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Final Thesis:

The Impact of Fossil-Fuel Subsidy Removal on Economic Sector and Income Distribution in Indonesia 2015

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Abstract

Climate change is the result of one of greatest market failure, market fails to maximize welfare and policy interventions are needed in order to correct them. Climate change is the result of the Greenhouse Gases (GHGs) -accumulation in the atmosphere, as a consequence of the externalities associated with the consumption of fossil fuels in economic activities. This calls for the implementation of climate policies in order to mitigate the GHG emission, such as fuel subsidy removal and carbon tax.

This study aims to analyse the distributional and general equilibrium impacts of fossil-fuel subsidies removal policy in Indonesia using the Social Accounting Matrix (SAM) framework. The Ordinary Least Square is applied to estimate the change in production and consumption that would follow the implementation of these climate policies. These estimated changes will then be used as shocks to the account of SAM.

Subsidy removal implementation leads to decrease in the production of all economic sectors (except Wholesale and retail sector), including the production and demand of fossil fuels. The policy also reduces income inequality significantly. In general, implementing fuel subsidies removal is not necessarily regressive, even tend to be progressive since the poor-people suffer less (proportionally to the income) than rich people because subsidy mostly enjoyed by rich people. Moreover, subsidy removal leads to increase labor factor share and the economy becomes more labor intensive.

Furthermore, subsidy revenue was reallocated in 3 different sectors whose have the highest backward and forward linkages to the economy e.g. Food, beverages, and clothing sector (S-I), Agriculture sector (S-II), and Government, education, health and other public services (S-III). Using SAM, by simulating 1% increase in consumption the result shows that per capita income and production factor income slightly increase. But, income inequality also increases and economy tends to be more capital intensive.

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Statement of Original Authorship

The work contained in this thesis has not been previously submitted to meet requirements for an award at this or any other higher education institution. To the best of my knowledge and belief, the thesis contains no material previously published or written by another person except where due reference is made.

Signature: _________________________

Date: _________________________

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Alhamdulillahirobbil 'alamin, Allohomma innanasaluka 'ilman nafi'aa, warisqon toyyibaa, wa'amalan mutaqobbalaa (Al-Hadits).

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I dedicate my master thesis for my late father, Nelih bin Kolay.
"Abah, Irwan sudah melangkah sejauh ini. Impian Abah supaya anak-anaknya *menjadi 'orang pinter' yang terus memotivasi Irwan untuk terus belajar dan belajar. Semoga Irwan menjadi anak yang shalih, manusia yang bermafaat untuk umat, dan terus membuat Abah bangga!"*

For my parent, Mimih Rosih and Pak Hasan, thank you for your prayers every day and night. I still remember your tears dropped when you said goodbye to me back then. For my another mother, Mak Dasih, thanks for your sacrifices and struggles for me. For my parent-in-law, Pak Totok and Bu Partini, and all my family.

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Chapter 1: Introduction

1.1 BACKGROUND

Environmental issues such as climate change are getting increasing attention from the business community, as the severity of climate-related extreme events is growing, mostly as a result of market failures (EEA, 2017). This situation occurs when markets fail to maximize welfare due to the presence of externalities, and policy intervention is needed in order to correct them. There is unequivocal evidence that the sharp increase in greenhouse gases (GHG) into the atmosphere, as an externality associated with the use fossil fuels has contributed to unprecedented warming observed since the mid-20th century (IPCC, 2013, 2014). Carbon dioxide is especially important, accounting for around three-quarters of the human-induced global warming effect (Stern, 2008, IPCC, 2014a). Other relevant GHGs include methane, nitrous oxide, and hydro-fluorocarbons (HFCs). The accumulation of GHGs in the atmosphere traps heat and results in global warming and furthermore global warming results in climate change.

The change of climatic conditions has consequences on physical (e.g. glacier, sea-level rise), biological (e.g. ecosystems), and human (e.g. food, health) systems (IPCC, 2014) such as extreme droughts or flood threaten food security, freshwater availability, housing, and infrastructure, as well as vector-disease pattern. These changes will potentially transform the physical and human geography of the planet, affecting where and how we live our lives. Today these phenomena become even worse, natural disasters are everywhere, unpredictable and the magnitude of some of these impacts could be catastrophic.

Given the global nature of the problem, involving all countries in the world, several multilateral meetings and joint-actions have been taken place since the Stockholm Conference in 1976 up to the latest 23rd Conference of The Parties (COP) to the United Nations Framework Climate Change Convention (UNFCCC)[1] in Bonn Germany on 8-14 November 2017. Several multilateral

[1] The United Nations Framework Convention on Climate Change (UNFCCC) is an international environmental treaty adopted on 9 May 1992. The UNFCCC objective is to "stabilize greenhouse gas

agreements have also been signed and ratified by UNFCCC parties, including the Kyoto Protocol[2] (2005) and the recent Paris Agreement that was effectively implemented since November 4th, 2016.

Many studies were conducted in order to assess the effect of fossil-fuel subsidies removal to CO_2 mitigation. Key-Hernández & Villarroel (2012) assessed the effect of removal of energy subsidies and its effects on the CO_2 emissions in Venezuela incorporating six sector oil and gas, oil refining, electricity, manufacturing, other goods, and services. The results show that the removal of subsidies effectively contributes to limiting the growth of CO_2 emissions. Other studies, for example, were conducted by Burniaux & Château (2011) and Aune, Grimsrud, Lindholt, Rosendahl & Storrøsten (2016) show the same result that subsidy removal significantly contributes to mitigate carbon emission.

Erickson (2017) suggests that the rationale for removing fossil fuel subsidies was that they ‘encourage wasteful consumption (inefficiency), distort market, impede investment in clean energy resources and undermine efforts to deal with climate change (externalities)’. Many Studies have been conducted in order to analyse the macroeconomic distributional effects of fossil fuel subsidies, as summarized in the latest IPCC report (Kolstad et al.2014).[3] How do these climate and energy-related policies affect the economy is a key concern given the world’s commitments to limit warming to ‘well below 2 degrees Celcius’ as mandated in the 2015 Paris Agreement that was signed on April 22nd, 2016.

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concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".

[2] The Kyoto Protocol is an international treaty which extends the 1992 UNFCCC that commits state parties to reduce greenhouse gas emissions. The Kyoto Protocol was adopted in Kyoto, Japan on 11 December 1997 and entered into force on 16 February 2005.

[3] These studies for example: Peter Erickson, Adrian Down, Michael Lazarus, and Doug Koplow. Nature Energy (2017): *Effect of subsidies to fossil fuel companies on United State crude oil production*. Ramón E. Key-Hernández & Claudina Villarroel (2012): *Removal of energy subsidies and its effects on the CO2 emissions in Venezuela*. Ali Eren Alper (2018): *Analysis of Carbon Tax on Selected European Countries: Does Carbon Tax Reduce Emissions?*.

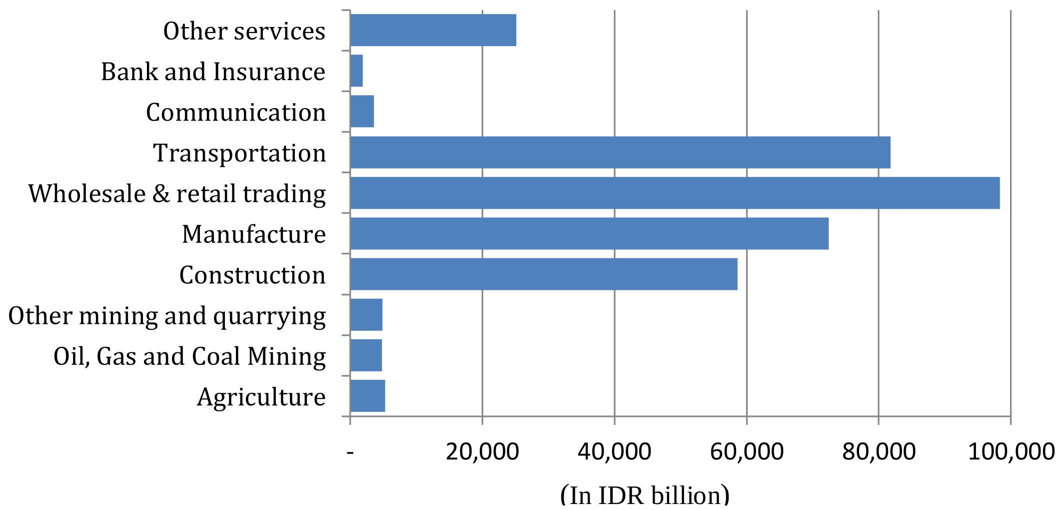
[3] These studies for example: Peter Erickson, Adrian Down, Michael Lazarus, and Doug Koplow. Nature Energy (2017): *Effect of subsidies to fossil fuel companies on United State crude oil production*. Ramón E. Key-Hernández & Claudina Villarroel (2012): *Removal of energy subsidies and its effects on the CO2 emissions in Venezuela*. Ali Eren Alper (2018): *Analysis of Carbon Tax on Selected European Countries: Does Carbon Tax Reduce Emissions?*.

1.1.1 The Indonesian economy and energy system

Indonesia is the most populous country in Southeast Asia and number four in the world with more than 250 million populations[4]. After the Asian financial crisis of 1997-1999, Indonesia's economy has returned to a strong and stable 5-6% annual growth, mainly supported by manufacture, wholesale & retail trade, and agricultural sector (BPS-Statistics Indonesia, 2015). These sectors, in particular, wholesale & retail trading, and manufacture sector, are carbon

energy like petroleum, gas, coal, and electricity[5].

Figure 1.1 Energy Expenditure per Economic Sector in Indonesia, 2010



Source: Calculated from Input-Output Table 2010, BPS-Statistics Indonesia
Note : Using USD1.00 = IDR 9,879.00, the annual average exchange rate in 2010, IDR 100.000 billion equal to USD 10.1224 billion)

The high of energy demand in Indonesia placed this new-industrialized country as the biggest energy consumer in Southeast Asia Region (ASEAN). It comprises 36% of total regional demand and most of the energy is fossil fuel energy. This amount is equal to total energy demand of Thailand, Malaysia, and Singapore (IEA, 2017). Therefore, Indonesian economy is strongly influenced by the availability

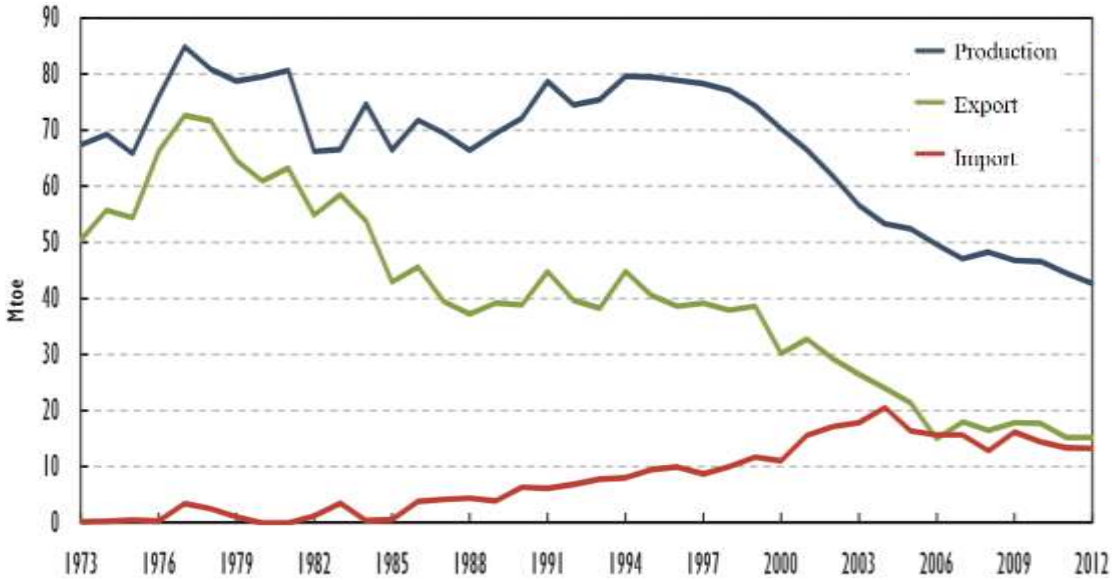
[4] Indonesia Population Projection 2005-2025. Published by BPS-Statistics Indonesia 2008
[5] In 2015, around 56% of electricity in Indonesia is generated from coal combustion, 25% from gas, 8.6 from oil and the rest from hydro, geothermal and NRE.

Chapter 1: Introduction

of energy as reflected, in period 2000-2015, when the GDP of Indonesia doubled, the energy demand also increased by 150% (IEA, 2017).

Indonesia now faces the serious challenge due to the fast-rising domestic energy demand but on the other hand the oil production, as the main energy resource[6], has been declining since 2000. To meet the energy demand, Indonesia has been increasing imports, and it is now close to become a net importer country.

Figure 1.2: Crude Oil Production, Export and Import of Indonesia, 1973-2012



Source: IEA, 2015

The figure 1.2 shows that since late 1990s the oil production tends to decrease in line with oil export that already decreased since late 1970s. While on the other side, to meet the domestic demand, the government has steadily increased oil import. Oil is the main energy resource for Indonesians, it comprises around 82% of total household fossil energy demand from 2007-2015[7] while the rest comes from natural gas, coal and non-fossil fuel (e.g. biodiesel). Household is the biggest energy consumer, with a share of 37% of total energy consumption, followed by Industry and transport respectively accounts for 30.5% and 27.6% (IEA, 2015). Due to the importance of energy, The Government of Indonesia tries to keep the price affordable for households by subsidizing energy commodities. But, the declining domestic oil

[6] Calculated from data on *The Consumption and Expenditure Survey (SUSENAS) Households in Indonesia 2007-2015*, published by BPS-Statistics Indonesia. On the average, the main energy consumed by household is petroleum (mainly gasoline, kerosene and solar) by 82%. While the rest energies are gases, coal and others.

[7] Calculated by the author. The data taken from *The Statistic of Expenditure and Consumption of Household in Indonesia from 2007-2015*. Published by BPS-Statistic Indonesia 2015.

production has led to a worsening in the subsidy burdens. The government of Indonesia allocates significant budget for energy sector, in 2011, Indonesia was ranked the 10th country in the world in term of government expenditure on fossil fuel consumption subsidies (IEA, 2012).

Table 1.1 Subsidies Expenditure in Indonesia, 2006-2015 (in trillion IDR)

Subsidies Expenditure	Year								
	2007	2008	2009	2010	2011	2012	2013	2014	2015
(1)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Energy	116.9	223.0	94.5	140.0	195.3	306.2	309.9	341.7	119.0
Fuel Subsidy	83.8	139.1	45	82.4	129.7	212.4	209.9	239.9	60.7
Electricity	33.1	83.9	49.5	57.6	65.6	94.6	99.9	101.8	58.3
Non-energy	33.3	52.2	43.5	52.8	41.9	39.8	45.1	50.2	66.9
Total subsidy	150.2	275.2	138.0	192.8	237.2	346.4	355.0	391.9	185.9
Ratio (%) Energy of Total subsidy	77.8	81.0	68.5	72.6	82.3	88.5	87.3	87.2	64.0

Source: Calculated from Audited LKPP (Audited Central Government Financial Report)

Since late 1990s, there have been some substantial efforts in Indonesia to reduce energy subsidies gradually. The most remarkable subsidies removal is in 2005, 2008 and 2014 where the government of Indonesia reduced almost a half of energy subsidies. In order to limit the impact of these policies, the government of Indonesia introduced the *Bantuan Langsung Tunai* (BLT) in 2005 and the *Bantuan Langsung Sementara Masyarakat* (BLSM) in 2008. Both BLT and BLSM are cash transfer programs for poor households designed as compensation mechanism of subsidies removal policies, since poor households spend a larger share of their income on energy.

In addition to reducing the subsidy burden, fuel subsidies removal is also an important instrument for carbon emission mitigation in the context of the Paris Agreement. Indonesia ratified Paris Agreement through Law No. 16/2016 in October 2016. With this ratification, Indonesia committed to reduce emission by 29% by 2030, with an increased effort up to 41% with international support. Nevertheless, in the implementation of fully subsidy removal, the government of Indonesia taking into account the three principles in the Nationally Determined Contribution (NDC) implementation:

a. Enable economic growth and put people’s welfare as priority, especially with regard to food, water and energy resilience;
b. Strengthen protection of poor and vulnerable communities, including environment conservation in the framework of sustainable development;

c. Focus on core interventions that reduce emissions and strengthen policy framework.

