sustainable and inclusive growth. In the past two decades, low-income countries have made substantial efforts in strengthening domestic revenue creation.

Along with world economic recovery and tapering fiscal policy pioneered by US recently; the potential issue will be shifted to the possibility of conducting tax counterbalancing policy to boost government revenue. Given the different goal of budget deficit, the emerging and low income countries encourage to hike tax through increasing tax rate of a particular object accompanied by lowering tax rate of other. Surprisingly, very little is known about the effects of tax counterbalancing policy on economic activity in emerging market countries.

Knowing the possibility of conducting tax counterbalancing policy is critical. The government may substitute a particular tax revenue to other tax revenuesources without deteriorating the private sector activity. Moreover, once the expenditures are pre-determined before the revenues availability, strengthening government revenues is a crucial point to maintain the fiscal sustainability (Kuncoro and Pambudi, 2014). Therefore, it is necessary to identify whether tax counterbalancing policy would effectively offer a better precondition to achieve economic growth in the short-run and stabilization in the long-run.

Indonesia provides a unique opportunity to examine the nature of tax revenue. Following global financial crisis, the government attempted to create new sources of government revenue through Sun Set Policy in early 2009. In 2016, government cut the central government spending budget along with tax amnesty and increased the lower limit of non-taxable personal income. The ratification the Law of Automatic Exchange of Information in 2018 allows the government to have greater access tax bases in the financial sectors. All of them are subjected to rebalance the structure of state budget to realize the sound fiscal policy. Hence, lessons from Indonesia will be useful to develop a better adjustment fiscal policy design.

This paper enriches the literature on fiscal policy in developing countries with focus on Indonesia. The motivation for this approach associates to tax revenues have always been below the target in the past five years. Moreover, the size of Indonesia's government is relatively small so the scope for actively promoting economic growth remains limited. Therefore, fiscal policy in the rebalancing process is likely to require an increase in the fiscal space in order to maintain fiscal sustainability.

1. Literature Review

The literature addressing the tax counterbalancing policy is divided in different aspects. The earliest theory about the changes in tax rates can be traced back to Ramsey taxation rule (1927). Ramsey assumed a case of perfectly elastic supply, where a supplier will provide an infinite amount at a given price. In his model, the more inelastic the demand, the less the dead weight loss. This rule states that tax rates on goods should be inversely related to their elasticity of demand.

The Ramsey rule is developed within the framework of economic agent interests which differ from the government's point of view. The government's motive to change the tax rates is intended to achieve the optimum tax revenue. It is true that the higher tax rates will be directly proportional to the tax revenue. Nevertheless, as outlined by Laffer (1974), the government revenues can decrease when the effective tax rates have been exceeded. Therefore, tax counterbalancing policy is a way to reach the tolerable tax rates to finance government expenditures as proposed by Peacock and Wiseman (1967).

Another motive to change the tax rates is to preserve tax base. In such a case, the motive of avoiding tax evasion (Allingham and Sandmo, 1972) can significantly be reduced. The government believes that the lower tax rates will increase taxpayer compliance so that it boosts the government revenues. However, the empirical evidence shows that the lower tax rates are not necessarily followed by the increase in taxpayer compliance (Allingham and Sandmo, 2015).

Even though the three theories above are still general, they provide a useful starting point to explore the more detail concepts. By incorporating external determinants, some studies concerned with the development of measures able to capture the tax competition (see for survey: Case, Hines, and Rosen, 1993 and Wilson, 1999; Vasile & Androniceanu, 2018; Ohanyan & Androniceanu, 2017). Theories of tax competition originally are assigned on the interjurisdiction settings but they might be adopted to explain the tax competition among countries.

In general, the theories of tax competition infer that a country's policy may be influenced by other country's policies to obtain benefit and/or avoid loss. To attract more foreign investors, Devereux (2007) examined the effect of tax on the behavior of companies investing abroad. His research concluded that the decision to establish a business abroad is influenced by the cost of exports from home country to host country. The second consideration is the tax burden in the home country and the host country. In the subsequent study, Devereux and Loretz (2013) pointed out

that corporate income tax cuts tend to be carried out continuously in response to the spillover from other countries.

