THE IMPACT OF FUEL SUBSIDY REALLOCATION: THE SOCIAL ACCOUNTING MATRICES APPROACH

(Dampak Realokasi Subsidi Bahan Bakar Minyak: Pendekatan Sistem Neraca Sosial Ekonomi)

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Abstrak

Dalam satu dekade terakhir, alokasi subsidi dalam APBN selalu memiliki proporsi yang signifikan. Dalam APBN-P tahun 2014, alokasi untuk subsidi meningkat secara signifikan dan lebih dari 50 persennya dialokasikan untuk subsidi BBM atau setara dengan Rp210 triliun. Kajian ini bertujuan untuk mensimulasikan dampak dari realokasi subsidi BBM ke subsidi lainnya, seperti subsidi bibit atau pupuk di sektor pertanian, sektor konstruksi, atau sektor layanan sosial. Simulasi ini sangat penting mengingat jenis subsidi BBM setiap tahunnya meningkat dan tidak terserap secara merata di masyarakat. Metodologi yang digunakan adalah simulasi dengan menggunakan Sistem Neraca Sosial Ekonomi (SNSE) tahun 2008. Terdapat dua jenis analisis yang dilakukan yaitu analisis dampak round by round dan dekomposisi multiplier dengan menggunakan metode Stone. Kedua analisis ini bertujuan untuk memperkirakan dampak masing-masing skenario terhadap perekonomian. Terdapat beberapa skenario dalam penelitian ini. Skenario pertama menghapus subsidi BBM tanpa melakukan realokasi. Skenario kedua adalah realokasi subsidi BBM ke sektor pertanian khususnya sektor pertanian tanaman pangan. Skenario ketiga adalah memindahkan subsidi BBM ke sektor konstruksi. Skenario terakhir adalah realokasi subsidi BBM ke sektor layanan sosial. Hasil simulasi menunjukkan bahwa skenario kedua lebih menguntungkan bagi rumah tangga dengan penghasilan yang terendah. Di sisi lain, skenario ketiga hanya memberikan manfaat bagi perusahaan dan pemerintah serta dampak negatif yang relatif lebih besar kepada rumah tangga yang tergolong miskin.
Kata kunci: subsidi, BBM, realokasi, fiskal, SNSE

Abstract

In the past decade, the allocation on subsidies spending in the state budget is always significant, in particular the proportion and value of the fuel subsidy which undeniably increases every year. In the 2014 State Budget, the allocation for the subsidies increased significantly in which more than 50 percent of it is allocated to the fuel subsidy or equivalent to 210 trillion IDR. This study aims to simulate the impact of the fuel subsidy reallocation to the other kind of subsidies such as seed or fertiliser subsidy in the agricultural sector, construction sector, or any other social services sector. This simulation is crucial due to the nature of fuel subsidy which increases every year and it is unequally distributed to the society. Methodology used in this study is a simulation based on the 2008 Social Accounting Matrices (SAM). Two types of analysis are conducted in this study, namely the round by round effect and the Stone multiplier decomposition method. These two types of analysis are aimed to predict the impacts of the following each scenario to the economy. First, phasing out the fuel subsidy without any reallocation. Second, reallocation of the fuel subsidy to the agricultural sector, in particular the crop farming sector. Third, fuel subsidy reallocation to the construction sector. Finally, the last scenario is to reallocate the fuel subsidy to the social services sector. The results reveal that the second scenario is more beneficial to the households with lowest income. Meanwhile, on the other hand, the third scenario will only benefit the firms and government, and even with more negative impacts on the poor households.
Keywords: subsidy, fuel, reallocation, fiscal, social accounting matrices

I. INTRODUCTION

A. Background

Indonesia has been classified as a middle income country for more than two decades. Even though Indonesia's economic performance has been improving significantly in period 2001 and 2012, which is indicated by almost the doubled GDP's value and significant increasing in the GDP per capita, there is a risk that Indonesia is being trapped in the middle income country.[1]

In the same report, the World Bank claims that there are three ways to improve economic growth based on productivity. First is to reduce the infrastructure gap, reduce the skills gap, and improving markets' function. Regarding of the infrastructure gap, the World Bank suggests to phase out the fuel subsidy spending at the central government level.[2]

The fuel subsidy spending is one of the dominant components of subsidies. In June 2014, the 2014

[1] World Bank, *Indonesia: Avoiding The Trap: Development Policy Review 2014,* (Jakarta: World Bank, 2014), p. 2.
[2] *Ibid*., p. 7.

state budget amendment was approved by the parliament with some revisions. One main issue in this revision is the increasing of the energy subsidy appropriation to approximately 453 trillion IDR in which contains 350 trillion IDR for the fuel subsidy with 46 billion litter quotas. The fuel subsidy amount increased significantly from the 2014 state budget in which 210 trillion IDR is allocated for the fuel subsidy or increase by 66 percent.

Basically, the subsidy account in the state budget can be decomposed into two main classifications: energy and non energy. The fuel and electricity subsidies are classified under energy while food, fertiliser, project loan, and tax are classified under non energy. In general, the value of subsidies increased significantly year by year. In 2004, the total value of subsidies approximately at 24.50 billion IDR. However in ten years, the value increased significantly to 333,68 billion IDR in the 2014 State Budget (Table 1).

B. Problems

In the last decade, the proportion of the fuel subsidy spending to the total subsidies spending was more than 50 percent. On the other hand, the non energy subsidies decreased significantly. For example the food subsidy spending were at 21 percent in 2004 and at 6 percent in 2014. Nevertheless, the fuel subsidy has been recognised as an inappropriate policy. The implementation of the fuel subsidy spending results in deteriorating welfare of a net oil importing country. Furthermore, the policies that the government implements to finance the subsidy does not have any significant impact. In regards of the macroeconomic variables, tax instruments have significant impact. For example, using the consumption tax to finance the subsidy results in crowding out of the non oil consumption which decreases the productivity of the non traded sector and inefficient labour allocation.[4]

C. Purposes

This study aims to simulate the impact of reallocating the fuel subsidy on the value added, institution, and production sectors. This study is different from previous studies from two main aspects. First, this study utilises the round by round effect to evaluate how much the shock is transmitted into other sectors. Second, this study uses the Stone multiplier decomposition method to investigate further the impact of the multiplier effect since the effect should be not absorbed entirely at once.