1.2 Research Questions

The objective of this research is to analyse the impact of fossil-fuel subsidy removal from the energy sector, on the distributional broad-spectrum macroeconomic and microeconomic variable in a developing country like Indonesia. In order to investigate this research question, I conducted a general equilibrium analysis using an approach based on Social Accounting Matrix (SAM). Specifically, the purpose of this study to:

- Analyze the impacts of fuel subsidies removal to the economic sector in Indonesia;
- Analyze the impact of subsidies removal on the income distribution;
- Analyze the impact of subsidies removal on the factor production;
- Identify the most vulnerable economic sectors to subsidies removal;
- Identify which sectors have a multiplier effect on the economy;
- Identify priority sectors related to subsidies and taxes revenue reallocation to reduce the impact of environmental policies.

This research required a lot of data from various sources, such as consumption and production data series of fossil fuel energy (e.g. oil, gas, and coal), export and import energy commodity, allocation of energy subsidy, energy prices and estimated population of Indonesia. Since the data for this research are completely available only for period 2015, this study will examine the impact of climate.

The remainder of the thesis is organized as follows:

Chapter 2 Literature Review

Consist of theory review and research mindset.

Describes how to obtain data and analytical methods to be used, consisting of descriptive analysis, Social Accounting Matrix (SAM) balance sheet impact analysis, Ordinary Least Square (OLS) regression analysis, income gap analysis, and structural path analysis.

Chapter 4 Result and Analysis

Present and discuss the results of analysis based on the analytical methods described in the chapter IV (descriptive analysis, SAM accounting multiplier analysis, and OLS regression analysis).

Chapter 5 Conclusions

Contains the final conclusion of the discussion and analysis, also includes suggestions based on the conclusions obtained.

Chapter 1: Introduction

Chapter 2: Literature Review

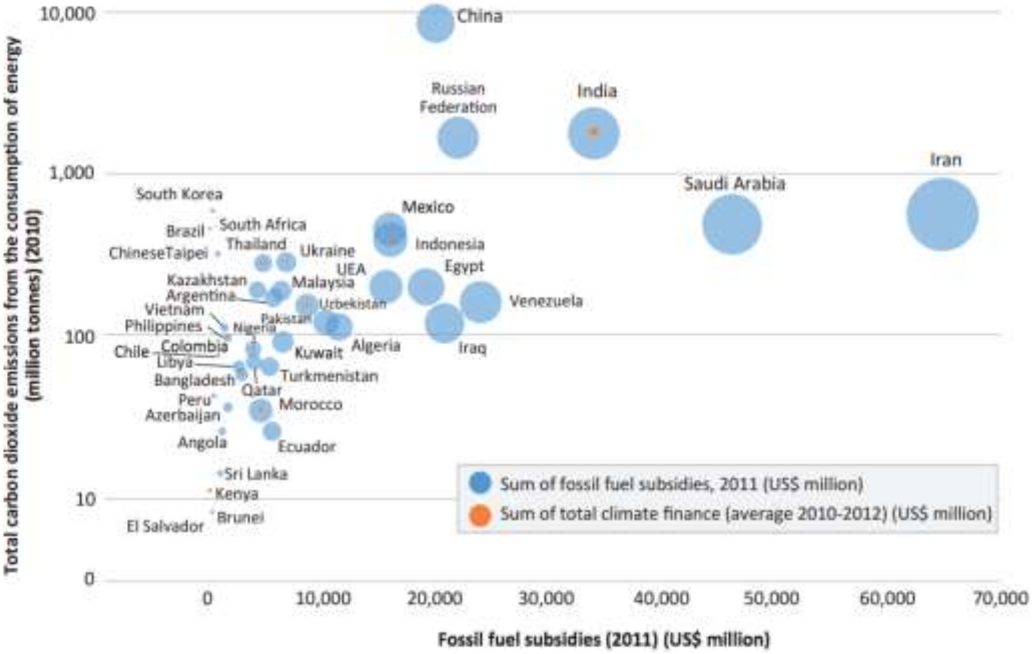
The energy sector is an important one for all the various countries of the world, and especially, the countries that are developing from an economic point of view. It has been observed that this sector has a strong linkage to all economic sectors since economic activities depend on the availability of energy resources, whether to provide transportation, to manufacture goods, run computers, and other machines, everything requires the energy resources. Peter Voser, The CEO of Royal Dutch Shell in World Economic Forum Energy Community Leader 2011 said "Energy is the 'oxygen' of the economy and the life-blood of growth, particularly in the mass industrialization phase that emerging economic giants are facing today" Therefore, undoubtedly, the energy sector has important role in order to encourage economic growth.

In addition to that, the access to energy sector is also essential for improving the livelihoods of the poor in developing countries. Contrary, the limited access to the energy is an important contributor to the poverty levels to be stagnant or even worse in developing countries. Therefore, the poverty alleviation will not be possible as long as there are billions of people who do not have access to energy. Hence, it is important for the government to provide an access to affordable energy by, for example, provides energy subsidies like subsidies for fuel or electricity. This chapter reviews the literature on fossil fuel subsidies with a focus on 1) The empirical evidence on implementation of fossil fuel subsidy removal around the world and 2) The distributional implication of subsidies removal.

2.1 Empirical evidence on fuel subsidies removal

The International Energy Agency (IEA) reported that the value of global subsidized fuel consumption in 2016 is estimated at around US$260 billion, lower than the estimate for 2015, which was close to US$310 billion (WEO, 2016). The decrease in the value largely reflects lower international energy prices of subsidized fuels since mid-2014, as well as the impact of pricing reform in several countries.

Figure 2.1: Fossil fuel subsidies and greenhouse gas emissions in developing country



Source: Whitley, 2013

Figure 2.1 shows the relationship between carbon emissions from fossil fuels and fossil fuel subsidies, highlighting that the countries still applying energy subsidies come from developing countries. One of the main reasons why many developing countries rely on fossil fuel subsidies is because, in general, for ensuring the affordable sufficient supply for the domestic market in particular poor-households such that they can increase their income and, in general, to stimulate the economy. But, on the other hand, energy subsidies can also generate high consumption level and energy inefficiency. Which is can exacerbate the negative externalities due to GHG emission, ultimately contributing to global warming. For this reason, it is often stated that phasing out energy subsidies is the first measure that should be used to curb GHG emission.

Lin & Jiang (2011) argued that for a transitional economy, such as China, some energy subsidies are reasonable, and sometimes even necessary for achieving social goals. The reluctance of developing countries to remove energy subsidies, come not only for economic reasons but also for political reasons. Widodo (2012) stated that there are several restrictions for the government effort to phase out subsidies: economic, political, social and behavioural. Yusuf, Komarulzaman, Hermawan, Hartono & Sjahrir (2010) conducted a study of the role of fiscal instrument on climate change mitigation. They found that removing energy subsidy can contribute to significant reduction in carbon emissions. A target of 14% reduction of emissions from the energy sector, for example, can be achieved by removing energy subsidy complemented by a carbon tax of only around US$3/ton CO_2.

In New Zealand, Gilmour & Gurung (2007) conducted a study in order to review New Zealand Agriculture Policy. This Policy Review focuses on agricultural policy today and how New Zealand is supporting the agricultural sector now without resorting to subsidies. It describes the policy New Zealand uses to support farmers dealing with adverse events such as climatic disasters. It also describes New Zealand's strategy for promoting competitiveness in world markets. Another study assessed the effect of subsidy removal was also conducted in Zambia by McCulloch, Baulch, & Cherel-Robson (2001). They found that a dramatic increase in poverty and inequality in urban areas between 1991 and 1996 due to stabilisation, the removal of maize meal subsidies, and job losses resulting from trade liberalisation and the privatisation programme. Furthermore, maize marketing reforms principally benefited those near the major urban centres, and hurt more remote rural farmers.

2.2 The impact of fossil-fuel subsidy removal on the economy and income distribution

The government in addition to concern how to increase the welfare, as reflected by per capita income, also concern how the welfare distributed across society (income equality). Income equality is important since it can prevent many socio-economic problems. Therefore, in order to implement fossil fuel subsidies, the income equality also becomes the main concern for the government. How these policies affect welfare of population among level of income, between rural and urban households, among low-skilled labor, entrepreneur, professional and even capital holder or investor. Hallegate (2012) stated that environmental policies can also increase GDP if they (i) Increase the effective quantity of production input; (ii) Produce productivity gains by correcting the many market failures affecting the environmental sphere and enhancing efficiency of resources; (iii) Shift production frontier by accelerating innovation, knowledge and technology.

Many researchers have proved that there is a strong correlation between subsidies removal to the economy and income distribution. Lin & Jiang (2011), used a Computable General Equilibrium (GCE) model, found that there is a significant declined in energy demand and is followed by reduced emissions due to the energy subsidies removal. The declined in energy demand has a negative impact on macroeconomic variables. The similar result also was shown by Saeed & Fatimah (2014). They identified the transmission channel caused by the energy subsidies removal to the economy. The result showed that subsidies removal declined the energy aggregate demand thereby lowering the carbon emission levels. Moreover, they also found that Malaysia's export and import value decreased while real GDP increased.

Another research conducted in India by Ganguly & Das (2016). Used The Energy Social Accounting Matrix (ESAM), they found a slightly different result. The results showed that international crude palm oil price fluctuations have a greater impact than subsidies removal. However, the effect of subsidies removal on GDP declined and appreciation of exchange rate remained significant. Their finding also confirmed by Liu & Li (2011) who concluded their study in China that energy consumption is not only influenced by subsidies removal but is also influenced by other factors like economic and social index. Vagliasindi (2012) also analysed subsidy reform and the fiscal burden of 20 developing countries. The results showed that there is a general declining in consumption despite the relatively price inelastic demand for gasoline and diesel. The declining in consumption mainly occurs in the low-income and lower-middle-income countries.

A more comprehensive research using SAM and CGE was conducted in Malaysia by Yusma & Bekhet (2016). They not only assessed how fuel subsidies removal affects energy consumption but also show how higher fossil fuel price due to subsidies removal significantly encourage the utilization of alternative energy. In addition to that, subsidies removal also increases real GDP and it is the right policy to improve energy efficiency. Another further study was conducted by Glomm & Jung (2013). They not only analysed the impact of subsidies removal in Egypt, where cutting subsidies by 15% then the GDP will decrease in proportion to the amount of energy used in production activities but also performed reallocation simulations. They also found that output will increase only if government reallocate subsidy into infrastructure.

Inequality is a concerned topic of government so that is widely discussed as an implication of energy reform in various studies. It is very important since economic inequality can give many negative impacts to society. T. M. Scanlon, a Professor of Natural Religion, Moral Philosophy, and Civil Polity at Harvard University, said that economic inequality can give wealthier people an unacceptable degree of control over the lives of others, undermine the fairness of political institutions and the fairness of the economic system itself.

Researchers believe that both subsidies removal can affect inequality, in this case, is income distribution. Employed a computable general equilibrium model Solaymani, (2016) undertook research to identify the long-run impacts of energy subsidy reform in the Malaysian economy. Solaymani also compared the impact of subsidy removal on urban and rural incomes. The results show that urban households suffer the most from rural household and noncitizen households. Furthermore, this policy generally increases overall inequality in the economy where inequality in urban areas is greater than in rural areas.

Chapter 3: Methodology

3.1 Data Collecting

The study used secondary data that were collected from many resources. The data used in the study are as follows[8]:

1. Publication of Indonesia Social Accounting Matrix (SAM) in 2008 from BPS-Statistics Agency of Republic Indonesia.
2. Input-Output Table 2010 from BPS-Statistics Agency of Republic Indonesia.
3. LKPP-Central Government Financial Report from 2007-2015 from Ministry of Financial of Republic Indonesia.
4. Statistics of Mining of Gas and Petroleum 2015 from BPS-Statistics Agency of Republic Indonesia.
5. Statistics of Non-Mining of Gas and Petroleum 2015 from BPS-Statistics Agency of Republic Indonesia.
6. Energy Outlook 2015 from Ministry of Energy and Mineral Resources of Republic Indonesia.
7. Population Projection from BPS-Statistics Agency of Republic Indonesia
8. Expenditure Statistics for Indonesian Consumption in 2015 from BPS-Statistics Agency of Republic Indonesia. And many others

[8] These data/publication can be access in website:

1. https://www.bps.go.id/publication/2011/11/07/6f64b0c03431a059c8569105/sistem-neraca-sosial-ekonomi-indonesia-1976-2008.html
2. https://www.bps.go.id/publication/2015/12/30/eb1ce54ade495db2654b85e2/tabel-input---output-indonesia-2010.html
3. https://bppk.kemenkeu.go.id/id/informasi-publik/lkpp
4. https://www.bps.go.id/publication/2016/12/21/85dc8b2ada7eb75a4690b6ad/statistik-pertambangan-minyak-dan-gas-bumi-2011-2015.html
5. https://www.bps.go.id/publication/2017/01/25/3c83610c3e2e5242177e2b11/statistik-pertambangan-non-minyak-dan-gas-bumi-2011-2015.html
6. https://www.esdm.go.id/en/publication/indonesia-energy-outlook
7. https://www.bps.go.id/publication/2008/09/04/905de36c09eb2347e61639ca/proyeksi-penduduk-indonesia-2005-2025.html
8. https://www.bps.go.id/publication/2016/05/31/e3eef4f76e014a3d782ec0de/pengeluaran-untuk-konsumsi-penduduk-indonesia-september-2015.html

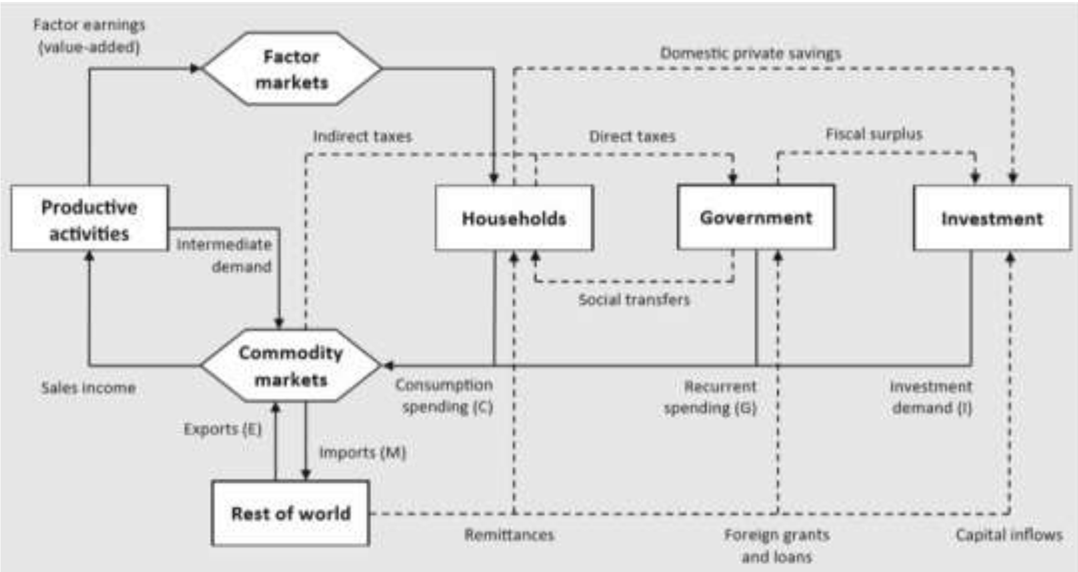
3.2. Method of Analysis

The main analytical method used in this study is Social Accounting Matrix (SAM) Multiplier Analysis as one of general equilibrium approach. This method used to analyse the impact of energy policies on economic sectors and income distribution across employment categories and rural-urban households. Slightly different from the study was conducted by Grainger & Kolstad (2019). They used Input-Output Model with Consumer Expenditure Survey data in order to analyse the policy impact. In addition to that, to support and conduct further analysis, this study also used Ordinary Least Square Regression (OLS) to estimate the change in production and consumption due to economic shocks.

3.2.1 Social Accounting Matrix (SAM)

One way to figure out the economy is the circular flow diagram shown in Figure 3.1, which summarizes all transfers and real transactions between sectors and institutions. A SAM is a representation of the economy through an accounting framework that assigns numbers to the incomes and expenditure in the circular flow diagram.

Figure 3.1 Circular Flow Diagram of the Economy



Sources: Breisinger, Thomas & Thurlow, 2010

A SAM is a square matrix format with each row and column consisting of several block accounts namely sectors account, commodity accounts, factors account, institutions account and other accounts (rest of the world). Table 3.1 shows the general structure of SAM based on the circular flow diagram in figure 3.1. Each cell on the SAM matrix shows, by convention, the flow of funds or transactions from account columns to row accounts.