Other scholars have narrowed the lens some what, disentangling tax competition into separated concepts, such as non cooperative tax setting (Wilson and Wildasin, 2001), transfer pricing (Owen, 2012), and profit shifting (Deverux and Loretz, 2015) across border, that each themselves still contain a number of different policy levers and types of interactions (Ciobanu & Androniceanu, 2018). Other literature also explains the impact of tax competition varies across countries depending on fiscal needs, population sizes, resources availability, and other factors (Kanbur and Keen, 1993; Troeger, 2013).

There also exist studies seeking to understand the determinants (or the causes) of the change in tax rates and, as a consequence, seeking to develop mechanisms to mitigate such tax rate. Peralta-Alva et al. (2018) found that in low-income countries, value added tax (VAT) has the least efficiency costs but is highly regressive, while personal income tax (PIT) impacts the economy in the opposite way with corporate income tax (CIT) impacts staying in between. Alavuotunki, Haapanen, and Pirttil (2018) revealed that the revenue consequences of the VAT have not been positive, indicating that income-based inequality has increased due to the VAT adoption, whereas consumption inequality has remained unaffected.

On the other hand, there are studies addressing the effects of tax rate policy on the economy. Harpaz (2015) reports that Japan is getting the lion's share of attention on this issue recently, but the strategy of lowering corporate taxes while increasing consumption taxes is playing out globally. New Zealand in 2010 raised its goods and service tax from 12.5 percent to 15 percent while reducing its corporate tax from 30 percent to 28 percent and cutting the highest personal income tax rate from 38 percent to 33 percent. So far, the strategy is working, with the country's GDP increasing over 53 percent between 2010 and 2014.

Malaysia is another example. She will move to a 6 percent goods and service tax on April 1, 2015 along with a plan to reduce individual income taxes between 1 percent and 3 percent and the corporate tax by 1 percent. Australia is also in play and will likely become the next major country to announce a similar tax counterbalancing act. Currently, the Australian government is considering raising its goods and service tax from 10 percent to 11 percent and we surmise that they may also lower their 30 percent corporate tax rate (Nugroho, 2015).

In the case of Indonesia, the related studies concerning the macroeconomic impact of tax rates policy are limited. In relation to fiscal austerity, Surjaningsih, Utari, and Trisnanto (2012) concluded that government spending is more effective to stimulate economic growth especially in times of recession, compared to taxation policies. In contrast, Basri and Rahardja (2011) argued that tax cut remains being effective to stimulate short-term economic growth particularly in the recession periods.

Hidayat and Ramadhan (2010) found that that personal income tax cut policy induce the household consumption. Unfortunately, the increase in household consumption is lower than the decrease in government expenditure, investment, and

net export (Pauhofova et al., 2018). Using inter-regional computable general equilibrium model, they also found that the positive impact holds only for poverty reduction. Hence, they do not suggest pursuing this kind of fiscal policy.

Kuncoro (2014) used data envelopment analysis to analyze the relative efficiency scores of government revenue sources. The results confirm that the relative efficiency scores of taxes revenue is the lowest and decrease compared to non taxed revenue, domestic debt, and foreign debt, resulting the tax-GDP ratio is relatively stagnant. Therefore, he suggests that increasing taxes will boost government revenue but not substantially deteriorate economic growth. The previous empirical studies in Indonesia present that there are no comprehensive studies covering tax cut and hike tax simultaneously. Normatively, the increase in tax revenues should be accompanied by tax rates reduction so that the government revenue target would be achieved (OECD, 2010).

Various efforts made by academics to prove tax counterbalancing related to the existence of tax competition so far have not received a definite general conclusion. Researches on tax counterbalancing are mostly based on the tax behavior theory. Those approaches indeed are very useful to identify the behavior of taxpayer considerations using case studies or laboratory experiments with relatively limited coverage at the micro level. Researches with a macro approach have advantages in terms of loss calculation simulations that occur immediately when the application of the rule is executed.