II. THEORITICAL PERSPECTIVES

A. Theoritical Review

In the past, the fuel subsidy policy aimed to keep the domestic fuel price low and affordable for the society. Nevertheless, the amount of fuel subsidy has been increased significantly since 1976. Since then,

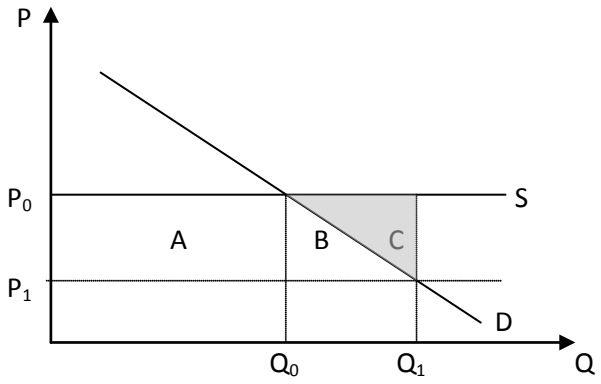
Table 1. Percentage of the Government Expenditure on Subsidies

Year	Energy		Non Energy					Total
	Fuel	Electricity	Food	Fertilizer	Project Loan	Tax	Others	
2004	0.59	0.14	0.21	0.06	0.00	0.00	0.00	1.00
2005	0.64	0.11	0.20	0.04	0.00	0.00	0.00	1.00
2006	0.86	0.00	0.09	0.05	0.00	0.00	0.00	1.00
2007	0.60	0.25	0.07	0.06	0.02	0.00	0.01	1.00
2008	0.47	0.30	0.07	0.08	0.02	0.03	0.03	1.00
2009	0.35	0.28	0.08	0.11	0.03	0.15	0.02	1.00
2010	0.44	0.24	0.07	0.09	0.03	0.11	0.02	1.00
2011	0.51	0.22	0.08	0.09	0.01	0.08	0.01	1.00
2012	0.59	0.22	0.07	0.08	0.01	0.02	0.01	1.00
2013	0.61	0.26	0.05	0.05	0.00	0.02	0.01	1.00
2014	0.63	0.21	0.06	0.06	0.01	0.01	0.01	1.00

Source: CEIC, 2014.[3]

[3] CEIC is a subscribed worldwide database which is provided by the Euromoney Institutional Investor. Further information is available at http://www.ceicdata.com.

[4] Michael Plante, "The Long-Run Macroeconomic Impacts of Fuel Subsidies", *Journal of Development Economics*, 107, 2014, pp. 129-130.



Source: IMF, 2013.[6]

Figure 1. The Deadweight Loss of Fuel Subsidy

the issue on reducing the fuel subsidy in order to reduce the budget allocation has been discussed. For example, in the earlier of the 80's, Widjojo Nitisastro claimed that to allocate more to other sectors, reducing the fuel subsidy was necessary.[5]

IMF in 2013 claim that the energy subsidy such as fuel subsidy causes a deadweight loss for the society. Figure 1 reveals that the budget allocation to the fuel subsidy is more than the amount which is received by the society. The assumptions are the supply curve (S) is inelastic and the government allocates subsidy for any fuel consumption before subsidy (Q_0) and after subsidy (Q_1). The fuel subsidy reduces the market price of fuel from P_0 to P_1. Moreover, the subsidy also induces increasing fuel consumption from Q_0 to Q_1. The deadweight loss is the shaded area (C) where the government allocates more resources to the fuel subsidy (A+B+C) and the society receives less benefit (A+B).[7] In other words, the consumer benefit due to lower fuel price is offset by higher cost for the government to allocate more for the fuel subsidy.

B. Empirical Review

Regarding of the fuel subsidy in Indonesia, there are several empirical researches. Cheon, *et al*, claim that the fuel subsidies in Indonesia only beneficial for the richest group of the society. They argue that 40 percent of the fuel consumption went to the 10 percent of the wealthiest population while the poorest only accounts for 1 percent.[8]

Similar to Cheon, *et al* and Dartanto claims that based on the share of fuel subsidies, 'more than 41 percent of gasoline subsidies benefitted the top richest income groups in Indonesia'.[9] In addition, Kawai & Morgan claim that higher level of food and energy subsidies contribute significantly to fiscal deficits.[10]

Furthermore, IMF argues that the fuel consumption is the key driver of the fuel subsidy. If the fuel consumption is maintained, the fuel subsidy is not a threat to the fiscal sustainability. When there is a 10 percent fuel consumption increasing, the subsidy will increase by 0.3 percent of GDP.[11]

Therefore, reallocating the fuel subsidy is very relevant to the current condition in Indonesia. Widodo, *et al* claim that by removing the fuel subsidy provides the government with ability to reallocate to other sectors.[12] Furthermore, World Bank claim reducing the fuel subsidy is one of many solutions to finance the infrastructure gap.[13]

Current studies on reallocating the fuel subsidy are Widodo, *et al*, Dartanto, and Pradipto & Sahadewo. Widodo simulated the reallocation of the fuel subsidy to the food, beverage, and tobacco industry; trade; agriculture; and education and health sectors using the 2008 SAM. They claim that the impact of reallocation to output, GDP, and income of the production factor is less than the impact of the fuel subsidy removal.[14]

Dartanto who uses CGE to simulate the impact of the fuel subsidy reallocation to poverty claims that the reallocation should reduce poverty. He uses several scenarios to reallocate the fuel subsidy such as increasing spending on health, education, infrastructure, and machinery; increasing government transfer. However, Dartanto finds that there is some mark-up effect which reduces the magnitude of the poverty reduction.[15]

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5 Widjojo Nitisastro, *Pengalaman Pembangunan Indonesia: Kumpulan Tulisan dan Uraian Widjojo Nitisastro*, (Jakarta: Kompas, 2010), p. 367.