Table 3.1 Basic Structure of Social Accounting Matrix (SAM)

Recipients	Spending				
	Production Factor	**Institution**	**Production Sector**	**Other Sheet**	**Total**
Production Factor			Allocation of added value to production factors	Income of production factors from abroad	Income distribution by production factors
Institution	Income allocation from production factor to institution	Transfer among institutions		Transfer from abroad	Institutional income distribution
Production Sector		Final demand	Intermediate demand	Export and investment	Total Output
Other Sheet	Income allocation from production factor to abroad	Saving	Import, indirect tax	Transfer and other balances	Total receipt
Total	Spending distribution of production factor	Institutional spending distribution	Total input	Total other spending	

Sources: Breisinger, Thomas & Thurlow, 2010

- **Modify Social Accounting Matrix (SAM)**

The latest Indonesia SAM framework, SAM 2008, in default format is a squared matrix with size 106 x 106 cells. In order to isolate the sector of interest for the purpose of the study, the 106 x 106 default SAM has been modified into 100 x100 by aggregating and disaggregating some of the matrix accounts. Disaggregations are conducted in order to emerge some specific account to further analyze and aggregate some other accounts that consider unrelated with this study.

Table 3.2 Modification of SAM structure

Before modification		After modification	
Name of Block Account	Number of account	Name of Block Account	Number of account
(1)	(2)	(3)	(4)
Factor account	17	Factor account	17
Sector account	24	Sector account	22
Commodity account	48	Commodity account	44
- Domestic	24	- Domestic	22
- Import	24	- Import	22
Institution account	10	Institution account	10
Other account	6	Other account	6

Source: Calculated from SAM

A modification was conducted in sector account and commodity account. Table 3.2 shows the structural difference between default SAM and modified SAM. A default SAM consists of 24 accounts for sector block account and 48 accounts for commodity block account. Then after modification sector block account, commodity block account for domestic and commodity account for import respectively 22 accounts for each. More detailed account before and after modification is presented in Table 3.3 below.

Table 3.3 Detailed SAM Modification for Sector and Commodity Account

<table>
<tr><th>Account Name Before Aggregation</th><th>Account Name After Aggregation</th></tr>
<tr><th>(1)</th><th>(2)</th></tr>
<tr><td>1. Main food agriculture</td><td rowspan="5">1. Agriculture, farms, fishery and forestry</td></tr>
<tr><td>2. Other agriculture</td></tr>
<tr><td>3. Farms</td></tr>
<tr><td>4. Fishery</td></tr>
<tr><td>5. Forestry</td></tr>
<tr><td rowspan="3">6. Coal, gas and petroleum mining</td><td>2. Coal mining</td></tr>
<tr><td>3. Petroleum/oil mining</td></tr>
<tr><td>4. Gas mining</td></tr>
<tr><td>7. Other mining and excavations</td><td>5. Other mining and excavations</td></tr>
<tr><td rowspan="2">8. Chemical product, fertilizer, cement and petroleum industry</td><td>6. Petroleum/oil industry</td></tr>
<tr><td rowspan="5">7. Other industry</td></tr>
<tr><td>9. Food, beverage and tobacco industry</td></tr>
<tr><td>10. Spinning, textile, clothing and leather Industry</td></tr>
<tr><td>11. Wood and wooden good industry</td></tr>
<tr><td rowspan="3">12. Paper, printing, transport and metal based Industry</td></tr>
<tr><td>8. Motorcycle industry</td></tr>
<tr><td>9. Other transport vehicle industry</td></tr>
<tr><td rowspan="3">13. Electricity, gas and water</td><td>10. Electricity</td></tr>
<tr><td>11. Gas</td></tr>
<tr><td>12. Water</td></tr>
<tr><td>14. Construction</td><td>13. Construction</td></tr>
<tr><td rowspan="2">15. Trading</td><td>14. Car, motorcycle and spare-part trading</td></tr>
<tr><td>15. Other trading</td></tr>
<tr><td>16. Restaurant</td><td rowspan="2">16. Accommodation, eating and drinking Services</td></tr>
<tr><td>17. Hospitality</td></tr>
<tr><td rowspan="2">18. Air and water transport and Communication</td><td>17. Communication and information</td></tr>
<tr><td rowspan="3">18. Transportation and warehousing</td></tr>
<tr><td>19. In land transport</td></tr>
<tr><td>20. Other transporting support services and Warehousing</td></tr>
<tr><td>21. Bank and insurance</td><td>19. Bank and insurance</td></tr>
<tr><td>22. Real estate and company services</td><td>20. Real estate and company services</td></tr>
<tr><td>23. Government, defences, education, health, entertainment and other social service</td><td>21. Government, defences, education, health, entertainment and other social service</td></tr>
<tr><td>24. Personal services, household and other Services</td><td>22. Personal services, household and other Services</td></tr>
</table>

Source: Calculated from SAM

- **Disaggregation Stages**

Used The 185 x 185 cells Input-Output table, the default 24 SAM sectors was aggregated into 22 sectors. This Aggregated Input-Output table used in order to support modification in SAM. Disaggregation is conducted in order to isolate some sectors of particular interest for this analysis. For example, in order to see the effect of a shock for specific production sector for example petroleum and gas sector, the coal, gas, and petroleum mining account was disaggregated into three new separated accounts; coal mining, oil/petroleum mining and gas mining account using input-output matrix. Chemical product, fertilizer, cement, and petroleum industry account also was disaggregated in order to isolate petroleum account, which is one of focal sector to be further analysed. Another account that has been disaggregated is Electricity, gas, and water account from the default account as well as trading account was divided into two new accounts.

- **Aggregation Stages**

Aggregation is aimed in order to simplify some accounts since it is does focus of study analysis. For example, the sector of agriculture, fisheries, livestock, and forestry was aggregated into agriculture sector. Some industries like foods, beverages, clothing, tobaccos, textiles, papers industries except petroleum, vehicles, and motors industries are aggregated become other industry sector. For the same reason, the account of restaurant and hospitality also were merged into one account namely accommodation, eating, and drinking services sector.

- **Multiplier analysis equation of Social Accounting Matrix (SAM)**

From the SAM framework, we can calculate the average expenditure (average expenditure propensity) which will be used to compile the matrix framework of accounting multiplier analysis. The average expenditure can be calculated by dividing each cell (entry) by the overall its total column. Suppose that the SAM matrix to be used is a 4 x 4 matrix so the A_{ij} matrix is also 4 x 4 values.

$$S = \begin{bmatrix} T_{11} & T_{12} & T_{13} & T_{14} \\ T_{21} & T_{22} & T_{23} & T_{24} \\ T_{31} & T_{32} & T_{33} & T_{34} \\ T_{41} & T_{42} & T_{43} & T_{44} \end{bmatrix}$$

$$T_j = \sum_{i=1}^{4} T_{ij}$$

$$A_{ij} = \frac{T_{ij}}{T_j}$$

$$A = \begin{bmatrix} A_{11} & A_{12} & A_{13} & A_{14} \\ A_{21} & A_{22} & A_{23} & A_{24} \\ A_{31} & A_{32} & A_{33} & A_{34} \\ A_{41} & A_{42} & A_{43} & A_{44} \end{bmatrix}$$

Where A_{ij} : Average spending tendency raw-i & column-j representing the share contribution of sector i as an input to sector j.

T_{ij} : Cell raw-i & column-j the value contribution of sector i as an input of sector j.

T_j : Total of column-j the total input from all economic sector.

Or it can be written as follow:

$$T_{ij} = A_{ij} T_j$$

By using the above equation, in matrix form that equation follows:

$$\begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \end{bmatrix} = \begin{bmatrix} 0 & 0 & A_{13} \\ A_{21} & A_{22} & 0 \\ 0 & A_{32} & A_{33} \\ A_{41} & A_{42} & A_{43} \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \end{bmatrix} + \begin{bmatrix} X_{14} \\ X_{24} \\ X_{34} \\ X_{44} \end{bmatrix}$$

Where X_i is the vector of the matrix T_{14} for each i = 1,2,3,4.[9] Cell A_{14} is assumed to be 0 because there is no record of the transaction of factor income abroad (T_{41} = 0), therefore the equation can be written as:

$$\begin{bmatrix} T_1 \\ T_2 \\ T_3 \\ T_4 \end{bmatrix} = \begin{bmatrix} 0 & 0 & A_{13} \\ A_{21} & A_{22} & 0 \\ 0 & A_{32} & A_{33} \\ A_{41} & A_{42} & A_{43} \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \end{bmatrix} + \begin{bmatrix} X_{14} \\ X_{24} \\ X_{34} \\ X_{44} \end{bmatrix}$$

Since A_{ij} is a matrix with constant elements, then the matrix equation can be written as follows:

$$\begin{bmatrix} T_1 \\ T_2 \\ T_3 \end{bmatrix} = \begin{bmatrix} 0 & 0 & A_{13} \\ A_{21} & A_{22} & 0 \\ 0 & A_{32} & A_{33} \end{bmatrix} \begin{bmatrix} T_1 \\ T_2 \\ T_3 \end{bmatrix} + \begin{bmatrix} X_1 \\ X_2 \\ X_3 \end{bmatrix}$$

and $T_4 = A_{42} T_2 + A_{43} T_3 + X_4$

3.2.2 Accounting multiplier matrix (*Ma*) & Linkage of SAM

The matrix of the accounting multiplier shows the endogenous change by *Ma* as a result of an exogenous account change by one unit. The equation can be written as:

$T = A. T + X$

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

$T = Ma\ X$

Where $Ma = (I-A)^{-1}$: Accounting Multiplier

The model explains that the change in the exogenous account (X) will cause a change in the endogenous account (T) by $(I-A)^{-1}$. Accounting multiplier analysis shows the interrelationship between economic sectors within a region as part of the economic

[9] In order to build this model, two types of variables are identified a) endogenous variables i.e. the values of endogenous variables are determined by the economic model; b) exogenous variables i.e. the values of exogenous variables are determined outside the model. In this case X is matrix of exogenous variables while T is matrix of endogenous variables. In SAM , in general, the exogenous matrix for example government account, capital account, indirect tax account, subsidy and foreign account (rest of the world).

analysis and provides information about the distribution of income and employment of household as part of a social analysis.

Before the accounting multiplier model is applied, it is necessary to make some adjustments to the SAM framework. The adjustment is regarding the provision of exogenous accounting in the SAM framework and the implications in order to obtain an accounting multiplier. Those considered as exogenous account, namely the government account, the capital account, the indirect tax account, the subsidy, and the foreign account (rest of the world account).

Therefore, changes in the economy can be affected by the policy in the four exogenous accounts, whether in the form of subsidy removal, introduce a carbon tax or other policy like government spending, investment and foreign policy.

Ma Matrix in SAM has some weakness, for that we use some assumptions as follows:

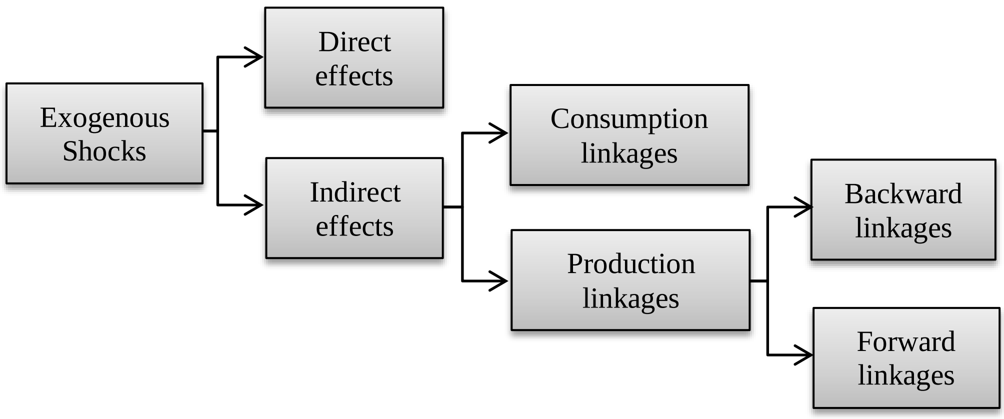
- Fixed prices and any changes in demand lead to change in physical output rather than prices.
- Factor resources are unlimited or unconstrained, so that any increase in demand is matched by increase by supply.
- The coefficient of technology is assumed to be unchanged (constant), or change is considered to have no effect.
- Fixed pattern of factor production ownership. Therefore we assume there is no a change in the factor of production ownership.
- The size and pattern of transfers between institutions are fixed.

An exogenous shock can emerge both direct and indirect effects. Direct effects are those pertaining to the sector that is directly affected by the shock. For example, an exogenous decrease in demand for Indonesian fossil fuel commodity has a direct impact on the fossil fuel industry sector. However, it may also have indirect effects stemming from fossil fuel industry's linkages to other sectors and parts of the economy. These indirect linkages can, in turn, be separated into production and consumption linkages.

Production linkages are determined by sectors production technologies, which are contained in the input-output part of SAM. They are differentiated into backward and forward linkages.

- Backward production linkages are the demand for additional inputs used by producers to supply additional goods or services. For example, when agricultural production expands, it demands intermediate goods like fertilizers, machinery, and transport services. This demand then stimulates production in other sectors to supply these intermediate goods. The more input-intensive a sector's production technology is, the stronger its backward linkages are.
- Forward production linkages account for the increased supply of inputs to upstream industries. For example, when agricultural production expands, it can supply more goods to the food-processing sector, which stimulates manufacturing production. So the more important a sector is for upstream industries, the stronger its forward linkages will be.

Figure 3.2. Direct and Indirect Linkage



Sources: Breisinger, Thomas & Thurlow, 2010

3.3.3 Ordinary Least Square (OLS) Regression

The injection or shock in the SAM analysis is the change (increase or decrease) of production in a sector or change in demand for a commodity in the economy. Therefore, estimation the change of production or demand of a sector or commodity due to fossil-fuel subsidy removal is needed before injecting a shock in SAM framework. In order to estimate the change in production or demand, this study used the Ordinary Least Square (OLS). Ordinary Least Squares (OLS) method is widely used to estimate the parameter of a linear regression model. OLS estimators minimize the sum of the squared errors (a difference between observed values and predicted values).

- **The General form of OLS**

In a standard regression model with N observations on a scalar dependent variable and several regressors, Y denotes observations on the dependent variable and X denotes a matrix of independent variables. The general regression model of OLS:

$$Y_i = X_i\beta+\varepsilon_i$$

Where X_i is a K ×1 regressor vector and β is a K ×1 parameter vector.

For notational purpose, it is simpler to drop the subscript i and write the model for typical observation as:

$$Y = X\beta + \varepsilon$$

In matrix notation the N observations are stacked by row to yield:

$$Y = X\beta + \varepsilon,$$

Where y is an N ×1 vector of dependent variables, X is an N ×K regression matrix, and u is an N ×1 error vector.

- **Assumption on OLS**

Cameron & Trivedi (2005) the necessary OLS assumptions, which are used to derive the OLS estimators in linear regressions are:

1. The observations are random sampling.
2. The model is correctly specified so that $Y_i = X_i\beta + \varepsilon_i$.
3. Non-stochastic, linearly independent regressors.
4. The errors are heteroskedastic.
5. The errors are normally distributed.

- **Independent and Dependent Variables**

Both production and consumption of goods or service is a function of Consumer Price (CP), Product Quality (PQ) and Price of Substitution Product (SP).

$$Y = f(CP, PQ, SP)$$

Since Consumer Price (CP) is a function of International Price (IP) and Subsidy (S), then we can write:

$$CP = g(IP, S)$$

$$Y = f(IP, S, PQ, SP)$$

In this study we assume that PQ is fixed then:

$$Y=f(IP,S,SP)$$

Since regression in this study involved a time series data set, then in order to eliminate "population size effect" then regression in this study using per capita term. Therefore those 3 independent variables (X) become Per Capita Subsidy of Energy i (PSEi), International Price of Energy i (IPEi), and Substitution product Price of Energy i (SPEi). These independent variables are used to estimate dependent variable (Y) namely Per Capita Production of Energy i (PPEi) or Per Capita Consumption of Energy i (PCEi).

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_2 X_2 + \varepsilon$$

Estimated per capita production or consumption of energy (Y) will be used as shock injection to the SAM framework.

- **Model Selection: Backward Selection Method**

  In order to find the best model, I used backward selection method based on p-value of each independent variable. The selection steps as follows:

1. Regress all independent variable comprise PSEi, IPEi and SPEi with respect to dependent variable namely PPEi or PCEi.
2. Eliminate the insignificant independent variable by comparing their p-value with significant level ($\alpha = 5\%$)
3. Regress new regression after exclude the insignificant independent variable. Back to step 2 until all remained independent variables are significant.
4. Check the classical regression assumptions.

Chapter 4: Results and Analysis

4.1 Overview of Economy of Indonesia 2015

In 2015, the economy of Indonesia recorded a positive performance. Macroeconomic indicators and financial systems were maintained stable while the momentum of economic growth begins to increase. Although it experienced a slowdown in economic growth in the beginning, since the second half of 2015 there is a significant improvement in economic growth. The slowdown of economic growth in the first half of 2015 was caused by the global economic downturn, falling commodity prices, and currency depreciation. In general, economic growth is still slowing from 5.0% in 2014 to 4.8% (Bank of Indonesia, 2015).