This study attempts to test the feasibility of tax counterbalancing policy. As suggested by Abbas and Klemm (2012), any policy should be based on the cost and benefit analysis. Our approach is in the same spirit, although it has a significant difference. We employ the demand system to access the impact of the change in tax rate in the case of Indonesia. More specifically, using the demand system allows us to identify wide economic impacts either in the types of tax or industrial levels. We start with hypothesis that the increase in VAT rate combined by CIT rate reduction can help raise the government tax revenue.

2. Research Method

Calculating consumer demand for commodities begins with the estimation of demand equations derived from neoclassical consumer theory. Three flexible demand systems have received considerable attention because of their relative empirical expedience. They are the Linear Expenditure System (LES) developed by Stone (1954), the Almost Ideal Demand System (AIDS) developed by Deaton and Muellbauer (1980), and the Quadratic Almost Ideal Demand System (QUAIDS) of Banks, Blundell, and Lewbel (1997).

The QUAIDS model used in our empirical analysis is based upon the AIDS model and allows to a more general Engel curve shape. The nonlinear terms are restricted to be a quadratic in log income to provide a significantly better fit of budget shares to changing income levels while remaining a parsimonious model specification. This model is designed to estimate a complete demand system

consistent with both microeconomic theory and available expenditure and price data (Oliver, 2014). He mentions that, through the addition of the quadratic income term, the QUAIDS model allows goods to be luxuries at some income levels but necessities at others.

The QUAIDS has rank three, and can better approximate non-linear Engel curves in empirical analysis. Since a QUAIDS model produces a considerably larger regular region than the locally flexible forms, it can be classified as effectively globally regular, where corresponding utility and indirect functions, and cost functions satisfy their theoretical properties for all non-negative demand, price and all utility levels as appropriate. The QUAIDS model generates a rank three system and is based upon the following indirect utility function (U):

$$\ln U(P, Y) = \left[\left\{ \frac{\ln Y - \ln a(P)}{b(P)} \right\}^{-1} + \lambda(P) \right]^{-1} \quad (1)$$

where the term in the brace is the indirect utility function of a Price-Independent Generalized Logarithmic (PIGLOG) demand system, Y indicates total expenditures of households, and P represents a vector of prices. $a(P)$ is a differentiable and homogeneous function of degree one in prices. $\lambda(P)$ and $b(P)$ are homogeneous functions of degree zero in prices.

These functions are defined as:

$$\ln a(P) = a_0 + \sum_{i=1}^k a_i \ln p_i + \frac{1}{2} \sum_{i=1}^k \sum_{j=1}^k \gamma_{ij} \ln p_i \ln p_j \quad (2a)$$

$$b(P) = \prod_{i=1}^k p_i^{b_i} \quad (2b)$$

$$\lambda(P) = \sum_{i=1}^k \lambda_i \ln p_i, \text{ where } \sum_{i=1}^k \lambda_i = 0 \quad (2c)$$

Applying the Roy's identity to the indirect utility function (1), the budget share equation for commodity i is

$$s_i = \frac{\partial \ln a(P)}{\partial \ln p_i} + \frac{\partial \ln b(P)}{\partial \ln p_i} (\ln Y) + \frac{\partial \lambda}{\partial \ln p_i} \frac{1}{b(P)} (\ln Y)^2 \quad (3)$$

where s_i is defined as $s_i = p_i q_i / Y$ representing the budget share for commodity i . In order to be consistent with the microeconomic theory, the parameters should impose three strict conditions that (i) aggregation: $\sum_{i=1}^k a_i = 1$, $\sum_{i=1}^k b_i = 0$, $\sum_{j=1}^k \gamma_{ij} = 0$, (ii) homogeneity: $\sum_{j=1}^k \gamma_{ij} = 0$, and (iii) symmetry: $\gamma_{ij} = \gamma_{ji}$.

Replacing (2) in (3), we get the QUAIDS expenditure share equation:

$$s_i = a_i + \sum_{j=1}^k \gamma_{ij} \ln p_j + b_i \ln \left\{ \frac{Y}{a(P)} \right\} + \frac{\lambda_i}{b(P)} \left[\ln \left\{ \frac{Y}{a(P)} \right\} \right]^2 \quad (4)$$

In the case the last term is zero, equation (4) will become the AIDS model which the most widely used for modeling consumption behavior for grouped commodities.