6 IMF, *Energy Subsidy Reform in Sub-Saharan Africa: Experiences and Lessons*, (Washington D.C.: International Monetary Fund, 2013), p. 18.

7 *Op.Cit.*, IMF, p. 18.

8 Andrew Cheon, Johannes Urpelainen, and Maureen Lackner, "Why Do Governments Subsidize Gasoline Consumption? An Empirical Analysis of Global Gasoline Prices, 2002–2009", *Energy Policy*, Vol. 56, 2013, p. 382.

9 Teguh Dartanto, "Reducing Fuel Subsidies and the Implication on Fiscal Balance and Poverty in Indonesia: A Simulation Analysis", *Energy Policy*, Vol. 58, 2013, p. 118.

10 Masahiro Kawai and Peter J. Morgan, "Long-Term Issues for Fiscal Sustainability in Emerging Asia". *ADBI Working Paper Series No. 432*, (Japan: ADB Institute, 2013), p. 18.

11 IMF, "Indonesia: 2008 Article IV Consultation-Staff Report", *IMF Country Report No. 08/299*, (Washington D.C.: International Monetary Fund, 2008), p. 18.

12 Tri Widodo, Gumilang A. Sahadewo, Sekar U. Setiastuti, and Maftuchatul Chaerriyah, "Impact of fuel Subsidy Removal on Government Spending" *in* Wu, Y., X. Shi, and F. Kimura (eds.), Energy Market Integration in East Asia: Theories, Electricity Sector and Subsidies. *ERIA Research Project Report 2011-17*, (Jakarta: ERIA, 2012), p. 191.

13 *Op.Cit.*, World Bank, p. 7.

14 *Op.Cit.*, Widodo, Sahadewo, Setiastuti, and Chaerriyah, p. 201.

15 *Op.Cit.*, Dartanto, p. 128.

Pradipto & Sahadewo who examine the exit policy for the fuel subsidy using the experiment approach find that the households prefer to have the fuel subsidy. However, the most preferable exit strategy to reallocate the fuel subsidy is the gradual elimination and earmarked allocation scheme such as for vaccination and Mass Rapid Transit (MRT) program. They claim that the results are consistent for all sessions and groups.[16]

III. METHODOLOGY

A. Data

The main data source in this study is the 2008 updated Social Accounting Matrices which was constructed by the Central Bureau of Statistic of Indonesia. Figure 2 shows the structure of the 2008 SAM. Basically, the 2008 SAM is a system which describes the society's social and economy condition with comprehensive, consistent, and integrated linkages.[17]

In general, the 2008 SAM consists of production factor, institution, production sector, and exogenous variable. There are 17 types of production factors that can be categorised as labour and non labour, rural and urban. Regarding of institutions, there are eight types of households, and two others are the private and government. The production activities consist of the production sector, in which disaggregated into 24 different sectors, the domestic commodities, and import commodities. Finally for exogenous variables, there are profits, capital, indirect tax, subsidy, and foreign account.

B. Analysis Method

This study uses a simulation approach by utilising the 2008 Social Accounting Matrices (SAM) as a main tool. All calculation for the analysis is done by utilising the matrices operation in the Microsoft Excel.

This study uses two types of analysis. The first one is the round by round effect. In this approach, the impact of shock is calculated according to the infinite rounding effects according to the expenditure coefficients. The expenditure coefficient is calculated by dividing the value of one matrix element with the total value in one column. Miller & Blaire argue that the round by round effect is one way to evaluate the impact of changes in the final demand. Furthermore, the round by round analysis reveals the magnitude of the transmitted shock for each round. For example, Miller & Blaire claim that the total effects usually can be captured in three rounds.[18]

The second approach is decomposition of the multiplier effect. Decomposition can be done by using the Stone Decomposition and Pyatt & Round Decomposition. In this study, the decomposition is done by using the Stone decomposition method since Blair & Miller argue that it is more convenient to use additive multiplier rather than multiplication.[19] Equation 1 is the Stone Decomposition which consists of three important parts: the own effect, the extra-group effect, and the closed loop effect.

$$(I-S)^{-1} = I + (M_1 - I) + (M_3 - I)M_1 + ((M_2 - I)M_1M_3 \ldots (1)$$

To simplify, the SAM matrices can be defined as:

$$S = Q + R \ldots\ldots (2)$$

Where S is the endogenous matrix which includes T_{13}, T_{21}, T_{22}, T_{32}, and T_{33}. If $S = \begin{bmatrix} 0 & 0 & V \\ Y & H & 0 \\ 0 & C & A \end{bmatrix}$ Matrix S is defined as then Q and R matrices can be defined as:

	Production Factor	Institution	Production Activities	Exogenous	Total
Production Factor			T_{13}	T_{14}	T_1
Institution	T_{21}	T_{22}		T_{24}	T_2
Production Activities		T_{32}	T_{33}	T_{34}	T_3
Exogenous	T_{41}	T_{42}	T_{43}		T_4
Total	T_1	T_2	T_3	T_4	

Source: Modified from BPS, 2010.

Figure 2. SAM 2008 Structure

16 Rimawan Pradiptyo and Gumilang Aryo Sahadewo, "On the Complexity of Eliminating Fuel Subsidy in Indonesia; A Behavioral Approach", *Munich Personal RePEc Archive Paper No. 40045*, 2012, p. 25.