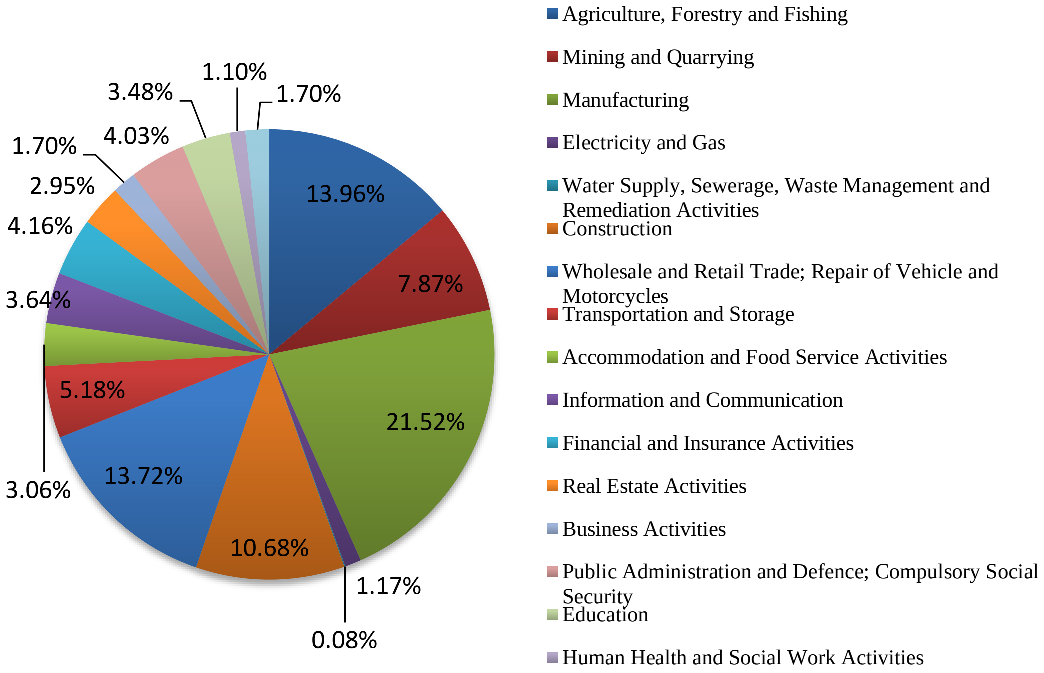
Table 4.1 Macroeconomic Indicators of Indonesia 2011-2015

Economic Indicators	2011	2012	2013	2014	2015
(1)	(2)	(3)	(4)	(5)	(6)
GDP (IDR billion)	7,831,726.0	8,615,704.5	9,546,134.0	10,569,705.3	11,531,716.9
Per Capita GDP (IDR million)	32,363.7	35,105.2	38,365.9	4, 915.9	45,140.7
Economic Growth (%)	6.4	6.2	5.6	5.0	4.8

Source: BPS-Statistic Indonesia

Even the economy grew slower than the previous year, the GDP and per capita GDP in 2015 increased steadily. The GDP increased by 7.59% from IDR 10,569,705.3 billion in 2014 to 11,531,716.9 billion in 2015. While for per capita GDP also was increase by 6.24% became IDR 45,140.7 million in 2015 where previously in 2014 was IDR 4,195.9 million. The structure of the Indonesian economy in 2015, as reflected in the Gross Domestic Product (GDP), has been shifting from the first patterned agrarian country become increasingly industrialist from year to year. The structure of Indonesia economy can be seen in the contribution of each sector to GDP.

Figure 4.1 Share of Economic Sector to GDP Indonesia 2015



Source: BPS-Statistic Indonesia

The sector of manufacturing was the major contributor to GDP in 2015 with 21,52% share of GDP, followed by Sector of Agriculture, Forestry, and Fishing with 13,96% and Sector of Wholesale and Retail Trade with 13,72%. Another significant sector is Mining and Quarrying sector contributed 7,87% to GDP. The smallest share is Sector of Water Supply, Sewerage, Waste Management and Remediation Activities with only 0.08% share followed by Sector of Electricity and Gas, and Sector of Other Services Activities with share respectively 1,10% and 1,70%.

Table 4.2 Share of Gross Domestic Product (GDP) Indonesia by Sectors 2015

Sector	GDP (IDR Billion)	Percen tage
(1)	(2)	(3)
Agriculture, Forestry and Fishing	1,560,399.3	13.52
Agriculture, Livestock, Hunting and Agriculture Services	1,186,520.6	10.28
Forestry and Logging	81,743.1	0.71
Fishing	291,135.6	2.53
Mining and Quarrying	879,399.6	7.62
Crude Oil, Natural Gas and Geothermal	382,680.9	3.32
Coal and Lignite Mining	198,881.8	1.72
Other mining and Quarrying	217,550.6	2.58
Manufacturing	2,405,408.9	20.84
Manufacture of Coal and Refined Petroleum Product	307,703.8	2.67
Manufacture of Food Product and Beverages	647,002.2	5.61
Other Manufacturing (14 subsectors)	1,490,702.9	12.56
Electricity and Gas	131,264.2	1.14
Electricity	102,082.9	0.88
Manufacture of Gas and Production of Ice	29,181.3	0.25
Water Supply, Sewerage, Waste Management and Remediation Activities	8,606.0	0.07
Construction	1,193,346.1	10.34
Wholesale and Retail Trade; Repair of Vehicle and Motorcycles	1,534,067.3	13.29
Wholesale and Retail Trade and Repair of Motor Vehicles and Motorcycles	312,068.9	2.70
Other Wholesale and Retail Trading	1,221,998.4	10.59
Transportation and Storage	578,963.9	5.02
Accommodation and Food Service Activities	341,790.2	2.96
Information and Communication	406,887.6	3.53
Financial and Insurance Activities	464,734.6	4.03
Real Estate Activities	329,796.9	2.86
Business Activities	190,267.9	1.65
Public Administration and Defence; Compulsory Social Security	450,733.1	3.91
Education	388,682.6	3.37
Human Health and Social Work Activities	123,410.3	1.07
Other Services Activities	190,579.5	1.65
Total	11,178,338.0	100.00

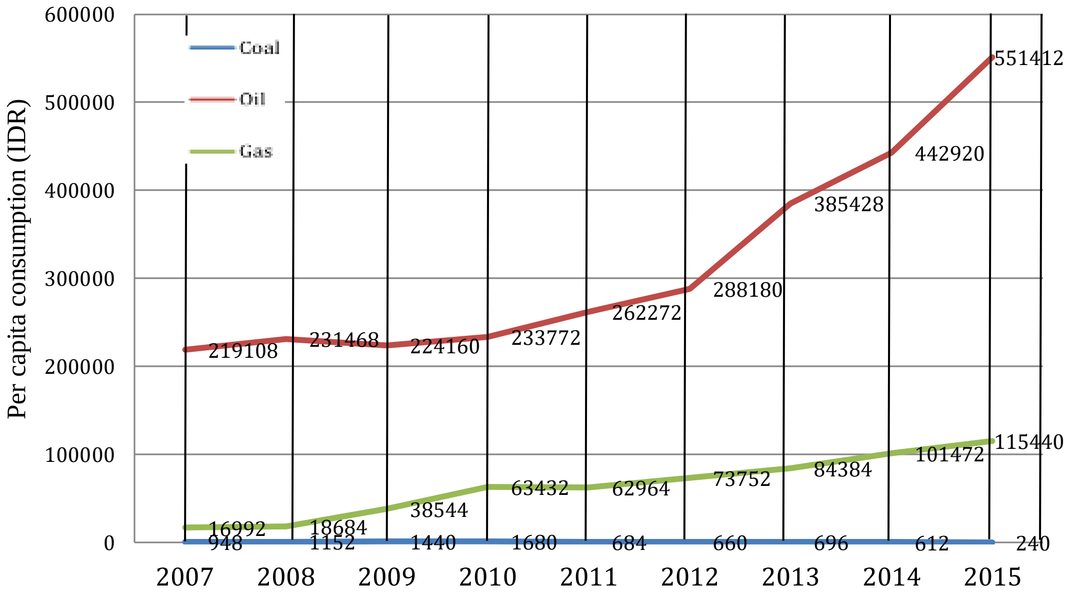
Source: BPS-Statistic Indonesia

Mining and quarrying sector and Manufacturing sector have a significant share of the economy with share almost one-third of GDP. Mining and quarrying were dominated by crude oil, natural gas and geothermal subsector, and coal and lignite mining with share respectively 43,51% and 22,62%. Those fossil energies are the main energy resources in Indonesia. But while the contribution of petroleum, gas and geothermal mining was considerable, Indonesia's petroleum production tends to decline due to the declining stock availability of petroleum. Therefore since 2005, Indonesia became petroleum net-import country. Subsector manufacture of coal and refined petroleum product also have significant contribution to share 12.79% of overall Manufacturing sector after Manufacture of food product and beverages subsector with share 26.90%.

4.2 Energy Consumption and Carbon Emissions

Manufacture sector is one of the carbon-intensive sectors. This sector needs energy as an intermediate input to assure production and distribution process keep going. In the aggregate, Indonesia's energy consumption, especially fossil fuel, continues to increase year by year. Even though the government continues to phase out energy subsidies, which caused prices to rise, but it did not seem to make people reduce energy consumption significantly.

Figure 4.2 Per capita consumption of fossil-fuel energy, 2007-2015



Source : BPS-Statistics Indonesia

Note : Using USD1.00 = IDR 14,000.00, the annual average exchange rate in 2010, IDR 600.000 to USD 42.85)

Figure 4.2 shows that per capita consumption of oil product (in this case gasoline, kerosene and diesel) significantly increased, notably during period 2012 to 2015. As well as per capita gas that steadily increased during period 2007-2015, while per capita coal tend to be decrease during this period. Petroleum, gas, and coal are the main energy resources in Indonesia. Unfortunately, as a fossil fuel, these three kinds of energy produced carbon dioxide that can lead to global warming. The carbon factor shows us that gas is the ‘cleanest’ energy among them. While coal is the ‘dirtiest’ energy if compare with petroleum and gas. Table 4.3 shows us the estimation of carbon emission from these three fossil-fuel energy in 2015.

Table 4.3 National Energy Consumption and Carbon Emission in Indonesia 2015

No	Commodity	National Consumption (litre or kg)	Carbon Factor[10]	Total Carbon Emission (kg)
(1)	(2)	(3)	(4)	(5)
1	Petroleum	95,090,590,000	2.52 $kgCO_2$/litre	239,628,286,800
2	Gas	43,715,200,000	1.10 $kgCO_2$/kg	48,086,720,000
3	Coal	71,027,430,000	3.26 $kgCO_2$/kg	231,549,421,800
		Total		519,264,428,600

Source: BPS-Statistic Indonesia

4.3 Fiscal burden of fuel subsidies

The economic crisis hit Indonesia in mid-1997, made the burden of the national budget was increasingly heavy for the Indonesian government. Some expenditures such as debt payments, interest payments, and subsidies rose sharply in related to currency depreciation (rupiah). Various efforts had made by the government, in order to maximize the efficiency of the national budget. One such effort is to reduce the amount of spending on subsidies, such as fuel subsidies, fertilizers, and electricity. In addition to that, subsidy reduction is also an effort to improve the efficiency of fossil fuel energy use which is the main source of carbon emissions.

[10] DEFRA (2007). Carbon factor of Petroleum (Refined oil) : 2.52$khCO_2$/litre equal to 3.15 $kgCO_2$/kg; Gas (LPG) : 0.185kgCO2/kWh equal 2.072 $kgCO_2/m^3$ (11.2 kWh/m^3) also equal to 1.10 kgCO2/kg (1 m^3 = 1.89kg). DEFRA (2012) Carbon factor for coal 3.26$kgCO_2$/kg.

Table 4.4 Consumption Subsidies Burden to GDP of Indonesia period 2007-2015

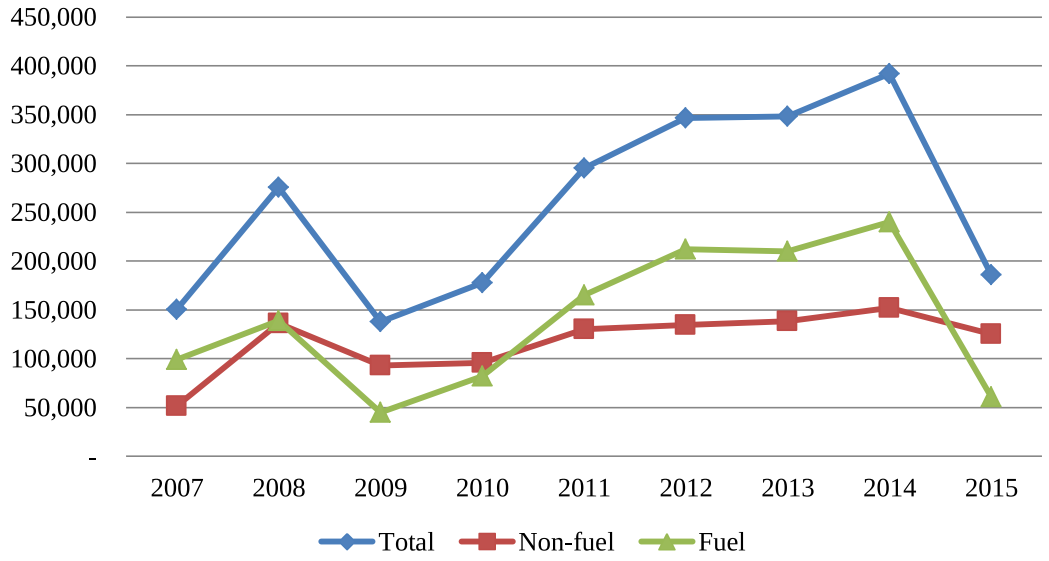
Year	Subsidy (Billion)			Total Subsidy (Billion)	Percentage Subsidy to GDP
	Oil	Gas	Other		
(1)	(3)	(4)	(5)	(6)	(7)
2007	83,792.32	15,052.1*)	51,369.63	150,214	3.80
2008	135,216.14	3,890.57	136,184.29	275,291	5.56
2009	37,136.45	7,902.94	93,042.61	138,082	2.46
2010	67,499.27	14,852.06	95,539.68	177,891	2.76
2011	142,568.59	22,592.75	130,196.66	295,358	3.98
2012	179,046.48	32,849.23	134,524.29	346,420	4.21
2013	179,017.97	30,982.03	138,119.00	348,119	3.83
2014	191,018.72	48,973.34	151,969.94	391,962	3.88
2015	34,886.44	25,872.27	125,212.29	185,971	1.61

Note: *)Estimated value

Source: LKPP-Annual Financial Report of Ministry of Finance

The subsidy, especially fuel subsidy, tended to fluctuate during period 2007 to 2015. The highest subsidy was in 2014 amounted to IDR 191,018.72 billion. In percentage of GDP term, subsidy in 2008 subsidy was the highest percentage with the share of 5.56% from total GDP. From year to year, the Indonesian government continues to reduce subsidy burden to GDP, therefore in 2015 subsidy expenses are reduced to only 2.61% of the total GDP value during this period.

Figure 4.3 Consumption Subsidies trend during period 2007 – 2015 (in IDR billion)



Source : LKPP-Annual Financial Report of Ministry of Finance
Note : Using USD1.00 = IDR 10,000.00, the annual average exchange rate in 2011, IDR 450.000 billion equal to USD 45 billion

From the figure 4.3, it is clear that the total subsidy pattern is in line with the pattern of fuel subsidy, which fluctuated during period 2007-2015. Fuel subsidy increased in 2008 and then fell quite sharply in 2009 as well as the total subsidy. Then they increased gradually from 2010 to 2014 before finally fell down drastically in 2015. While non-fuel subsidy pattern is relatively stable. This indicates that the fuel subsidy is relatively significant compared to non-fuel subsidies. This is understandable because the reduction of fuel subsidy has a very wide multiplier effect compared to the non-fuel subsidy, which is high inflation.