To apply the QUAIDS model in the tax counterbalancing policy, we assume that the government has three main tax resources, i.e. corporate income tax (CIT), value added tax (VAT), and others (OT). We do not explicitly specify the personal income tax because of informality problem in labor market and no reliable data on wage income. The government's utility is an increasing function of the three tax revenue:

$$U = f(CIT, VAT, OT) \quad (5)$$

Each tax revenue (TR) has different tax base. In the case of Indonesia, the CIT is dominated by agricultural, mining, and oil and gas industries. The VAT refers

to the non oil and gas manufacturing industry, and the rest economic sectors determine OT. Therefore, we can rewrite:

$$TR = CIT + VAT + OT \quad (6a)$$

$$TR = \{ \in (CIT + VAT + OT) \} = t_i Y_i \quad (6b)$$

where t is average tariff of tax and Y is nominal tax base.

The nominal tax base is multiplication of price and quantity. This notion is applied on the total and individual tax base:

$$TR = T \times P \times Q = \sum_{i=1}^k t_i p_i q_i \quad (7)$$

$$TR = PZ = \sum_{i=1}^k p_i z_i \quad (8)$$

where $Z = \frac{Q}{T}$ and $z = \frac{q}{t}$

Tax rate, t , is obtained by taking regression on (6b). The average tax rate (t) is called the effective marginal tax rate (Devereux and Griffith, 2003). According to Mendoza, Milesi-Ferretti, and Asea (1997), the main obstacle in empirical research on growth effects of tax policy is the difficulty to construct adequate tax variables. Most theoretical propositions are based on marginal tax rates whereas most empirical studies rely on either average or statutory tax rates.

Under these circumstances, the government would like to maximize utility as (5) subject to budget line as (8), resulting the conventional theory of demand. By transforming them into QUAIDS, we have:

$$s_i \equiv \frac{p_i z_i}{Z} = a_i + \sum_{j=1}^k b_{ij} \ln p_j + c_i \ln \left\{ \frac{Z}{P} \right\} + d_i \left[\ln \left\{ \frac{Z}{P} \right\} \right]^2 \quad (9)$$

The linear-approximate QAIDS should be estimated as a system of equations with the above-mentioned restrictions on the parameter estimates. The own price elasticity can be derived from the parameter estimates as:

$$\epsilon_{ii} = -1 + \left(\frac{b_i}{s_i} \right) - c_i + \left[2 d_i \ln \frac{Z}{P} \right] \quad (10)$$

The uncompensated (Marshallian) price elasticity of commodity i with respect to change in the price of good j is

$$\epsilon_{ij} = \left(\frac{b_{ij}}{s_i} \right) - \left(\frac{c_i}{s_i} \right) s_j + \left[\left(2 d_i \ln \frac{Z}{P} \right) / s_j \right] \quad (11)$$

The expenditure (income) elasticity for commodity i is

$$\epsilon_{iZ} = 1 + \left(\frac{c_i}{s_i} \right) + \left[\left(2 d_i \ln \frac{Z}{P} \right) / s_i \right] \quad (12)$$

It seems more appropriate to analyze these variables directly. However, estimation of single demand function creates the problem that the quantity projections obtained may not satisfy the requirements of demand theory, particularly the budget constraint. The estimation method developed by Zellner (1962) for Seemingly Unrelated Regressions Estimation (SURE) provides estimates that are more efficient.

In general, the result of SURE will be equivalent with the maximum likelihood estimators (Greene, 2012). To obtain a symmetric and homogenous equation system, the estimation will be done directly on shares of agriculture and oil and gas industry and non oil and gas manufacturing industry, while share of other sectors will be done indirectly.

As explained in the conventional theory of demand, two goods vis-à-vis can be viewed as substitution, complement, and independent. The substitutability among the three commodities implies that tax counterbalancing policy is feasible to execute. Conversely, the complementarity among the three commodities presents that tax counterbalancing policy is not advisable, i.e. the change in tax rate will reduce the government revenue. The government taxes revenue data are taken from Ministry of Finance (2017).