17 Biro Pusat Statistik, *Sistem Neraca Sosial Ekonomi Indonesia Tahun 2008*, (Jakarta: Rian Sera Permata, 2010).

18 Ronald E. Miller and Peter D. Blair, *Input-Output Analysis: Foundations and Extensions*, (New York: Cambridge University Press, 2009), p. 34.

19 *Ibid*., p. 528.

$$Q = \begin{bmatrix} 0 & 0 & 0 \\ 0 & H & 0 \\ 0 & 0 & A \end{bmatrix} \quad \text{and} \quad R = \begin{bmatrix} 0 & 0 & V \\ Y & 0 & 0 \\ 0 & C & 0 \end{bmatrix} \quad \text{..... (3)}$$

Based on Pyatt and Round decomposition, there are three multiplier effect which are the direct effect (M_1), the open-loop effect (M_2), and the closed loop effect (M_3). To produce these three matrices, this study modifies the formula as suggested by Blair & Miller in 2009 due to different ordering in the SAM matrices. Therefore, these three matrices can be defined as:

$$M_1 = [I-Q]^{-1} = \begin{bmatrix} I & 0 & 0 \\ 0 & [I-H]^{-1} & 0 \\ 0 & 0 & [I-A]^{-1} \end{bmatrix} \text{..... (4)}$$

$$M_2 = I+T+T^2 = \begin{bmatrix} I & V[I-A]^{-1}C & V \\ [I-H]^{-1}Y & I & [I-H]^{-1}YV \\ [I-A]^{-1}C[I-H]^{-1}Y & [I-A]^{-1}C & I \end{bmatrix} \text{..... (5)}$$

$$M_3 = [I-T^3]^{-1} = \begin{bmatrix} [I-V[I-A]^{-1}C[I-H]^{-1}Y]^{-1} & 0 & 0 \\ 0 & [I-[I-H]^{-1}YV[I-A]^{-1}C]^{-1} & 0 \\ 0 & 0 & [I-[I-A]^{-1}C[I-H]^{-1}YV]^{-1} \end{bmatrix} \text{..... (6)}$$

The Stone decomposition basically utilises further the M_1, M_2, and M_3 matrices. Stone defines the decomposition as the own effect (N_1), the extra-group effect (N_2), and the closed loop effect (N_3). The three effects in the Stone decomposition can be defined as:

$N_1 = M_1$ ..... (7)
$N_2 = (M_3 - I)M_1$ ..... (8)
$N_3 = M_3M_1 - M_1$ ..... (9)

To simulate the impacts of the fuel subsidy reallocation, this study uses several scenarios. Regarding the scenario's setting, there are four scenarios in this study which is simply done by phasing out or reallocating the fuel subsidy to the other specific sectors.

The first scenario is to phase out the fuel subsidy. This scenario also functioning as a baseline since in the last decade, the government already tried to phase out the fuel subsidy twice, in 2005 and 2008. Aswicahyono, *et al* claim that the implementation of the fuel subsidy results in fiscal balance deterioration such as increasing budget deficit, budget cutting, balance of payment worse off, higher dependency on the fuel imports, and finally can disturb the macroeconomic balance.[20]

The second scenario (SIM2) is to reallocate the subsidy to the agriculture sector. Widodo, *et al* argue that based on the number of labour force, the agricultural sector is the main priority for the government.[21] Furthermore, in the recent years, the subsidies' values for food and fertiliser are less than 15 percent from the total subsidies in the state budget. Compared to the fuel subsidies, the food and fertiliser subsidies in total only one fifth of the fuel subsidy which indicates that subsidies for food and fertiliser are less significant in amount. Therefore, the second scenario tries to capture the impact of increasing subsidies in the agricultural sector, in particular the crop farming sector.

The third scenario (SIM3) is to move the subsidy to the construction sector. World Bank argue that to finance the other sector such as infrastructure can be done through phasing out the energy subsidies since there are lack of financing in the state budget. For example, the allocation for infrastructure is at 2.5 percent of GDP which is slightly lower than the allocation for the fuel subsidy.[22]

The fourth scenario (SIM4) is to reallocate the budget into social services. This scenario basically tries to capture the impact of the direct cash transfer which was done on the last phasing out fuel subsidy in 2008 since Rosfadhila, *et al* claim that this policy could reduce the impact of fuel subsidy phase out.[23]

After obtaining the impact, this study decomposes the effects by using the second and third round analysis. Furthermore, this study decomposes the multiplier effects into the own effect, extra-group effect, and closed loop effect based on the Stone decomposition. Further analysis is to evaluate the impacts into each block such as value added, institutions, and productions sectors.

IV. RESULTS AND DISCUSSION

A. Phasing Out the Fuel Subsidy

Using the 2008 SAM, phasing out the fuel subsidy will have significant negative impacts on the

[20] Aswicahyono, Haryo, Deni Friawan, Pratiwi Kartika, and Widdi Mugijayani, "Penyesuaian subsidi BBM: Pilihan Rasional Penyelamatan Ekonomi". *Naskah Kebijakan-Mei 2011*, (Jakarta: Centre for Strategic and International Studies, 2011).

[21] *Op.Cit.*, Widodo, Sahadewo, Setiastuti, and Chaerriyah, p. 192.

[22] *Op.Cit.*, World Bank, pp. 93-94.

[23] Meuthia Rosfadhila, Nina Toyamah, Bambang Sulaksono, Silvia Devina, Robert J. Sodo, and Muhammad Syukri, "Kajian Cepat Pelaksanaan Program Bantuan Langsung Tunai (BLT) 2008 dan Evaluasi Penerima Program BLT 2005 di Indonesia". (Jakarta: SMERU Research Institute, 2011), hal. 37.