4.4 The impact of subsidy removal on production & consumption of fossil fuel products

- **Petroleum production and consumption**

To determine the impact of fossil-fuel subsidy removal to production and consumption of petroleum, the Ordinary Least Square regression estimation was conducted using Gretl Software. In addition, to find the best model, Backward Elimination based on p-value was also conducted (see Appendix A part 1.a). Prior to the estimation with the previous OLS, the assumption test was first performed (see Appendix A part 1.b). In this OLS estimation involved several variables as follows:

a. Dependent variables:

PPPetro	: Per capita production of petroleum
PCPetro	: Per capita consumption of petroleum

b. Independent variables:

PSPetro	: Subsidy per capita of petroleum
PCIncome	: Per capita income
IPPetro	: International price level of petroleum
IPGas	: International price level of gas
IPCoal	: International price level of coal

In estimating the number of production, the dependent variable, per capita production of petroleum (PPPetro), was regressed with five independent variables (PCIncome, PSPetro, IPPetro, IPGas, and IPCoal). The result showed that the IPGas and IPCoal variables are not significant since their p-value > 0.05. In the final result, there are 2 significant independent variables remain in the model. The obtained OLS model for per capita production of petroleum as follow:

$$PPPetro = -0{,}671991\ PSPetro + 0{,}269835\ IPPetro + \varepsilon$$

The OLS model[11] shows that per capita production of petroleum is inversely proportional to its per capita subsidy. Based on data, the national oil production has been decline since 2000s while the consumption level keeps increase. Therefore, the government has to import more oil time by time and this mean that the subsidy keep increase since government buy the oil by international price while sell to domestic market with lower price (subsidized price). As the result, the national oil production has an inverse relationship with subsidy.

From the model, if per capita subsidy of petroleum (PSPetro) increases IDR 1.00 then per capita of petroleum production (PPPetro) will decrease by IDR 0.671991. In the aggregate term, if the total subsidy of petroleum is fully removed by IDR 135.416 trillion. Furthermore, if the decreasing of per capita petroleum production multiplied by the total population in 2015, that is 257,623,254, the total decreasing of petroleum production is IDR 90.99 trillion this amount equal to decreasing by 0.21%.

The subsidy removal not only affects the production level of petroleum. Since both affect the consumer's price level then they must be, also affect the level of consumer demand. Therefore, this study also estimated the change in consumption due to the implementation of subsidy removal. For this purpose, the OLS regression using Gretl was also conducted with involved same independent variables (PCIncome, PSPetro, IPPetro, IPGas, and IPCoal) and per capita consumption of petroleum (PCPetro) as the dependent variable.

Further analysis was also conducted in order to find the best model using backward elimination by eliminated the most insignificant variable by its p-value from the model. The result is all variables are insignificant whether they were regressed together or solely. Therefore we conclude that subsidy removal and carbon tax policy do not significantly affect the consumption level of petroleum. This result also reflects that petroleum demand in Indonesia is inelastic to price (see Appendix A part 2.a).

[11] In this study, the production model for petroleum, gas and coal did not involve the intercept (β_0), since it was assumed that there is no producer or firm or company would produce any goods or service with zero price and zero subsidy. But, the consumption model involved intercept (β_0) since we assume that the demand of fuel (energy) is exist even if price is zero and no subsidy for example sun-light.

- **Natural gas production and consumption**

In order to analyse the impact of subsidy removal on the change of production and consumption of natural gas, then the Ordinary Least Square Regression was conducted with the following variables:

a. Dependent variables:

PPGas : Per capita production of natural gas

PCGas : Per capita consumption of natural gas

b. Independent variables:

PSGas : Per capita subsidy of natural gas

PCIncome : Per capita income

IPGas : International price level of natural gas

IPPetro : International price level of petroleum

IPCoal : International price level of coal

After calculated the regression model and then applied backward elimination based on p-value, finally, from five independent variables (PCIncome, PSGas, IPGas, IPPetro and IPCoal), the only significant variable is IPGas (with p-value $<\alpha = 0.05$) (see Appendix A part 3.a). Prior to the estimation with the previous OLS, the assumption test was first performed (see Appendix A part 3.b). Then the regression model for the estimation of gas production OLS calculation results obtained results:

$$PPGas = 7{,}47912\ IPGas + \varepsilon$$

The result shows that only international price of natural gas (IPGas) significantly affects the production of natural gas, while subsidy, per capita income, and substitute goods price do not significantly affect the natural gas production. This is in line with the fact that Indonesia is natural gas exporter country that exports a significant amount of its production and zero import for natural gas (BPS Statistics Indonesia, 2015).

In order to estimate the change of per capita consumption of natural gas (PCGas), the OLS was also conducted using five independent variables namely PCIncome, PSGas, IPGas, IPPetro, and IPCoal. After performing OLS regression and backward elimination in order to find best model (see Appendix 4.a). Prior to the estimation with the previous OLS, the assumption test was first performed (see Appendix A part 4.b). The OLS model of per capita consumption of petroleum as follows:

$$PCGas = 25325.4 + 0.211226\ PSGas + \varepsilon$$

From the result, the only significant independent variable is per capita subsidy of natural gas (PSGas). The R-square of the model is 0.711994. This means the two variables are able to explain the variation of the change in per capita consumption of natural gas by 71.1994% while the rest is explained by other variables.

The OLS model shows that per capita consumption of natural gas has a positive correlation with its subsidies per capita. More precisely, if the per capita subsidy of natural gas increases by IDR 1.00 then per capita consumption natural gas will increase by IDR 0.211226. In aggregate, with total population 257,623,254, if the natural gas subsidy is fully removed by IDR 25,872,274,516,157 (or equal to IDR 68,317,54 per capita), the per capita consumption of natural gas will decrease by IDR 14,430.44 or in aggregate by IDR 3,717,617,090,828.84, this amount equal to decrease by 30.69%.

4.5 The impact of fuel subsidy removal on economic sector

In previous part, it was estimated the impact of fully subsidy removal on production and consumption of fuel energy. The results showed that if the government of Indonesia phasing out all fossil-fuel subsidy, the production of petroleum will decrease by 0.21%. As well as natural gas, once the government of Indonesia phasing out all subsidy of natural gas, the consumption of natural gas will decrease by 30.69%.

Table 4.5 Summary of regression estimation results.

Independent variable (X_i)	Dependent variable (Y_i)			
	Petroleum production	Petroleum consumption	Natural gas production	Natural gas Consumption
(1)	(2)	(3)	(4)	(5)
Subsidy removal	**Sign (-)**	Not sign	Not sign	**Sign (+)**
International fuel price	**Sign (+)**	Not sign	**Sign (+)**	Not sign
Substitution good price	Not sign	Not sign	Not sign	Not sign
Per capita income	Not sign	Not sign	Not sign	Not sign

Note: Sign (+) = significantly affected with positive relationship
Sign (-) = significantly affected with negative relationship
Not sign = not significantly affected

To analyse the impact of a change in production and consumption, as the result of fuel subsidy removal to the economy, the SAM multiplier analysis was conducted. The SAM analysis multiplier was conducted by imposed an injection, all the change of production and consumption, to equilibrium SAM framework. This injection allows us to see the impact of subsidy removal to the other production sectors, demand for products, income distribution and factor production. And the result as follows:

Table 4.6 Global multiplier account *(Ma)* for production and commodity sector

Account	Production sector	Subsidy removal	
		Injection	*Ma*
(1)	(2)	(3)	(4)
Production Sector	Agriculture, farms, fishery and forestry	0.00	**-6.36**
	Coal mining	0.00	-0.45
	Petroleum mining	0.00	-0.72
	Gas mining	0.00	-4.24
	Other mining and quarrying	0.00	-0.29
	Petroleum/oil industry	**-0.21**	-2.31
	Transport vehicle industry	0.00	-0.71
	Motorcycle industry	0.00	-0.61
	Other industry	0.00	**-11.12**
	Electricity	0.00	-0.40
	Gas	0.00	**-30.68**
	Water	0.00	-0.06
	Construction	0.00	-1.11
	Car, motorcycle and spare-part trading	0.00	0.00
	Other trading	0.00	0.00
	Accommodation, eating and drinking services	0.00	-1.88
	Communication and information	0.00	-1.29
	Transportation and warehousing	0.00	-0.69
	Bank and insurance	0.00	-1.06
	Real estate and company services	0.00	-1.32
	Government, defences, education, health, entertainment and other social service	0.00	-3.33
	Personal services, household and other services	0.00	-1.31
Commodity consumption	Agriculture, farms, fishery and forestry	0.00	**-8.23**
	Coal mining	0.00	-0.50
	Petroleum/oil mining	0.00	-1.06
	Gas mining	0.00	-4.65
	Other mining and excavations	0.00	-0.43
	Petroleum/oil industry	0.00	-3.18
	Transport vehicle industry	0.00	-1.02
	Motorcycle industry	0.00	-0.91
	Other industry	0.00	**-17.21**
	Electricity	0.00	-0.41
	Gas	**-30.69**	**-30.74**
	Water	0.00	-0.07
	Construction	0.00	-1.13
	Car, motorcycle and spare-part trading	0.00	0.00
	Other trading	0.00	0.00
	Accommodation, eating and drinking services	0.00	-2.08
	Communication and information	0.00	-1.56
	Transportation and warehousing	0.00	-0.87
	Bank and insurance	0.00	-1.11
	Real estate and company services	0.00	-1.61
	Government, defences, education, health, entertainment and other social service	0.00	-3.45
	Personal services, household and other services	0.00	-1.40

Source: Calculated from SAM BPS-Statistic Indonesia

From table 4.6, fully subsidy removal leads to decreasing of petroleum production by 0.21% and consumption of natural gas by 30.69%. These decreasing lead to the production of other sectors decreased. The most affected sector by fully subsidy removal is the production of gas, in which this sector decreases the production by 30.68%. The second and third most affected sectors are the sector of other industry and sector of agriculture respectively decrease by 11.12% and 6.36%.

On demand side, the consumption level of all sectors was affected except wholesale and retail trading sector group namely car, motorcycle and spare-part trading, and other trading sectors. The most decreased demand in the domestic product are gas demand, foods, beverages and clothing demand and agriculture demand respectively decreased by 30.74%, 17.21%, and 8.23%. The demand for gas for good import is zero since Indonesia meets their gas need by its domestic production.

4.6 The impact of subsidy removal on income distribution

Table 4.7 The impact of subsidy removal on total income of group of household

Code	Description of institution	Population in 2015 (person)	Total Income (IDR Trillion)		Change (%)
			Before Subsidy removal	After subsidy removal	
(1)	(2)	(3)	(4)	(5)	(6)
I1	Household type I	20,955,730	176.75	174.69	**-1.17**
I2	Household type II	75,684,566	731.56	693.39	-5.22
I3	Household type III rural	33,682,721	494.23	476.15	-3.66
I4	Household type IV rural	8,542,063	173.15	170.70	-1.41
I5	Household type V rural	29,355,177	468.45	450.58	-3.81
I6	Household type III urban	40,608,070	710.49	674.31	-5.09
I7	Household type IV urban	8,222,889	243.90	239.73	-1.71
I8	Household type V urban	40,572,038	827.88	780.66	**-5.70**
I9	Firm	-	1,916.70	1,504.23	-21.52
I10	Government	-	1,264.03	1,147.11	-9.25

Source: Calculated from SAM BPS-Statistic Indonesia

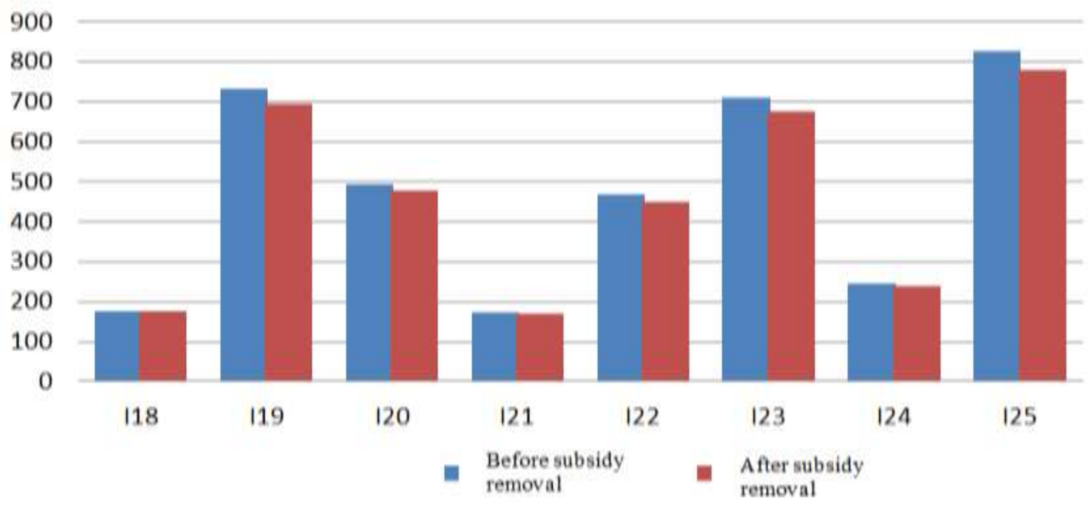
Note : Household type 1 refer to household of worker in agriculture
Household type II refer to household of entrepreneur in agriculture
Household type III refer to household of low income
Household type IV refer to household of non-labor force
Household type V refer to household of high income

After removing all fossil-fuel subsidies, total income of the group of household, firm, and government is decreased. This is because subsidy removal caused a decreasing of petroleum production and also decreasing of gas consumption. Due to subsidy removal, firm's income (I9) will decrease by 21.52% and government's income (I10) will decrease by 9.25%. While for household, the most suffered household is household of high income people in urban which decreased by

5.70% (I8), followed by household of entrepreneur in agriculture (I2) and household of low income in urban (I6) respectively decreased by 5.22% and 5.09%. While, household of worker in agricultural (I1) is the least decreased household which decreased by 1.17%.

Further analysis, households in rural (I3, I4 & I5) decreased by 2.96% and households in urban (I6, I7 & I8) decreased by 4.17%. While the 'poor' households (I1, I3, & I6) decreased by 3.31% and 'rich' households (I2, I4, I5, I7, & I8) decreased by 3.57% as well as agricultural household (I1 & I2) and non-agricultural household (I3, I4, I5, I6, I7 & I8) decreased by similar rate namely 3.20% and 3.56%. Therefore, subsidy removal affects income distribution differently between rural and urban. Figure 4.4 presents the comparison of income distributional among segments of population. It is clearly figured out that after implemented subsidy removal, the total income decreased for all segments.

Figure 4.4 Income distribution across household before and after subsidy removal



Source: Calculated from SAM BPS-Statistic Indonesia

4.7 The impact of subsidy removal on income inequality

Table 4.8 The impact of subsidy removal on income inequality

Code	Description of institution	Per Capita Income (million IDR)		Relative Income	
		Before subsidy removal	After subsidy removal	Before subsidy removal	After subsidy removal
(1)	(2)	(3)	(4)	(5)	(6)
I1	Household type I	8,434.77	8,336.19	1.00	1.00
I2	Household type II	9,665.94	9,161.61	1.15	1.10
I3	Household type III rural	14,673.23	14,136.61	1.74	1.70
I4	Household type IV rural	20,270.50	19,983.71	2.40	2.40
I5	Household type V rural	15,958.16	15,349.45	1.89	1.84
I6	Household type III urban	17,496.41	16,605.50	2.07	1.99
I7	Household type IV urban	29,661.78	29,154.60	3.52	3.50
I8	Household type V urban	20,405.27	19,241.51	2.42	2.31

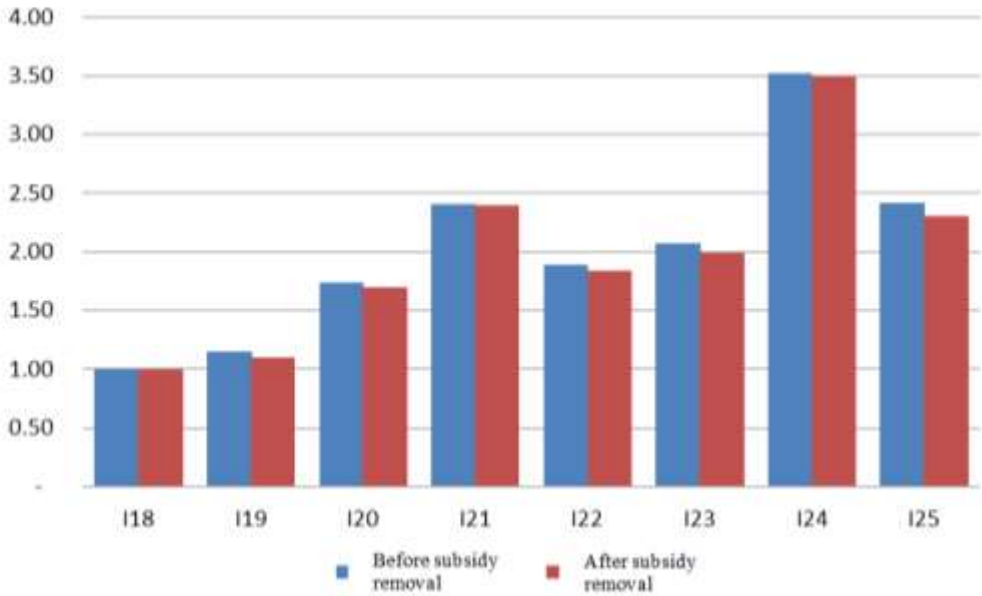
Source: Calculated from SAM BPS-Statistic Indonesia

Note: Household type 1 = Household of worker in agriculture
Household type II = Household of entrepreneur in agriculture
Household type III = Household of low income
Household type IV = Household of non-labor force
Household type V = Household of high income

Table 4.8 shows that fuel-subsidy removal lead to the per capita income of the group of household decreased. By dividing each per capita income by the lowest per capita income, household of workers in agriculture (I1), then we got the relative index for each group of households with respect to the poorest household group, as presented in column 5 and 6. The relative indexes of each group household after applied subsidy removal is smaller than before.