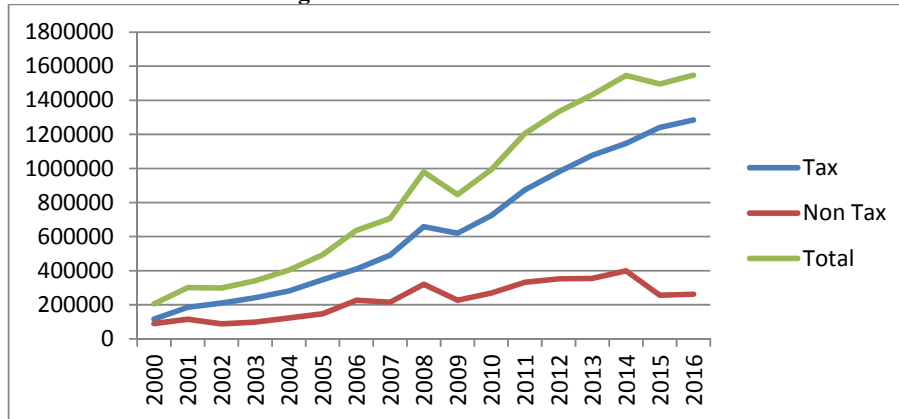
Since we concern with degree of substitutability and/or complementarity, we need reliable and long span time series data on primary, secondary, and tertiary economic sectors. Those data are derived from the national income and product account. The industrial output and government revenue are presented in 2010 constant price. The deflator is then used as general price (P). The prices of industrial output are obtained by dividing their industrial products in current price by their industrial products in constant price. In general, the data are obtained mainly from Central Bank of Indonesia, Ministry of Finance, and Central Board of Statistics. The sample periods chosen for this study extend from 2001(1) to 2016(4).

3. Results and Discussion

Figure 1 delivers the movement of tax, non tax, and total government revenues for the whole period. The contour of tax and non tax revenues slightly dropped in 2009 as a consequence of global financial crisis. As a result, the total government revenue was also decrease in the corresponding periods. After that, they hadbeen increasing substantially. Meanwhile, the non tax revenue dropped in 2014 in accordance with the end of commodity boom. Given this, we can say that tax revenue dominated to the government revenue and is relatively less responsive than the non tax revenue to the economic fluctuations.

As stated in the previous section, following global financial crisis the government substantially attempted to create new sources of government revenue. Unfortunately, those efforts were unsuccessful enough. The structure of tax revenue was not change significantly. The income tax revenue (the direct tax) was not far from the value added tax (the indirect tax) suggesting some distributional problems in taxation. In addition, the income tax revenue is dominated by corporate income tax (90 percent) rather than the personal income tax (10 percent). Overall, the tax to GDP ratio was stagnant for about 11-13 percent (or 10-12 percent when we exclude customs and excise duties).

Figure 1. Tax and non tax revenue



(Source: Ministry of Finance, 2017)

Table 1 presents the basic statistics covering mean, median, and extreme (maximum and minimum) values. The average value of other tax revenue (Q3) is the highest (8,252 billion Rupiah) followed by corporated tax income (Q1, 684 billion Rupiah). Hence, the share of other tax revenue reaches 89 percent of the total government receipt. Conversely, the value added tax revenue (Q2) is the lowest both in absolute (404 billion Rupiah) and relative (4.4 percent) terms. The high other tax revenue (mainly trade taxes, i.e. import and export taxes) relative to the total government revenue is the common figure in developing countries (Zee and Tanzi, 2001).

The standard deviation is also presented to show how far the dataset lay from its mean. The magnitude of standard deviation is consistent with the distance of maximum-minimum value. Statistically, a set data is said to be relatively volatile if its CV (ratio of standard deviation to its mean) is more than 50 percent. Based on the empirical rule, government tax revenue from extractive sectors (Q1) has the lowest CV implying that the associated variable is the most stable.