Table 2. The Round by Round Effect on the Production Activities

Description	2nd			3rd		
	SIM2	SIM3	SIM4	SIM2	SIM3	SIM4
Crop farming	4.17	-	6.15	3.32	-	4.97
Other crop farming	2.53	(0.00)	0.10	2.30	(0.00)	0.09
Livestock and livestock products	3.46	(0,03)	2.39	2.59	(0.02)	1.80
Forestry and hunting	(0.00)	2.00	0.00	(0.00)	1.64	0.00
Fishery	-	-	0.66	-	-	0.49
Coal, metal, and oil mining	(0.03)	(0.03)	(0.03)	(0,02)	(0.02)	(0.02)
Other mining and quarrying	-	7.41	0.24	-	5.92	0.19
Food, beverage, and tobacco industry	(0.04)	(0.04)	4.85	(0.03)	(0.03)	3.80
Garment, textile, clothes, and leather industry	(0.14)	(0.10)	0.08	(0.12)	(0.13)	0.07
Wood and wood product industry	0.01	5.59	0.05	0.01	4.49	0.04
Paper, printing, transportation tools, metal product, and other industries	(2.53)	23.30	2.40	(2.09)	12.67	1.62
Chemical, clay products, and cement industry	(20.88)	(11.19)	(23.45)	(14.76)	(6.82)	(15.01)
Electricity, gas, and drinking water	(0.43)	(0.40)	(0.08)	(0.42)	(0.39)	(0.08)
Construction	(0.31)	(0.44)	0.17	(0.31)	(0.43)	0.16
Trade	-	-	-	-	-	-
Restaurant	(0.29)	0.29	(0.05)	(0.28)	0.26	(0.07)
Hotels	(0.02)	0.08	0.01	(0.02)	0.07	0.01
Land transportation	(0.65)	(0.55)	(0.60)	(0.63)	(0.53)	(0.59)
Air and water transportation, and communication	(2.02)	(1.43)	(1.24)	(1.37)	(0.88)	(0.78)
Transportation supporting services and warehousing	(0.93)	(0.94)	(0.90)	(0.87)	(0.88)	(0.85)
Bank and Insurance	(1.98)	(1.19)	(1.63)	(1.96)	(1.21)	(1.66)
Real Estate and service firms	(1.80)	0.97	(0.33)	(1.25)	0.77	(0.05)
Government, defense, education, health, film, and other social services	(0.00)	(0.00)	2.40	(0.00)	(0.00)	1.98
Individual, households, and other services	(18.96)	(18.59)	(18.47)	(18.23)	(17.88)	(17.78)

Source: Calculated from the 2008 SAM (BPS, 2010).

economy. For example, by reducing the fuel subsidy at 100 billion IDR leads to significant decrease of the GDP by 176.23 billion IDR, the institutions' income by 211.37 billion IDR, and the total output by 742.05 billion IDR.

The round by round effects analysis reveals that the impact of phasing out the fuel subsidy will reach the income distribution in the second round. The labours income in the production, transport operators, and blue collar receive severe impacts. The urban labour forces receive less income by around 21.35 billion IDR while the rural labour forces receives less income by around 18.41 billion IDR, slightly above the urban labour forces. In addition, the capital has decreasing income at around 7 billion IDR decreasing in value.

This analysis also reveals that in the third round impact, the shock of phasing out the fuel subsidy is transmitted into the households, firms, and government. Similar to Cheon, *et al* in 2013 and Dartanto in 2013, this study finds that the richest household group receives mostly the negative impacts at around 24.02 billion IDR or similar to 68.72 percent of the total impacts on the institutions. Similar to the round by round effect analysis, the Stone decomposition reveals that the impacts occur mostly in the own effect.

Therefore, the policy to phase out the fuel subsidy without any substitution policy is not preferable. The government should reallocate the subsidy rather than direct elimination or reduction of the fuel subsidy. The next three scenarios are based on assumption that the government reallocate some of the fuel subsidy into specific sectors such as agriculture, construction, and social services.

B. The Round by Round Effect Analysis

The first round effect of the fuel subsidy reallocation directly affects the related sectors such as the crop farming sector; construction sector; and social services sector. In the second round, the shock from the first round transmitted into other sectors according to the expenditure coefficients. Similarly, in the third round, the sectors, which receive the shock, allocate with similar proportion with the second round.

There are no impact for the institutions and the owners of the production factor in the first

Table 3. The Impact on the Income of the Production Factors

Description			SIM2	SIM3	SIM4
Labour					
Agriculture	Wage and salary receiver	Rural	11.30	-	-
		Urban	2.32	-	-
	Non wage and salary receiver	Rural	56.20	-	-
		Urban	5.52	-	-
Production, operators of transportation means, unskilled labour	Wage and salary receiver	Rural	(5.08)	0.97	(4.50)
		Urban	(7.62)	(1.65)	(4.72)
	Non wage and salary receiver	Rural	(4.41)	(3.62)	(4.30)
		Urban	(9.28)	(8.42)	(8.54)
Administration, sales, and services	Wage and salary receiver	Rural	(1.15)	(1.09)	2.51
		Urban	(3.10)	(2.24)	10.41
	Non wage and salary receiver	Rural	(0.26)	(0.36)	(0.03)
		Urban	(0.60)	(0.39)	0.84
Leaders, military, professional, and technicians	Wage and salary receiver	Rural	(0.02)	0.03	11.85
		Urban	(0.48)	0.14	19.89
	Non wage and salary receiver	Rural	0.13	0.07	0.51
		Urban	(0.11)	0.29	1.34
Non Labour (Capital)			(2.51)	11.58	2.00

Source: Calculated from the 2008 SAM (BPS, 2010).

round, as expected. However, in the second and third round, the shocks are already transmitted into the production activities as well as through the production factors before ended at the institutions.

Table 2 reveals that the second and third round effects for the production activities. The effects on the crop farming sector and the social services are positive in value. On the other hand, the effect for the construction sector is negative. The negative impacts on the third scenario might be caused by the positive increasing in the construction sector is less than the negative impacts of the phasing out of the fuel subsidy. Therefore, in total, the impacts to the economy, in aggregate, becomes negative. Based on the round by round effect, the individual, households and other services get the worst impact which is indicated by the lowest value on the production sector for all scenarios. As expected, the effect values diminish as the round become further from the original recipient.