Before subsidy removal, the household with the highest income is household of non-labor force in urban (I7) with income IDR 29,661.78 million. This is equal to 3.52 times higher than the poorest household group (I1) whose has per capita income IDR 8,434.77 million. After subsidy removal, the relative index between the highest income household and the poorest is decrease became 3.50. This is because energy subsidies, accounted for around one fifth of the Indonesian government's outlays, do not protect the poor as intended. Around 40% of subsidy benefits go to the richest 10% of the population, and less than 1% goes to the poorest (OECD, 2014). Therefore, we can conclude that although subsidy removal leads to income decreasing but it also reduces income inequality. Figure 4.5 presents the comparison of between the relative indexes of income distribution before and after subsidy removal.

Figure 4.5 Relative Index of Income distribution among scenario policies



Source: Calculated from SAM BPS-Statistic Indonesia

4.8 The impact of subsidy removal on distribution of income of production factor

Table 4.9 The impact of subsidy removal on production factor

Code	Description of institution	Share before subsidy removal (%)	Share after Subsidy removal (%)	Change (%)
(1)	(2)	(3)	(4)	(5)
F1	Paid worker type I in rural	4.87	4.91	**0.00044**
F2	Paid worker type I in urban	1.30	1.32	0.00019
F3	Unpaid worker type I in rural	14.40	14.33	-0.00074
F4	Unpaid worker type I in urban	1.50	1.52	0.00021
F5	Paid worker type II in rural	8.18	8.15	-0.00026
F6	Paid worker type II in urban	15.36	15.21	*-0.00159*
F7	Unpaid worker type II in rural	4.90	4.91	0.00006
F8	Unpaid worker type II in rural	4.46	4.49	0.00025
F9	Paid worker type III in rural	3.43	3.46	0.00037
F10	Paid worker type III in urban	16.15	16.02	*-0.00129*
F11	Unpaid worker type III in rural	5.58	5.66	**0.00074**
F12	Unpaid worker type III in urban	8.41	8.51	**0.00098**
F13	Paid worker type IV in rural	2.61	2.63	0.00028
F14	Paid worker type IV in urban	7.13	7.14	0.00010
F15	Unpaid worker type IV in rural	0.48	0.49	0.00007
F16	Unpaid worker type IV in rural	1.24	1.26	0.00017
	Total labor force factor	52.16	60.15	0.07990
F17	Total capital factor	47.84	39.85	*-0.07990*
	Total production factor	100.00	100.00	-

Source: Calculated from SAM BPS-Statistic Indonesia
Note: Type I refer to worker in agriculture
Type II refer to worker in production, operator, transportation, manual and low-skilled worker
Type III refer to worker in administration, trading and service
Type IV refer to worker in leadership, military, professional and technician

Table 4.9 shows the income distribution among factor of production namely labor force factor and capital factor due to subsidy removal policy. Labor force factor consists of 16 sub-factors from code F1 to F16 while the capital factor has code F17. Subsidy removal caused a shifting on sharing among production factors where the share of some production factor increased while some others decreased. In general, labor force share increase by 0.0799% while conversely capital factor decrease by the same amount, 0.0799%. Furthermore, the most increased share of production factors are unpaid worker type III in urban (F12), unpaid worker type III in rural (F11) and paid worker type I in rural (F1) respectively their share increase by 0.00098%, 0.00074%, and 0.00044%. While for the most decreased share, exclude the capital factor, is paid worker type II in urban (F6) where its share decreased by 0.00159%. If we look at the share between labor and capital factor, since the share for labor force increased then subsidy removal tend to make economy more labour intensive.

Further analysis, households in rural (F1, F3, F5, F7, F9, F11, F13 & F15), due to subsidy removal, decreased by 0.97% and households in urban (F2, F4, F6, F8, F10, F12, 14 & F16) decreased slightly higher, by 1.07%. While household of non-wages and salary recipient/employer (I3, I4, I7, I8, I11, I12, I15 & I16) decrease by 0.74 and household of wage and salary recipient/employee (I1, I2, I5, I6, I9, I10, I13 & I14) decrease, almost twice than the employer, by 1.29%. In addition to that, those 4 types of labor have different sensitivity due to subsidy removal. The most vulnerable is labor in production, operator, transportation, manual and low-skilled worker (type II) that decreased by 1.76% followed labor type III i.e. labor in administration, trading and service (decrease by 0.92%), type I i.e. labor in agriculture (decrease by 0.81%) and type IV i.e. labor in leadership, military, professional and technician (decrease by 0.59).

4.9 Reallocation of subsidy revenue

One of the main benefit of fuel subsidy removal, beside the reduction in the use of fossil-fuels, is the availability of revenue from subsidy removal to be reallocated to other sectors to compensate adhere effect due to subsidy removal. A government has their own consideration in order to reallocate the subsidy removal revenue, depend on their crucial and urgent problem. Since each government has different problem and priority then they most likely reallocate this revenue in different sectors. But in general the revenue should be reallocated to strategic programs that would create multiplier effect both in the short- and long-run. For this reason, one way to determine the priority sector is by analyse the backward and forward effect of one sector. This study will provide the impact of reallocation to production, consumption, factor production, income distribution and the effect to the inequality.

4.9.1. Identification of reallocation sectors

It already showed that subsidy removal leads to decreasing in many sectors, commodities are also decreased as well as per capita income for all segment of the population. In general subsidy removal lead to economic slowdown growth. But on the other side, economy slightly became more labor intensive. It is actually a benefit for developing country that mostly has a high unemployment rate. Moreover, the income inequality was reduced especially due to subsidy removal implementation.

Regarding those positive and negative effects, the government in order reallocates the fuel subsidy must be careful such that the reallocation policy can boost economic growth, per capita income, income equality, and also environmental quality. Table 4.10 present sectors with their backward and forward linkages that represent how a sector can affect or affected by another sector such that the economy. Since those two linkages describe interconnection among economic then it also highly related to multiplier account in SAM.

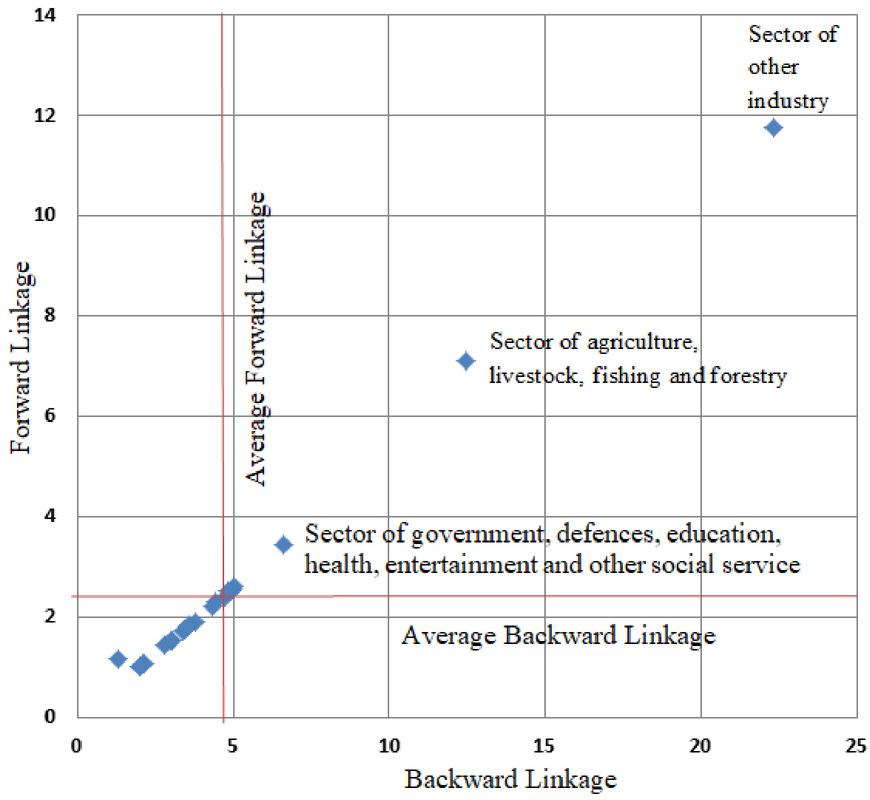
Table 4.10 Backward and forward linkages across sector in economy

Code	Sector	Backward Linkages	Forward Linkages	Total Linkages
(1)	(2)	(3)	(4)	(5)
S1	Agriculture, farms, fishery and forestry	**12.49**	**7.12**	**19.61**
S2	Coal mining	1.29	1.15	2.44
S3	Petroleum/oil mining	3.44	1.74	5.18
S4	Gas mining	3.79	1.91	5.70
S5	Other mining and excavations	2.81	1.43	4.24
S6	Petroleum/oil industry	5.00	2.55	7.55
S7	Transport vehicle industry	3.38	1.72	5.11
S8	Motorcycle industry	3.62	1.84	5.46
S9	Other industry	**22.34**	**11.74**	**34.08**
S10	Electricity	3.04	1.54	4.58
S11	Gas	2.10	1.05	3.16
S12	Water	2.13	1.07	3.20
S13	Construction	3.00	1.52	4.52
S14	Car, motorcycle and spare-part trading	2.00	1.00	3.00
S15	Other trading	2.00	1.00	3.00
S16	Accommodation, eating and drinking services	5.04	2.60	7.64
S17	Communication and information	4.44	2.28	6.72
S18	Transportation and warehousing	3.58	1.82	5.40
S19	Bank and insurance	4.70	2.40	7.10
S20	Real estate and company services	4.30	2.20	6.50
S21	Government, defences, education, health, entertainment and other social service	**6.63**	**3.44**	**10.07**
S22	Personal services, household and other services	4.91	2.52	7.43

Source: Calculated from SAM, BPS-Statistics Indonesia

The table 4.10 shows that sector whose the highest backward linkages are sector of other industry (S9), sector of agriculture, livestock, fishery and forestry (S1), and sector of government, defenses, education, health, entertainment and other social services (S21) with respectively by 22.34, 12.49, and 6.63. Those sectors with the same order also have the highest forward linkages with respectively by 11.74, 7.12, and 3.44. Therefore in total, sector of other industry is the highest total linkages by 34.08, sector of agriculture, livestock, fishing and forestry by 19.61, and sector of government, defenses, education, health, entertainment and other social services by 10.07.

Figure 4.6 Backward and forward linkages among economic sector



The other industry consists of food, beverage, clothing industry that has a significant share in the industry. If government reallocate subsidy revenue on this sector, especially for main food, this can help the poor household in order to get cheap food. Moreover, poor households spend proportionally more money to buy food than the rich households. Sector of agriculture, livestock, fishing, and forestry also can be considered as a sector to be reallocated since this sector mostly labor-intensive sector and households who involved in this sector mostly poor household that can reduce unemployment rate significantly. Another option can be the sector of government, defenses, education, health, entertainment and other social services where the government can invest the subsidy revenue for research and development in renewable energy. In this sector also government can improve health quality due to pollution or improve human resources development.

4.9.2. The impact of reallocation of subsidies revenue on production and

In order to analyse the impact of subsidy reallocation a simulation was conducted by allocated the subsidy revenue as subsidy of domestic consumption (commodity). For simplicity, this study assumed that subsidy reallocation lead to an increase in consumption by 1%. Therefore, this consumption increasing is used as injection into SAM framework. This study comprised 3 scenarios:

1. Scenario I (S-I) by injection IDR 1 billion reallocation subsidy into sector of food, beverage and clothing industry / other industry (S9),
2. Scenario II (S-II) by injecting IDR 1 billion reallocation subsidy into sector of agriculture (S1),
3. Scenario III (S-III) by injecting IDR 1 billion reallocation subsidy into sector of government, education, health, social security and services (S21).

The result as follows:

Table 4.11 Global multiplier account (*Ma)* of production sectors

Code	Sector	*Ma* (S-I)	*Ma* (S-II)	*Ma* (S-III)
(1)	(2)	(4)	(5)	(6)
S1	Agriculture, farms, fishery and forestry	**0.2904**	**1.1405**	**0.3708**
S2	Coal mining	0.0050	0.0024	0.0034
S3	Petroleum/oil mining	0.0292	0.0155	0.0225
S4	Gas mining	0.0266	0.0142	0.0207
S5	Other mining and excavations	0.0186	0.0083	0.0132
S6	Petroleum/oil industry	0.0359	0.0414	0.0647
S7	Transport vehicle industry	0.0212	0.0227	0.0303
S8	Motorcycle industry	0.0230	0.0209	0.0287
S9	Other industry	**1.2829**	**0.4862**	**0.6626**
S10	Electricity	0.0142	0.0141	0.0216
S11	Gas	0.0041	0.0017	0.0024
S12	Water	0.0029	0.0020	0.0031
S13	Construction	0.0099	0.0150	0.0189
S14	Car, motorcycle and spare-part trading	0.0000	0.0000	0.0000
S15	Other trading	0.0000	0.0000	0.0000
S16	Accommodation & restaurant services	**0.0476**	**0.0606**	0.0841
S17	Communication and information	0.0380	0.0472	0.0674
S18	Transportation and warehousing	0.0222	0.0240	0.0411
S19	Bank and insurance	0.0368	0.0407	0.0503
S20	Real estate and company services	0.0315	0.0334	0.0563
S21	Government, defences, education, health, entertainment and other social service	0.0741	0.0947	**1.1228**
S22	Personal services, household and other services	0.0365	0.0441	0.0632

Source: Calculated from SAM, BPS-Statistics Indonesia

Table 4.11 shows that by simulating an increase by 1% on consumption of commodity food, beverage and clothing sector (S-I) will lead to increase production of the same sector by 1.2829%, followed by agriculture sector and accommodation and restaurant service sector by 0.2904% and 0.0476%. Under S-II, the most affected sector are agriculture sector, other industry sector, and accommodation and restaurant service sector that increased respectively by 1.1405%, 0.4862%, and 0.0606%. While under S-III, sector of government, education, health, social security and services will increase by 1.1228% followed by other industry sector and agricultural sector that increase by 0.6626% and 0.3708%.