Table 1 also delivers the implicit price deflator for 3 commodities (P_i) and general price (P). All of the median values, primarily price in services sector (P_3), are close enough to the respective mean. This preliminary indicates that P_3 is normally distributed. The Jarque-Bera tests confirm that the associated variables are symmetrically distributed (bell-shaped) indicated by probability value higher than 5 percent. In other words, the null hypotheses that most of the series data is normally distributed can be rejected in 95 percent confidence level.

The asymmetric distribution of P_1 , P_2 , and P is confirmed by the negative value of skewness. The upper tail of the distribution is thicker than the upper tail. Again, P_3 has the greatest value of kurtosis. It implies that the tail of the distribution is thinner (moderate) than the normal indicated by the kurtosis coefficient is less than 3. This raises a logical question of whether (in relation to the highest share) the change in tax rate imposed on Q3 can induce the overall government tax revenue. We test empirically later using sophisticated econometric tool.

Table 1. Descriptive statistics

	Q1 _a	Q2 _a	Q3 _a	Z _a	Log(Z) _a	P1 _a	P2 _a	P3 _a	P _a
Share _a	0.0687 _a	0.0439 _a	0.8874 _a	1.0000 _a	-	-	-	-	-
Mean _a	684.437 _a	403.620 _a	8.251.606 _a	9.528.999 _a	16.0304 _a	0.8302 _a	0.8531 _a	0.8734 _a	0.8535 _a
Median _a	660.538 _a	390.221 _a	7.857.352 _a	8.833.368 _a	15.9940 _a	0.8687 _a	0.9460 _a	0.8785 _a	0.8873 _a
Maximum _a	872.254 _a	592.846 _a	13.656.387 _a	15.171.935 _a	16.5350 _a	1.3528 _a	1.2692 _a	1.3567 _a	1.3392 _a
Minimum _a	548.925 _a	227.437 _a	4.571.114 _a	5.715.740 _a	15.5587 _a	0.2920 _a	0.4967 _a	0.4131 _a	0.3812 _a
Std. Dev. _a	89.435 _a	104.503 _a	2.697.374 _a	2.722.755 _a	0.2824 _a	0.3832 _a	0.2688 _a	0.2986 _a	0.3196 _a
CV _a	0.1307 _a	0.2589 _a	0.3269 _a	0.2837 _a	0.0176 _a	0.4616 _a	0.3151 _a	0.3419 _a	0.3744 _a
Skewness _a	0.4412 _a	0.1698 _a	0.3347 _a	0.4899 _a	0.1332 _a	-0.1088 _a	-0.0232 _a	0.0654 _a	-0.0373 _a
Kurtosis _a	1.9952 _a	1.9424 _a	1.8715 _a	2.0960 _a	1.8821 _a	1.4304 _a	1.4515 _a	1.6567 _a	1.5220 _a
Jarque-Bera _a	4.7693 _a	3.2904 _a	4.5908 _a	4.7387 _a	3.5215 _a	6.6960 _a	6.3999 _a	4.8577 _a	5.8401 _a
Probability _a	0.0921 _a	0.1930 _a	0.1007 _a	0.0935 _a	0.1719 _a	0.0352 _a	0.0408 _a	0.0681 _a	0.0539 _a

(Source: own calculation)^b

The SURE estimation results of the Zellner's method (1962) for three equations are presented respectively in Table 2. Statistically, the estimated structural equation model of QUAIDS is significant for all expenditure categories indicated by t-statistics is greater than the associated t-table at 5 percent or even 1 percent confidence levels. Unfortunately, the coefficient of squared-log income in the third equation is insignificant^{*)}. The insignificance of the squared-log income does not allow goods to be luxuries at some income levels but necessities at others.

Hence, we re-estimate the AIDS model (Deaton and Muellbauer, 1980), by deleting the squared-log income. The results perform that all coefficients of regression are statistically significant. These results confirm to the analysis of descriptive statistics above that all of expenditures are relatively stable in the whole period of observation. However, our attention and further analysis are not aimed at the results of the structural model (Table 2). The parameters that have economic meaning are the derived coefficients that show the price and income elasticity indices for the corresponding expenditure (Table 3).