Table 3 reveals the effects on the production factors' income. The second scenario has more beneficial impacts on the labour force on the agriculture, in particular in the rural area. On the other hand, the capital account is worse off. Furthermore, the second scenario simulation reveals that the rural labour forces receive more benefits compare to the urban labour forces.

Contrast to the second scenario, in the third scenario, the beneficial labour force are in the production, operators of transportation means, unskilled labour and leaders, military, professional, and technicians. In this scenario, the impact on capital is the highest compare to other scenarios. Finally, in the fourth scenario, it is more beneficial for the administration, sales, services and leaders, military, professional, and also technicians, particularly in the urban area.

Table 4 reveals the third round effect on the institutions as the owner of the production factors. On the third round effect, the institution such as the households, firms, and governments receive the shocks' transmition with a different proportion. For example, in the second scenario, the entrepreneurs in the agricultural sector are the most beneficiary agent. In addition, in the third scenario, the firms are more dominant recipient. While in the fourth scenario, the high income group get the most benefits of the injection which might be caused by untargeted social services. The government, as expected, receives no further impact on the third round.

The round by round effect demonstrates the shocks' path in the SAM which is the transmition of the shock if it starts from the production activities, and then it should affect the production factors first before it has any impacts on the institution. In this study, the shock starts in the production activities as the first round effect. Beside the second and third round effects on the production activities as shown in Table 2, the shock is transmitted to the production factors as the second round effect, and finally affects the institution as the third round effect.

Table 4. The Third Round Effect on the Income Distribution

Description				SIM2	SIM3	SIM4
Households						
Agriculture						
Labour				5.27	(0.10)	0.35
Entrepreneurs				38.48	(0.95)	2.04
Non Agriculture						
	Rural		Low-income entrepreneurs, administration officer, unskilled labour, and individual service	0.73	0.02	(1.38)
			Non labour force	4.40	(0.53)	0.50
			High income entrepreneurs, non agricultural entrepreneurs, managers, military, professional, and technicians	10.61	(1.24)	7.95
	Urban		Low-income entrepreneurs, administration officer, unskilled labour, and individual service	(10.64)	(5.95)	(3.73)
			Non labour force	(1.49)	(0.64)	1.71
			High income entrepreneurs, non agricultural entrepreneurs, managers, military, professional, and technicians	(4.75)	(3.18)	18.18
Firms				(1.62)	7.46	1.29
Governments				-	-	-

Source: Calculated from the 2008 SAM (BPS, 2010).

C. The Multiplier Effect Analysis

The aggregated multiplier effects for each scenario are presented in Table 5. This study disaggregates the multiplier effects into the output, demand, GDP, and income multiplier as suggested by Breisinger, *et al*.[24]

In general, the second scenario is preferable, since it has the highest impact on the production factors, institutions, and production activities while the third scenario is less preferable since all three economic agents have negative impacts. However, the results in Table 5 are too general and need to be examined in more detail.

Table 6, 7, and 8 disaggregate the multiplier effects in Table 5 into more detail components such as the multiplier effect on the production sectors, income of the production sectors, and income distribution among households, firms, and government.

Table 6 reveals the disaggregated multiplier effects on the production sector. The highest multiplier effects occur in the injected sectors. In this study, the injected sector are the crop farming sector, the construction sector, and the government, defense, education, health, film, and other social sector (social services). However, with similar shocks, the injected sectors have different multiplier. For example, it is more beneficial to reallocate the subsidy from the fuel subsidy into the crop farming sector since it has the highest multiplier. For 100 billion IDR increase, the crop farming can produce more at 125.62 billion IDR. It is relatively higher than the third scenario 108.24 billion IDR and the second scenario at 99.43 billion IDR.

Table 5. Aggregated Multiplier Effect

Description	SIM2	SIM3	SIM4
Output	13.08	(22.78)	7.67
GDP	49.30	(16.79)	32.15
Income	49.24	(15.84)	33.28

Source: Calculated from the 2008 SAM (BPS, 2010).

Regarding of the income of the production sector owners, the second scenario is also more beneficial for the rural labour in agricultural sector in which income increases by 64.90 billion IDR. Similar to the second scenario, the fourth scenario gives more benefits for the leaders, professional, and technicians in the urban area. On the other hand, the income of capital only increases in the fourth scenario.

For the income distribution, Table 8 describes that the income in the second scenario is received more by the agricultural entrepreneurs. On the other hand, the third scenario has more benefits for the firms and governments while the fourth scenario only beneficial for the high income entrepreneurs. These findings to some extent are similar to Widodo, *et al* who claim that the impacts of the fuel subsidy reallocation mostly beneficial for the high income entrepreneurs, managers, military, professional,

[24] Clemens Breisinger, Marcelle Thomas, and James Thurlow, "Social accounting matrices and Multiplier Analysis: An Introduction with Exercises", *Food Security in Practice Technical Guide 5*, (Washington, D.C.: International Food Policy Research Institute, 2009), p. 25.