4.9.3. The impact of reallocation subsidies revenue on factor production

Table 4.12 Income of production factor among scenario policies (in billion IDR)

Code	Description of institution	Share after subsidy removal (%)	Share after subsidy reallocation		
			S-I	S-II	S-III
(1)	(2)	(3)	(4)	(5)	
F1	Paid worker type I in rural	130,193	130,331	**130,401**	130,248
F2	Paid worker type I in urban	34,940	34,949	**34,954**	34,943
F3	Unpaid worker type I in rural	379,778	380,963	**381,574**	380,248
F4	Unpaid worker type I in urban	40,331	40,344	**40,351**	40,336
F5	Paid worker type II in rural	314,908	**315,239**	315,032	315,050
F6	Paid worker type II in urban	447,794	**448,613**	448,083	448,222
F7	Unpaid worker type II in rural	236,362	**236,569**	236,433	236,446
F8	Unpaid worker type II in rural	194,275	**194,421**	194,324	194,343
F9	Paid worker type III in rural	97,311	**97,370**	97,329	97,360
F10	Paid worker type III in urban	405,048	**406,033**	405,301	405,812
F11	Unpaid worker type III in rural	159,333	**159,455**	159,348	159,353
F12	Unpaid worker type III in urban	233,945	**234,282**	233,981	234,016
F13	Paid worker type IV in rural	73,488	73,508	73,500	**73,579**
F14	Paid worker type IV in urban	181,687	181,816	181,750	**182,088**
F15	Unpaid worker type IV in rural	26,214	26,216	26,215	**26,216**
F16	Unpaid worker type IV in rural	29,268	29,271	29,269	**29,273**
	Total labor force factor	2,984,876	**2,989,380**	2,987,847	2,987,534
F17	Total capital factor	1,515,531	**1,530,536**	1,523,320	1,522,540
	Total production factor	4,500,407	**4,519,916**	4,511,167	4,510,074

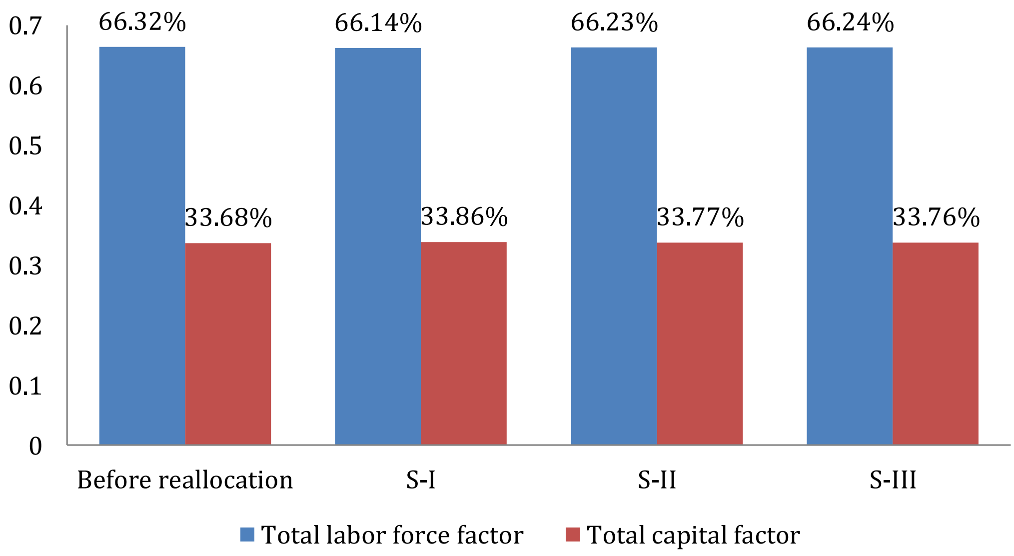
Source: Calculated from SAM BPS-Statistic Indonesia

Note : Type I refer to worker in agriculture
Type II refer to worker in production, operator, transportation, manual and low-skilled worker
Type III refer to worker in administration, trading and service
Type IV refer to worker in leadership, military, professional and technician

Table 4.12 shows that all scenario lead to increase production factor income. Each sector responded uniquely each scenario as reflected on increasing pattern. In general, S-I is better than other two scenarios. In aggregate, S-I increase production factor by IDR 19.509 billion or equal to increase by 0.43%. While S-II and S-III increase production factor respectively by IDR 10.760 billion (equal to 0.24%) and

IDR 9.667 billion (equal to 0.21%). For labor force factor, from 16 group of labor factor, 8 groups increased under S-I, 4 groups increased under S-II, another 4 groups increased under S-III. Figure 4.7 shows that reallocation under S-I, S-II and S-III slightly increase share of capital factor. This means that these reallocation schemes lead the economy to be more capital intensive.

Figure 4.7 Production factor share among scenarios reallocation



Source: Calculated from SAM BPS-Statistic Indonesia

4.9.4. Effect reallocation subsidies revenue on income distribution

Table 4.13 Effect of subsidy reallocation total income of group of household

Code	Description	Per Capita Income	Per capita income after reallocation		
			S-I	S-II	S-III
(1)	(2)	(3)	(4)	(5)	(6)
I1	Household type I	8,336,186	8,339,462	**8,344,121**	8,340,212
I2	Household type II	9,161,613	9,178,199	**9,203,386**	9,181,758
I3	Household type III rural	14,136,607	14,151,532	**14,154,515**	14,152,585
I4	Household type IV rural	19,983,714	19,992,637	**19,999,601**	19,994,975
I5	Household type V rural	15,349,446	15,366,101	15,378,856	**15,379,493**
I6	Household type III urban	16,605,498	16,631,827	16,626,017	**16,636,837**
I7	Household type IV urban	29,154,596	29,168,353	29,167,413	**29,176,068**
I8	Household type V urban	19,241,515	19,268,353	19,269,478	**19,309,219**

Source: Calculated from SAM BPS-Statistic Indonesia

Note : Household type 1 refer to household of worker in agriculture
Household type II refer to household of entrepreneur in agriculture
Household type III refer to household of low income
Household type IV refer to household of non-labor force
Household type V refer to household of high income

Table 4.13 shows that all scenario lead to increase per capita income. Specifically, S-II has the highest effect on household type I, type II, type III rural, and type IV rural since under S-II these types of household have more than other scenario. S-III scenario efficiently increase per capita income of household type V rural, type III urban, type IV urban, and type V urban. While for S-I increase per capita income slightly less than other two scenarios.

Table 4.14 Effect of subsidy reallocation on income inequality

Code	Description	Per capita income before subsidy reallocation	Per capita income after reallocation		
			S-I	S-II	S-III
(1)	(2)	(3)	(4)	(5)	(6)
I1	Household type I	**1.0000**	**1.0000**	**1.0000**	**1.0000**
I2	Household type II	**1.0990**	1.1027	1.1030	1.1009
I3	Household type III rural	**1.6958**	1.6982	1.6963	1.6969
I4	Household type IV rural	2.3972	2.3972	**2.3968**	2.3974
I5	Household type V rural	**1.8413**	1.8443	1.8431	1.8440
I6	Household type III urban	**1.9920**	1.9967	1.9925	1.9948
I7	Household type IV urban	3.4974	3.4981	**3.4956**	3.4982
I8	Household type V urban	**2.3082**	2.3155	2.3093	2.3152

Source : Calculated from SAM BPS-Statistic Indonesia
Note : Household type 1 refer to household of worker in agriculture
Household type II refer to household of entrepreneur in agriculture
Household type III refer to household of low income
Household type IV refer to household of non-labor force
Household type V refer to household of high income

Table 4.14 shows that in general, the scenarios lead to increase income inequality. Only S-II can decrease income inequality but only for 2 household group namely household type IV rural and type IV urban. This result suggest that, even if subsidy reallocation in commodity sector can increase per capita income but it failed to decrease (or at least maintain) income inequality.

Chapter 5: Conclusions

Based on previous analysis, there some conclusions and findings as follow:

1. Fully removal petroleum subsidies, by IDR 135.416 trillion in 2015, will decrease the production of petroleum by 0.21%.
2. While for gas consumption level significantly affected by subsidies where fully subsidies removal by IDR 25,872,274,516,157 in 2015 will decrease consumption of gas by 30.69%
3. Imposing fully removal fuel subsidy by injected the shock will lead to decrease in all sectors (except trading sector). The most affected sector is Gas supply sector, decreased by 30.68% followed by Other industries manufacture sector & Agriculture, livestock, fishing and forestry sector respectively decreased by 11.12% and 6.36%.
4. Imposing fully removal fuel subsidy by injected the shock also will lead to decrease consumption almost all domestic commodity. The most decreased sector is Gas supply sector by -30.74% followed by Other industries manufacture sector & Agriculture, livestock, fishing and forestry sector respectively decreased by 17.21% and 8.23%.
5. Imposing fully removal fuel subsidy by injected the shock will decrease total income of all segments of households. The most decreased households segment is household of high income people in urban (I25), decreased by 5.70% while the least decreased households segment is household of worker in agricultural sector, decrease by 1.17%. Subsidy removal also decreases income inequality as reflected on decreasing of relative income index. This is because the fossil fuel subsidy mostly enjoyed by rich people than poor one.
6. Furthermore, income distribution in rural and urban responds the shock differently. Income distribution decreased by 2.96% in rural and decrease by 4.17% in urban. In addition, shock similarly responded by household whether agricultural (decreased by 3.20%) or non-agricultural (decreased by 3.65%) as well as whether poor household (decreased by 3.31%) or rich household (decreased by 3.57%).

7. Imposing fully removal fuel subsidy by injected the shock will decrease share of capital production factor from 47.84% (labor factor 52.16%) to 39.85% (labor factor 60.15%). Therefore, the economy become more labor intensive. The impact vary across type of labor, some of them are increase while some other decrease.
8. Furthermore, labor factor in rural and urban respond the shock similarly. Labor factor income decrease by 0.97% in rural and 1.07% in urban. In addition, shock differently responded by labor factor depend on type of labor and whether employee or employer.
9. Simulation of subsidy reallocation was conducted by injecting 1% increasing on consumption level, under 3 scenario shows that:
    a. Subsidy reallocation was responded uniquely by each factor production. In general, subsidy reallocation leads to increase on production factor income. The best scenario is S-I since it increases production factor income more than in other scenarios. Subsidy reallocation slightly decrease labor factor share so that the economy become slightly more capital intensive.
    b. Subsidy reallocation increase per capita income. The best scenario is S-II since it, in general, increases per capita income more than in other scenarios. But, subsidy reallocation under all scenario tend to increase income inequality.

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Appendices

Appendix A: Model selection and classical regression assumptions test

1. Model estimation of petroleum production

1.a. Model selection

The Gretl output as follows:

Model 1: OLS, using observations 2007-2015 (T = 9)
Dependent variable: PPPetro

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
PSPetro	−0.672111	0.133754	−5. 250	0.0074	***
I Petro	0.231078	0.06 0685	3.7839	0.0194	**
IPGas	7.1731e-05	0.0 150295	0.0477	0.9642	
IPCoal	0.191 52	0.313409	0.6121	0.5735	
PCIncome	−0.000571135	0.00458833	−0.1245	0.90 9	

Mean dependent var	891.8636	S.D. ependent var	2 1.4179
Sum squared resi	68582.89	S.E. of egression	130.9417
Uncentered R-squared	.990917	Centered R-squared	0.8251 6
F(5, 4)	87.28019	P-value(F)	0.000358
Log-likelihood	−52.99403	Aka ke criterion	115.9881
Schwarz criteri	116.9742	Ha nan-Quinn	113.8600
Rho	−0.399033	Durbin-Wa son	2.489375

Eliminate insignificant independent variables from model and regress new model using remained significant independent variable. The Gretl output as follows:

Model 1: OLS, using observations 2007-2015 (T = 9)
Dependent variable: PPPetro

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
PSPetro	−0.671991	0.1061	−6.3336	0.00 4	***
IPPetr	0.269835	0.0183369	14.7154	<0.0001	***

Mean dependent var	891.8636	S.D. dependent var	221.4179
Sum squared resid	78316 75	S.E. of re ression	105.7738
Uncentered R-squared	0.989628	Centered R-squared	0.800318
F(2, 7)	33 .9562	P-value(F)	1.14e-07
Log-likelihood	−53.59126	Akaike criterion	111.1825
Schwarz crit rion	111.5770	Hannan-Qu n	110.3313
Rho	−0.562351	Durbin-Wats	2.914962

All remained independent variables are significant, but this does not mean that we should necessarily believe our results. The OLS is BLUE (Best Unbiased Linear Estimator) only if the assumptions of the classical regression model are fulfilled (See assumptions tests in part 1.b). After tested the assumptions, it was found that the data contains of heteroskedasticity. In order to solve this problem, we run a new regression with respect to robust corrected heterkedasticity (see the output in part 1.b heteroskedasticity test). The regression model as follows:

$$PPPetro = -0{,}671991\ PSPetro + 0{,}269835\ IPPetro + \varepsilon$$

1.b. Test of OLS assumptions

- Autocorrelation test

  H_0 : No Autocorrelation(1)

  H_1 : Autocorrelation(1)

  From table: Durbin-Watson value is 2.914962

```
Durbin-Watson statistic = 2.91496
p-value = 0.905433
```

Since P-value > $\alpha = 0.05$, then we cannot reject H_0. This means that there is no autocorrelation.

- Linearity test

  H_0: Model is well specified as linear model

  H_1: Model is not well specified as linear model

```
Auxiliary regression for RESET specification test
OLS, using observations 2007-2015 (T = 9)
Dependent variable: PPPetro

             coefficient    std. error    t-ratio    p-value
  ---------------------------------------------------------
  PSPetro    −0.813901      0.544097      −1.496     0.1949
  IPPetro     0.307643      0.202104       1.522     0.1885
  yhat^2      0.000111452   0.00148212     0.07520   0.9430
  yhat^3     −2.03582e-07   7.45772e-07   −0.2730    0.7958

Test statistic: F = 0.948535,
with p-value = P(F(2,5) > 0.948535) = 0.447
```

Since p-value > α = 0.05, then we cannot reject H_0. This means that our model is well specified as linear model.

- Multicolinearity test

  H_0: Data sets are not correlation

  H_1: Data set are correlated

```
 Correlation coefficients, using the observations 2007 - 2015
      5% critical value (two-tailed) = 0.6664 for n = 9

             PSPetro      IPPetro
              1.0000       0.7671    PSPetro
                           1.0000    IPPetro
```

Since P-value > α = 0.05 then we cannot reject H_0. This means that our data sets are uncorrelated.

- Normality test

  Ho: Data normal distributed

  H1: Data not normally distributed

```
Test for normality of uhat24:

 Doornik-Hansen test = 0.741204, with p-value 0.690318

 Shapiro-Wilk W = 0.907674, with p-value 0.299931

 Lilliefors test = 0.156754, with p-value ~= 0.75

 Jarque-Bera test = 0.691148, with p-value 0.707814
```

Since P-value for all normality test > $\alpha = 0.05$, then we cannot reject H_0. This means that data normally distributed.

- Heteroskedasticity test

  H_0 : Homoskedasticity

  H_1 : Heteroskedasticity

```
White's test for heteroskedasticity
OLS, using observations 2007-2015 (T = 9)
Dependent variable: uhat^2

                 coefficient      std. error    t-ratio  p-value
  -------------------------------------------------------------
  const         19212.2        46908.4          0.4096  0.7096
  IPPetro         -17.3330        26.1452      -0.6629  0.5548
  PSPetro          66.5991        73.4517       0.9067  0.4314
  sq_IPPetro        0.00390712     0.00377885   1.034   0.3772
  X2_X3            -0.0250273      0.0221456   -1.130   0.3406
  sq_PSPetro        0.0346161      0.0560886    0.6172  0.5808

  Unadjusted R-squared = 0.535929

Test statistic: TR^2 = 4.823362,
with p-value = P(Chi-square(5) > 4.823362) = 0.437816
```

Since P-value > $\alpha = 0.05$, then we cannot reject H_0. This means that data contains of heteroskedasticity. To solve this issue, we perform new regression with robust heteroskedasticity corrected. The Gretl result follows:

Model 1: OLS, using observations 2007-2015 (T = 9)
Dependent variable: PPPetro
HAC standard errors, bandwidth 1 (Bartlett kernel)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
:PPetro	0.269835	0.0120504	22.3922	<0.0001	***
'SPetro	−0.671991	0.0714174	−9.4093	<0.0001	***

Mean dependent var	891.8636	S.D. dependent var	221.4179
Sum squared resid	78316.75	S.E. of regression	105.7738
R-squared	0.989628	Adjusted R-squared	0.988147
F(2, 7)	851.3128	P-value(F)	4.39e-09
Lo -likelihood	−53.59126	Akaike criterion	111.1825
Schwarz criterion	111.5770	Hannan-Quinn	110.3313
Rho	−0.562351	Durbin-Watson	2.914962

2. Model estimation of petroleum consumption

2.a. Model selection

The Gretl output as follows:

Model 2: OLS, using observations 2007-2015 (T = 9)
Dependent variable: PCPetro

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	17001.3	12922.3	1.3157	0.2798	
PSPetro	−0.596815	5.72421	−0.1043	0.9235	
IPPetro	0.668542	2.02183	0.3307	0.7626	
IPGas	−0.0331427	0. 61802	−1.2659	0.2949	
IPCoal	−8.36674	5.91032	−1.4156	0.2518	
PercapitaIncome	0.476795	0.190803	2.4989	0.0878	*

Mean dependent var	20944.33	S.D. dependent var	5004.415
Sum squared resid	15605649	S.E. of regression	2280.764
R-squared	0.922109	Adjusted R-squared	0.792292
F(5, 3)	7.103110	P-value(F)	0.068707
Log-likelihood	−77.41708	Akaike criterion	166.8342
Schwarz criterion	168.0175	Hannan-Quinn	164.2805
Rho	−0.121758	Durbin-Watson	1.876996

From the result above, we can see that all variables are not significantly affect petroleum production as indicated by their p-value > $\alpha = 0.05$. Therefore, we can conclude that given available data, we cannot prove that those independent variables affect the consumption of petroleum.