The negative sign of own-price elasticity fulfills the requirement of conventional demand theory behavior. This means that a rise 1 percent in 'price' in agricultural, mining, and oil and gas industries, for instance, will decrease the quantity of corresponding products demanded, so that the tax receipt also declines for about 0.48 percent on the average. Similarly, an increase in 'price' of Q1 and Q3 will decrease the quantity of associated expenditures for about 0.47 and 1.04 percent on the average respectively.

The income elasticity with respect to Q1, on the other hand, is the lowest, 0.17. This result is consistent with the fact that the government tax revenue received from agriculture, mining, and oil and gas industries is dominated by corporate income tax. The agricultural products are very sensitive to the season. Meanwhile, the mining and oil and gas industries mostly are state-owned so that less sensitive to the macroeconomic conditions. Moreover, the associated products are categorized basic needs for the society.

The effect of Q2 on the VAT revenue is moderate (0.52). In an empirical macro study by Keen and Lockwood (2010), it is found that the VAT is also a 'money machine', it has helped countries generate more revenues than they would have had without the VAT in place. However, the suitability of the VAT has been hotly debated. Within the theoretical work on the subject, Emran and Stiglitz (2005) argue that the VAT can be problematic when the economy has a large informal sector, whereas Keen (2008) points out that the VAT also taxes the informal sector indirectly, as the VAT is levied on some of the inputs and imports they use.

In contrast, the income elasticity with respect to Q3 is the highest, 1.08. It means that government tax revenue generated from the service sectors is very responsive to the economic performance. An increase 1 percent in services output induces the change in government revenue for about 1.08 percent. Therefore, the

^{*)} We have tried estimating all possible structural equations to statistically verify the income elasticity. The results are available upon request.

service sector would appear to be the major mainstays of that country in the near future. In the longer term, the tax bases will change in favour of the service-oriented tax mix of consumption and personal income taxes rather than trade taxes.

Table 2. Estimation results of QUAIDS and AIDS, 2001-2016

Q1	QUAIDS		AIDS	
	Coeff.	t-stat	Coeff.	t-stat
a	10.6944	4.1236	0.9821	11.4597
b(1)	0.0435	10.4595	0.0317	11.5178
b(2)	-0.0104	-6.8644	-0.0107	-12.3943
b(3)	-0.0332 a)	-7.9586 f)	-0.0210 a)	-6.8694 f)
c	-1.2447	-3.9233	-0.0565	-10.6697
d	0.0363	3.7446	-	-
Q2	Coeff.	t-stat	Coeff.	t-stat
a	0.6789	1.0463	0.3816	20.2968
b(1)	-0.0104	-6.8644	-0.0107	-12.3943
b(2)	0.0223	11.9880	0.0224	14.2623
b(3)	-0.0119 a)	-7.7559 f)	-0.0117 a)	-12.6098 f)
c	-0.0575	-0.7220	-0.0210	-18.0793
d	0.0011	0.4591	-	-
Q3	Coeff.	t-stat	Coeff.	t-stat
a	-10.3733 b)	-2.4025 g)	-0.3636 b)	-4.1529 g)
b(1)	-0.0332 a)	-7.9586 f)	-0.0210 a)	-6.8694 f)
b(2)	-0.0119 a)	-7.7559 f)	-0.0117 a)	-12.6098 f)
b(3)	0.0451 c)	0.1375 g)	0.0327 c)	2.8454 g)
c	1.3022 d)	-0.5913 g)	0.0775 d)	8.7471 g)
d	-0.0375 e)	0.7690 g)	-	-

Note:

- a) estimates were calculated from the restriction: $\sum b_i = 0$
- b) estimate was calculated from the restriction: $\sum a_i = 1$
- c) estimate was calculated from the restriction: $\sum b_{ij} = 0$
- d) estimate was calculated from the restriction: $\sum c_i = 0$
- e) estimate was calculated from the restriction: $\sum d_i = 0$
- f) standard error was taken from direct estimation of share of Q1 and share of Q3
- g) standard error was taken from direct estimation of share of Q2 and share of Q3

Overall, the income elasticity is positive for three cases. The positive income elasticity index shows that economic agent's expenses on natural resources base products, manufacturing industry output, and services move along the line of the income consumption curve (ICC). The ICC shows that in the case of commodity prices change, any increase in income will induce the demand for all of the three commodities. The effects that cause the changes in the amount of goods consumed

as economic agents move along the line of the new ICC to a higher level, which implies the same expenditure previously, is called expenditure effect.