Table 6. Multiplier on the Production Sector

Description	SIM2	SIM3	SIM4
Crop farming	125.62	(4.80)	21.45
Other crop farming	7.92	(1.82)	2.17
Livestock and livestock products	15.27	(2.93)	9.84
Forestry and hunting	0.34	5.00	0.22
Fishery	6.13	(1.99)	5.04
Coal, metal, and oil mining	(6.33)	(3.25)	(6.19)
Other mining and quarrying	(0.20)	13.21	0.28
Food, beverage, and tobacco industry	29.21	(9.36)	25.46
Garment, textile, clothes, and leather industry	3.29	(2.02)	1.93
Wood and wood product industry	1.21	11.92	0.95
Paper, printing, transportation tools, metal product, and other industries	(5.15)	30.37	5.35
Chemical, clay products, and cement industry	(32.37)	(25.05)	(37.68)
Electricity, gas, and drinking water	(0.27)	(1.65)	0.41
Construction	(0.34)	99.43	0.55
Trade	11.65	1.71	8.80
Restaurant	4.08	(2.13)	3.81
Hotels	0.21	(0.06)	0.34
Land transportation	(98.01)	(100.75)	(99.65)
Air and water transportation, and communication	0.26	(3.92)	0.77
Transportation supporting services and warehousing	(1.72)	(1.89)	(1.70)
Bank and Insurance	(2.13)	(3.89)	(1.81)
Real Estate and service firms	(1.24)	(0.08)	1.21
Government, defense, education, health, film, and other social services	7.26	(2.98)	108.24
Individual, households, and other services	(34.62)	(37.91)	(34.04)

Source: Calculated from the 2008 SAM (BPS, 2010).

Table 7. Multiplier on Income of the Production Sectors

Description				SIM2	SIM3	SIM4
Labour						
	Agriculture	Wage and salary receiver	Rural	14.05	(0.38)	1.84
			Urban	3.00	(0.07)	0.47
		Non wage and salary receiver	Rural	64.90	(1.49)	6.45
			Urban	6.41	(0.14)	0.68
	Production, operators of transportation means, unskilled labour	Wage and salary receiver	Rural	(5.27)	1.46	(4.71)
			Urban	(8.52)	(2.01)	(5.50)
		Non wage and salary receiver	Rural	(4.54)	(2.80)	(4.42)
			Urban	(9.32)	(8.26)	(8.64)
	Administration, sales, and services	Wage and salary receiver	Rural	(1.20)	(1.67)	2.42
			Urban	(4.32)	(5.25)	9.21
		Non wage and salary receiver	Rural	0.47	(0.43)	0.52
			Urban	0.39	(0.69)	1.62
	Leaders, military, professional, and technicians	Wage and salary receiver	Rural	0.35	(0.19)	12.24
			Urban	(0.26)	(0.76)	20.20
		Non wage and salary receiver	Rural	0.14	0.17	0.52
			Urban	(0.22)	0.13	1.27
Non Labour (Capital)				(9.90)	(6.77)	5.59

Source: Calculated from the 2008 SAM (BPS, 2010).

Table 8. Multiplier on the Income Distribution

Description			SIM2	SIM3	SIM4
Households					
Agriculture					
Labour			6.52	(0.44)	1.35
Enterpreneurs			45.09	(2.59)	6.88
Non Agriculture					
	Rural	Low-income entrepreneurs, administration officer, unskilled labour, and individual service	1.81	(0.14)	(0.58)
		Non labour force	5.38	(0.64)	1.24
		High income entrepreneurs, non agricultural entrepreneurs, managers, military, professional, and technicians	12.95	(2.06)	9.67
	Urban	Low-income entrepreneurs, administration officer, unskilled labour, and individual service	(11.49)	(7.38)	(4.49)
		Non labour force	(1.67)	(1,33)	1,54
		High income entrepreneurs, non agricultural entrepreneurs, managers, military, professional, and technicians	(4.64)	(6.03)	18.18
Firms			(4.16)	3.83	(1.01)
Governments			(0.55)	0.95	0.49

Source: Calculated from the 2008 SAM (BPS, 2010).

and technicians due to greater backward and inward linkages of economic activities.[25]

D. The Decomposition Analysis

Further analysis is done by using the Stone decomposition analysis. In this decomposition, the multiplier effects are disaggregated into three main parts as mentioned earlier in the methodology part. Table 9 displays the aggregated Stone multiplier decomposition which is in total similar to Table 5. However, in Table 9, the multiplier effects are decomposed into the own effect (N_1), the extra-group effect (N_2), and the closed loop effect (N_3).

Table 9 clearly shows that the multiplier effects in Table 5 can be misled. For example, the multiplier effect on the production activities basically should be differentiate into the own effect and the closed loop effect. For example, in the second scenario, the increasing spending on the agriculture sector actually has positive value in the closed-loop effect which is more than the own effect. The fourth scenario also has similar decomposition effects. On the other hand, the third scenario has more negative impacts in the closed-loop effect. Table 9 also reveals that the production factors and the institutions only have effect in the extra-group effect.

Examination on more detail on the Stone multiplier decomposition is presented in Table 10. Similar shock has different impacts. For example, in the second scenario, the crop farming sector receives relatively highest impact at around 103.52 billion IDR increasing in the production activities. The fourth scenario also has more than the initial shock value at around 101.83 billion IDR. On the other hand, the third scenario has less than the initial shock's value at 99.93 billion IDR.

Regarding of the closed-loop effect, the transmitted shock is less significant in value, For example, the total closed effect from all the production activities for the first and second scenario are 68.60 and 40.03 billion IDR. On the other hand, the closed effect for the third scenario has a negative value at around 26.22 billion IDR. These findings imply that even though the shock in the construction sector has positive impact for the initial shock, after the shock is transmitted back to the production activities

Table 9. Aggregated Stone Multiplier Decomposition

Description	SIM2			SIM3			SIM4		
	N1	N2	N3	N1	N2	N3	N1	N2	N3
Output	(55.53)	-	68.62	3.43	-	(26.22)	(32.37)	-	40.05
GDP	-	49.30	-	-	(16.79)	-	-	32.15	-
Income	-	49.24	-	-	(15.84)	-	-	33.28	-

Source: Calculated from the 2008 SAM (BPS, 2010).

[25] *Op.Cit.*, Widodo, Sahadewo, Setiastuti, and Chaerriyah, p. 194.