Table 3. Own price, Cross price, and Income Elasticity of AIDS, 2001-2016

	Q1	Q2	Q3	Z
Q1	-0.4823	-0.1201	0.4243	0.1781
Q2		-0.4679	0.1577	0.5220
Q3			-1.0407	1.0873
Z	0.1781	0.5220	1.0873	-

(Source: Processed form Table 1 and 2)

So far, we have discussed individually the price and income elasticity. Table 3 also highlights the cross-price elasticity for all three types of expenditures. The cross price elasticity of Q1 with respect to Q2 seems to be negative (-0.12). This result implies that a fiscal contraction (the increase in corporate income tax rate) that makes the related goods relatively more expensive will induce substantial expansion in Q2, thereby offsetting or even outweighing the negative impact of the fiscal contraction on the sectoral demand. Therefore, the adverse impact occurs, i.e. the Q1 expenditure is substitutable for Q2 spending.

In contrast, the cross-price elasticity of Q1 with respect to Q3 shows a positive sign (0.42) as well as the cross-price elasticity between Q2 and Q3 (0.16). They imply that a fiscal contraction that makes Q1 relatively more expensive will generate a large negative income effect that outweighs the substitution effect, leading to a concomitant contraction in Q2 and Q3 that further depresses aggregate demand. These predictions about the two kind of expenditures' reaction to fiscal austerity seem to be consistent with what we have been observed during the 2008 global financial crisis. Given that, we can say the existence of crowding-in that is the Q1 and Q3 expenditures are complement for Q3 expenditures.

Based on the above results, we conclude the possibility of partial tax counterbalancing policy. Hence, tax counterbalancing policy is feasible for Indonesia to boost government revenue mobilization along with economic growth. The decrease in corporate income tax rate cut does not wholly depress the government tax revenue. The corporate income tax rate cut cannot be accompanied by the increase in the value added tax rate. Conversely, the corporate income tax rate cut may be compensated by the increase in services tax rates. In the case of Indonesia, where the informal sectors are inherent in manufacturing industry and services sector, the tax counterbalancing policy should remove them so the government easy-to-tax.

4. Conclusions

It is generally accepted that the change in tax rate on the government revenue depends to a large extent on whether or not the tax is distortive. This paper attempts to identify the feasibility of tax counterbalancing policy in the forms of reducing a

particular tax rate accompanied by increasing other tax rate. The basic of our analysis is the theory of demand system to test substitutability or complementarily or even independently among private expenditure on industrial outputs.

We contribute to the empirical literature on the effect of government revenue mobilization on economic activity, by assessing the impact of changes in tax rate simultaneously on the private spending. Unlike previous studies, we take into account primary, secondary, and tertiary sectors in compliance with the national income product based on production approach. We do this by analyzing quarterly data over the period of 2001-2016 using the quadratic almost ideal demand system.

The results suggest that government tax revenue from natural resources base products spending is not substitutable with government tax revenue from manufacturing industry. In contrast, government tax revenue from natural resources base products spending is complement with government tax revenue from services spending. In short, there are mixed evidences of substitutability and complementarily among economic sectors. Hence, partial tax counterbalancing policy likely takes place in the case of Indonesia.

In order to be fully implemented, the tax counterbalancing policy should be completed by transforming informal sector to formal sector both in manufacturing sector and services sector. In such a case, the tax counterbalancing policy will potentially address not only the soundness of state budget but also promote the linkage between economic development and fiscal issues. Therefore, fiscal policy can play an important role both in stimulation and stabilization. However, the increase in tax rate in manufacturing sector and services sector should be selected referring to the unit product instead of industrial sector base. Indeed, taxation in developing countries leave out many substantial issues that need to address immediately.

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