Table 10. Disaggregated Multiplier on the Production Activities

Description	N1			N3		
	SIM2	SIM3	SIM4	SIM2	SIM3	SIM4
Crop farming	103.52	0.03	6.27	7.65	(2.09)	3.10
Other crop farming	1.82	(0.22)	0.04	1.92	(0.65)	0.97
Livestock and livestock products	3.05	0.04	2.33	3.47	(1.28)	1.85
Forestry and hunting	(0.06)	2.31	(0.02)	0.21	(0.07)	0.12
Fishery	(0.01)	0.02	0.77	2.61	(0.87)	1.38
Coal, metal, and oil mining	(3.56)	(0.64)	(3.12)	1.14	(0.52)	0.80
Other mining and quarrying	(0.14)	5.92	0.10	0.08	(0.03)	0.05
Food, beverage, and tobacco industry	0.36	0.01	4.87	11.93	(3.96)	5.95
Garment, textile, clothes, and leather industry	(0.46)	(0.26)	(0.15)	1.87	(0.65)	0.97
Wood and wood product industry	(0.10)	5.55	0.02	0.64	(0.24)	0.40
Paper, printing, transportation tools, metal product, and other industries	(6.17)	12.90	(1.15)	4.45	(2.43)	3.71
Chemical, clay products, and cement industry	(19.05)	(7.31)	(18.26)	4.95	(2.14)	3.30
Electricity, gas, and drinking water	(1.04)	(0.39)	(0.48)	0.91	(0.43)	0.69
Construction	(0.74)	99.93	(0.08)	0.57	(0.21)	0.35
Trade	(2.62)	3.79	(0.27)	8.34	(2.94)	4.59
Restaurant	(0.49)	0.33	(0.20)	2.48	(1.39)	2.04
Hotels	(0.07)	0.06	(0.03)	0.10	(0.05)	0.10
Land transportation	(101.57)	(99.53)	(101.12)	2.54	(0.84)	1.28
Air and water transportation, and communication	(2.29)	(0.55)	(1.35)	2.51	(1.05)	1.77
Transportation supporting services and warehousing	(1.15)	(0.78)	(1.03)	0.30	(0.12)	0.19
Bank and Insurance	(3.21)	(1.06)	(2.44)	2.15	(0.88)	1.50
Real Estate and service firms	(2.25)	0.92	(0.64)	1.88	(0.98)	1.36
Government, defense, education, health, film, and other social services	(0.26)	(0.08)	101.83	3.84	(1.37)	2.00
Individual, households, and other services	(19.04)	(17.55)	(18.28)	2.06	(1.03)	1.56

Source: Calculated from the 2008 SAM (BPS, 2010).

through the income distribution and institutions, the impact become negative for the economy.

E. Policy Implications

Based on the round by round effect, the second scenario is more beneficial for the agricultural sector. In the second round, the production factors receive more positive impact. Similar to the second round, the third round has positive impact on the income distributions. However, the third and fourth scenarios have more positive impacts on the middle and upper level of labour forces.

Similar to the round by round effect analysis, reallocating the fuel subsidy to the agricultural sector or social services are more beneficial for the economy. As shown in Table 5, the second and fourth scenarios have positive multiplier effect on the production factors and institutions. On the other hand, the third scenario has negative impact for the production factors, production activities, and institutions.

Furthermore, scrutinising the multiplier effects in more detail as shown in Table 9 reveals that even though the production activities has the negative multiplier effect in total, the second and fourth scenarios actually can be differentiated into the negative own effect and positive closed-loop effect. These multipliers are different in sign which implies that the shocks have negative impact since it reduces the production activities, in particular the production sectors. However, after the shocks are transmitted into the extra group and return to the

production activities, the effects have positive value. Unfortunately, these positive values are off-set by the direct impacts.

The findings in this study, in particular in the first scenario is similar to Widodo, *et al* in 2012 who argue that to phase out the fuel subsidy is unbeneficial for the whole society. Furthermore, the government should consider to have targeted fuel subsidy to reduce the inequality in the distribution of the fuel.[26] Regarding of the other scenarios, the findings in this study support the suggested policy from Aswicahyono, *et al* who argue that to protect the poor and reduce the society burden, the reallocation of the fuel subsidy to the construction, education, health, and social service are more preferable.[27]

Therefore, the best policy alternatives for the government are depending on the objectives of the fuel subsidy removal. If the government aims to reduce inequality due to fuel consumption, the second scenario is more preferable since it has higher impact on the agricultural households which is shown in the round by round effect and multiplier effects analysis. Furthermore, regarding of the income for the owner of production sectors, the second scenario is more beneficial since the agricultural labour force in rural and urban receive more benefits compare to other categories. On the other hand, the fourth scenario is more beneficial for the upper level of the labour force.

V. CONCLUSION AND RECOMMENDATION

A. Conclusion

This study simulates the impact of the fuel subsidy reallocation into the other sectors such as the crop farming sector, construction sector, and social services sector. Using the SAM as the main tool, this study utilises the round by round effect and the Stone decomposition method to analyse the impacts. Both analysis tools reveal that reallocating the fuel subsidy to the crop farming sector is more beneficial since it has more positive impact than other scenarios. Furthermore, the second scenario tends to reduce inequality which is shown by the income distribution and income of the production sector. In the third scenario, there are more negative impacts for economy. In the fourth scenario, the benefits are gained more by the middle and upper classes.

B. Recomendation

Based on the simulation's results in this study, the policy to phase out the fuel subsidy without any reallocation to other account will affect Indonesian economy negatively. Therefore, to reduce the negative impacts of the fuel subsidy removal, the government should reallocate the subsidy to other sectors in order to maximise the society welfare. Nevertheless, from the three scenarios to reallocate the fuel subsidy, the simulation reveals that the best alternative policy in this study is the government should concern more on the crop farming sector, whether in the form of the seeds subsidy or the fertiliser subsidy in order to increase the productivity of the agricultural sector.

[26] *Op.Cit.*, Widodo, Setiastuti, and Chaerriyah, p. 201.

[27] *Op.Cit.*, Aswicahyono, Friawan, Kartika, and Mugijayani, p. 14.

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