3. Estimation model of gas production

3.a. Model selection

The result as follows:

Model 4: OLS, using observations 2007-2015 (T = 9)
Dependent variable: PPGas

	Coefficient	Std. Error	t-ratio	p-value	
IPPetro	250.547	44.5507	5.6239	0.0049	***
PSGas	−627.134	13.707	−1.9991	0.1162	
IPGas	1.04296	1.19694	0.8714	0.4327	
IPCoal	−490.73	248.683	−1.9733	0.1197	
PCIncome	9.78874	4.59172	2.1318	0.1000	

Mean dependent var	1039303	S.D. dependent var	295030.8
Sum squared resid	4.34e+10	S.E. of regress on	10 206.5
Uncentered R-squared	0.995831	Centered R-squared	0.937623
F(5, 4)	191.0721	P-value(F)	0.000076
Log-likelihood	−113.1084	Akaike criterion	236.2169
Schwarz criterion	237.2030	Hannan-Quinn	234.0888
Rho	−0.232319	Durbin-Watson	2 336820

From the result above, we can see that PCIncome, PSGas, IPGas and IPCoal are not significantly affect gas production as indicated by their p-value > α = 0.05. But in this case we cannot straight to eliminate those variables particularly main independent variables namely PSGas and IPGas. If we eliminate those two main independent variables there is no main independent variable remained in the model.

The reason why none of main variables significantly affect production while the only significant variable is IPPetro is because during the period (started from 2007 to next several years) of study the government of Indonesia was doing "Energy Conversion Policy from Kerosene to LPG". Most of Indonesians were used to cook using kerosene rather than LPG, only a few segment of population, mostly high-income population, used gas for their daily energy. In order conducted this policy, the government took several years in many steps because change the behavior of citizen was not easy. Therefore the cross-elasticity between gas production and kerosene price is relatively high in that period

In this study, in order to analyze the effect of energy policy, the author keep the main independent variables and eliminate the price of substitute good in particular petroleum (kerosene) price (IPPetro) in order to avoid the effect of "Energy Conversion Policy from Kerosene to LPG". The result as follows:

Model 3: OLS, using observations 2007-2015 (T = 9)
Dependent variable: PPGas

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
PSGas	−282.119	628.554	−0.4488	0.6671	
IPGas	8.05551	1.46853	5.4854	0.0009	***

Mean dependent var	1039303	S.D. dependent var	295030.8
Sum squared resid	6.21e+11	S.E. of regression	297833.0
Uncentered R-squared	0.940396	Centered R-squared	0.108299
F(2, 7)	55.22132	P-value(F)	0.000052
Log-likelihood	−125.0781	Akaike criterion	254.1563
Schwarz criterion	254.5507	Hannan-Quinn	253.3050
Rho	−0.037259	Durbin-Watson	2.006044

From the result above, we can see that PSGas is not significantly affect gas production as indicated by their p-value > α = 0.05. Therefore, we can eliminate PSGas from the model. Then we regress the remained variables namely IPGas. The result as follows:

Model 3: OLS, using observations 2007-2015 (T = 9)
Dependent variable: PPGas

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
IPGas	7.47912	0.675839	11.0664	<0.0001	***

Mean dependent var	1039303	S.D. depende t v r	295030.8
Sum squared resid	6. 9e+11	S.E. of regression	282577.8
Uncentered R-squared	0.938681	Centered R-squared	0.082637
F(1, 8)	122.4655	P-value(F)	3.96e-06
Log-likelihood	−125.2058	Akaike criterion	252.4116
Schwarz criterion	252 608	Hannan-Quinn	251.9860
Rho	−0.011064	Durbin-Watson	1.934832

The result above shows that variable IPGas is significantly affects petroleum production as indicated by its p-value < α = 0.05. But this does not mean that we should necessarily believe our results. The OLS is BLUE (Best Unbiased Linear Estimator) only if the assumptions of the classical linear model are fulfilled. After tested the assumptions, it was found that the data contains of heteroskedasticity. In order to solve this problem, we run a new regression with respect to robust corrected heterkedasticity (see the output in part 3.b heteroskedasticity test). The regression model as follows:

$$PPGas = 7.47912\ IPGas + \varepsilon$$

3.b. Test of OLS assumptions

- Autocorrelation test

  H_0 : No Autocorrelation(1)

  H_1 : Autocorrelation(1)

```
Breusch-Godfrey test for first-order autocorrelation
OLS, using observations 2007-2015 (T = 9)
Dependent variable: uhat

                   coefficient   std. error    t-ratio    p-value
  ---------------------------------------------------------------
  PgasJapanCIFIDR    0.00163150    0.724592     0.002252   0.9983
  uhat_1            -0.0111299     0.379060    -0.02936    0.9774

  Unadjusted R-squared = 0.000123

Test statistic: LMF = 0.000862,
with p-value = P(F(1,7) > 0.00086212) = 0.977

Alternative statistic: TR^2 = 0.001108,
with p-value = P(Chi-square(1) > 0.0011083) = 0.973

Ljung-Box Q' = 0.00295773,
with p-value = P(Chi-square(1) > 0.00295773) = 0.957
```

Since P-value > $\alpha = 0.05$, then we cannot reject H_0. This means that there is no autocorrelation.

- Linearity test

  H_0: Model is well specified as linear model

  H_1: Model is not well specified as linear model

```
Auxiliary regression for RESET specification test
OLS, using observations 2007-2015 (T = 9)
Dependent variable: PPGas

              coefficient     std. error    t-ratio   p-value
  ---------------------------------------------------------
  IPGas       1.03809        7.77911         0.1334   0.8982
  yhat^2      2.23952e-06    1.84213e-06     1.216    0.2697
  yhat^3     −1.23104e-012   7.90781e-013   −1.557    0.1705

Test statistic: F = 3.960600,
with p-value = P(F(2,6) > 3.9606) = 0.0801
```

Since p-value > $\alpha = 0.05$, then we cannot reject H_0. This means that our model is well specified as linear model.

- Normality test

  Ho: Data normal distributed

  H1: Data not normally distributed

```
Test for normality of uhat27:

 Doornik-Hansen test = 3.86111, with p-value 0.145068

 Shapiro-Wilk W = 0.96519, with p-value 0.85076

 Lilliefors test = 0.156741, with p-value ~= 0.75

 Jarque-Bera test = 0.234104, with p-value 0.889539
```

Since P-value for all normality test > $\alpha = 0.05$, then we cannot reject H_0. This means that data normally distributed..

- Heteroskedasticity test

  H_0 : Homoskedasticity

  H_1 : Heteroskedasticity

```
White's test for heteroskedasticity
OLS, using observations 2007-2015 (T = 9)
Dependent variable: uhat^2

                       coefficient    std. error    t-ratio  p-value
  ------------------------------------------------------------------
  const                 2.31861e+011   3.63691e+011   0.6375  0.5473
  PgasJapanCIFIDR      -4.23351e+06    5.34291e+06   -0.7924  0.4583
  sq_PgasJapanCIFI~    21.0654        18.8166         1.120   0.3057

  Unadjusted R-squared = 0.478595

Test statistic: TR^2 = 4.307358,
with p-value = P(Chi-square(2) > 4.307358) = 0.116056
```

Since P-value > α = 0.05, then we cannot reject H_0. This means that data contains of heteroskedasticity. To solve this, we can perform new regression with robust corrected heteroskedasticity. The Gretl result follows:

```
          Model 28: OLS, using observations 2007-2015 (T = 9)
                     Dependent variable: PpCGasIDR
          HAC standard errors, bandwidth 1 (Bartlett kernel)
                  Coefficient  Std. Error   t-ratio    p-value
  PgasJapanCIFIDR    7.47912     0.737305    10.1439    <0.0001   ***

  Mean dependent var       1039303   S.D. dependent var     295030.8
  Sum squared resid       6.39e+11   S.E. of regression     282577.8
  R-squared               0.938681   Adjusted R-squared     0.938681
  F(1, 8)                 102.8979   P-value(F)             7.63e-06
  Log-likelihood         −125.2058   Akaike criterion       252.4116
  Schwarz criterion       252.6088   Hannan-Quinn           251.9860
  Rho                    −0.011064   Durbin-Watson          1.934832
```

4. Estimation model of gas consumption

4.a. Model selection

The Gretl output as follows:

Model 5: OLS, using observations 2007-2015 (T = 9)
Dependent variable: PCGas

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	−1055.59	655.725	−1.6098	0.2058	
IPPetro	−0.562495	0.0823205	−6.8330	0.0064	***
PSGas	1.18801	0.856044	1.3878	0.2593	
IPGas	0.0120963	0.00207753	5.8224	0.010	**
IPCoal	1.60836	0.459563	3.4997	0.0395	**
PCIncome	0.140745	0.0153581	9.1642	0.0027	***

Mean dependent var	4142.095	S.D. dependent var	1837.063
Sum squared resid	94623.89	S.E. of regression	177.5987
R-squared	0.996495	Adjusted R-squared	0.990654
F(5, 3)	170.5940	P-value(F)	0.000702
Log-likelihood	−54.44243	Akaike criterion	120.8849
Schwarz criterion	122.0682	Hannan-Quinn	118.3312
Rho	−0.555525	Durbin-Watson	3.006150

Eliminate insignificant independent variables from model and regress new model using remained significant independent variable. The Gretl output as follows:

Model 6: OLS, using observations 2007-2015 (T = 9)
Dependent variable: PCGas

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	−1766.29	454.475	−3.8864	0.0177	**
IPPetro	−0.532491	0.0881467	−6.0410	0.0038	***
IPGas	0.0126537	0.002262	5.5940	0.0050	***
IPCoal	1.80976	0.483892	3.7400	0.0201	**
PercapitaIncome	0.1593	0.00838749	18.9925	<0.0001	***

Mean dependent var	4142.095	S.D. dependent var	1837.063
Sum squared resid	155371.7	S.E. of regression	197.0861
R-squared	0.994245	Adjusted R-squared	0.988490
F(4, 4)	172.7665	P-value(F)	0.000099
Log-likelihood	−56.67403	Akaike criterion	123.3481
Schwarz criterion	124.3342	Hannan-Quinn	121.2200
Rho	−0.565104	Durbin-Watson	2.748659

All remained independent variables are significant, but this does not mean that we should necessarily believe our results. The OLS is BLUE (Best Unbiased Linear Estimator) only if the assumptions of the classical regression model are fulfilled (See assumptions tests in part 4.b). After tested the assumptions, it was found that the data contains of heteroskedasticity. In order to solve this problem, we run a new regression with respect to robust corrected heterkedasticity (see the output in part 4.b heteroskedasticity test). The regression model as follows:

$$PCGas = 25325.4 + 0.211226\ PSGas + \varepsilon$$

4.b. Test of OLS assumptions

- Autocorrelation test

  H_0 : No Autocorrelation(1)

  H_1 : Autocorrelation(1)

  From table: Durbin-Watson value is 2.914962

```
Breusch-Godfrey test for first-order autocorrelation
OLS, using observations 2007-2015 (T = 9)
Dependent variable: uhat

             coefficient   std. error   t-ratio   p-value
  ---------------------------------------------------------
  const       -265.242      980.468      -0.2705   0.7958
  SpCGasIDR      0.535644     2.75486     0.1944   0.8523
  uhat_1        -0.410291     0.812590   -0.5049   0.6316

  Unadjusted R-squared = 0.040758

Test statistic: LMF = 0.254942,
with p-value = P(F(1,6) > 0.254942) = 0.632

Alternative statistic: TR^2 = 0.366826,
with p-value = P(Chi-square(1) > 0.366826) = 0.545

Ljung-Box Q' = 0.122123,
with p-value = P(Chi-square(1) > 0.122123) = 0.727
```

Since P-value > $\alpha = 0.05$, then we cannot reject H_0. This means that there is no autocorrelation.

- Linearity test

  H_0: Model is well specified as linear model

  H_1: Model is not well specified as linear model

```
Auxiliary regression for RESET specification test
OLS, using observations 2007-2015 (T = 9)
Dependent variable: PCGas

             coefficient       std. error     t-ratio   p-value
  -------------------------------------------------------------
  const      9052.27          3838.25          2.358    0.0649  *
  PSGas       172.138           67.4837        2.551    0.0512  *
  yhat^2       -0.00423777       0.00188799   -2.245    0.0748  *
  yhat^3        2.87696e-07      1.39827e-07   2.058    0.0947  *

Test statistic: F = 5.291010,
with p-value = P(F(2,5) > 5.29101) = 0.0583
```

Since p-value > α = 0.05, then we cannot reject H_0. This means that our model is well specified as linear model.

- Normality test

  Ho: Data normal distributed

  H1: Data not normally distributed

```
Test for normality of uhat29:

 Doornik-Hansen test = 5.2169, with p-value 0.0736485

 Shapiro-Wilk W = 0.833377, with p-value 0.0487192

 Lilliefors test = 0.220376, with p-value ~= 0.23

 Jarque-Bera test = 3.18779, with p-value 0.203133
```

Since P-value for all normality test (except Shapiro-Wilk test) > α = 0.05, then we cannot reject H_0. This means that most of test agreed that data normally distributed.

- Heteroskedasticity test

  H_0 : Homoskedasticity

  H_1 : Heteroskedasticity

```
White's test for heteroskedasticity
OLS, using observations 2007-2015 (T = 9)
Dependent variable: uhat^2

                 coefficient     std. error      t-ratio    p-
value
  ---------------------------------------------------------------
---
  const          144101            2.36119e+06    0.06103
0.9533
  SpCGasIDR       10786.6      17898.0            0.6027
0.5688
  sq_SpCGasIDR      −19.6741      28.4240        −0.6922
0.5147

  Unadjusted R-squared = 0.084275

Test statistic: TR^2 = 0.758472,
with p-value = P(Chi-square(2) > 0.758472) = 0.684384
```

Since P-value > α = 0.05, then we cannot reject H_0. This means that data contains of heteroskedasticity. To solve this, we can perform new regression with robust heteroskedasticity corrected. The Gretl result follows:

Model 30: OLS, using observations 2007-2015 (T = 9)
Dependent variable: CpCGasIDR
HAC standard errors, bandwidth 1 (Bartlett kernel)

	Coefficient	*Std. Error*	*t-ratio*	*p-value*	
Const	1777.07	728.482	2.4394	0.0448	**
SpCGasIDR	8.41173	1.7256	4.8747	0.0018	***

Mean dependent var	4142.095	S.D. dependent var	1837.063
Sum squared resid	9817343	S.E. of regression	1184.262
R-squared	0.636373	Adjusted R-squared	0.584427
F(1, 7)	23.76233	P-value(F)	0.001805
Log-likelihood	−75.33141	Akaike criterion	154.6628
Schwarz criterion	155.0573	Hannan-Quinn	153.8116
Rho	−0.279164	Durbin-Watson	1.453534

Appendix B: Social Accounting Matrix (SAM) 2008

1. **Operational definitions in Social Accounting Matrix (SAM):**
   - **a. Work** is perform an activity or a job with the intention of obtaining income or profit for at least one hour a week ago and should not be interrupted (continuous).
   - **b. Factors of Production**. In the SAM classification, Factor of production consists of labor factors of production labor and capital factor.
   - **c. Imputation of wages and salaries** is the estimated value as wages and salaries of non-labor for instance family workers, the self-employed workforce, and so on.
   - **d. Institution**. In the SAM classification, Institution is divided into three categories households, firms, and Government.
   - **e. Margin of trading and cost of transportation** is the difference between the transaction values at the consumer price level with the producer price level.
   - **f. Transfer payments between institutions**, for example, the subsidies from the Government to the households, or the wages and salaries from the firm to the households, or transfer payments between households.
   - **g. Gross Domestic Product (GDP)** is the added value generated by all business units in a particular region or is the total value of final goods and services produced by the economy. GDP is an important economic indicator to analyze the economic condition and performance & conditions of a region in a given period.
   - **h. Income disposable** is an income after reduced by tax and add net transfer from other households.
   - **i. Agricultural households**, classify into 2 categories namely:
   - **Household of agricultural labors**, i.e. households with a head of household or the largest income recipient in the household works as a labor in agricultural sector.
   - **Household agricultural entrepreneur**, i.e. households with a head of household or the largest income recipient works as an entrepreneur in the agricultural sector.

j. Non-agricultural household consists of three categories and specified according to rural and urban area, namely:

- **Low-class household**, i.e. households with a head of household or the largest income recipients in the household works as low-class entrepreneur, low-class administrator, freelance in transport sector (such as driver), freelance in individual services sectors, low-class workers.
- **Non-labor force household**, i.e. households with a head household who is no longer working (retirement) or the greatest income is coming from transfers from another household (income receiver).
- **High-class household**, i.e. households with a head of household or the largest income recipients in the household works as high-class entrepreneurs (in non-agriculture sector), managers, professionals (such as accountants, doctors), military, teacher/lecturer/Professor, administrative workers and high-class trader.

k. Production sector or economic sector is the field of activity of the institution/company someone works/worked. The production sector in this modified SAM 22 sectors while in default SAM is 24 sectors.

l. Paid labor is the labor involved in economic activities as a labor factors and they earn wages and salaries.

m. Unpaid labor is the labor involved in economic activity as a labor factor but did not gain any wages and salaries at all (unpaid family labor), or those who do not earn wages and salaries because of the compensation for their labor factors of production are included in the surplus business (profit) from business they do, for example, are those who are self-employed.

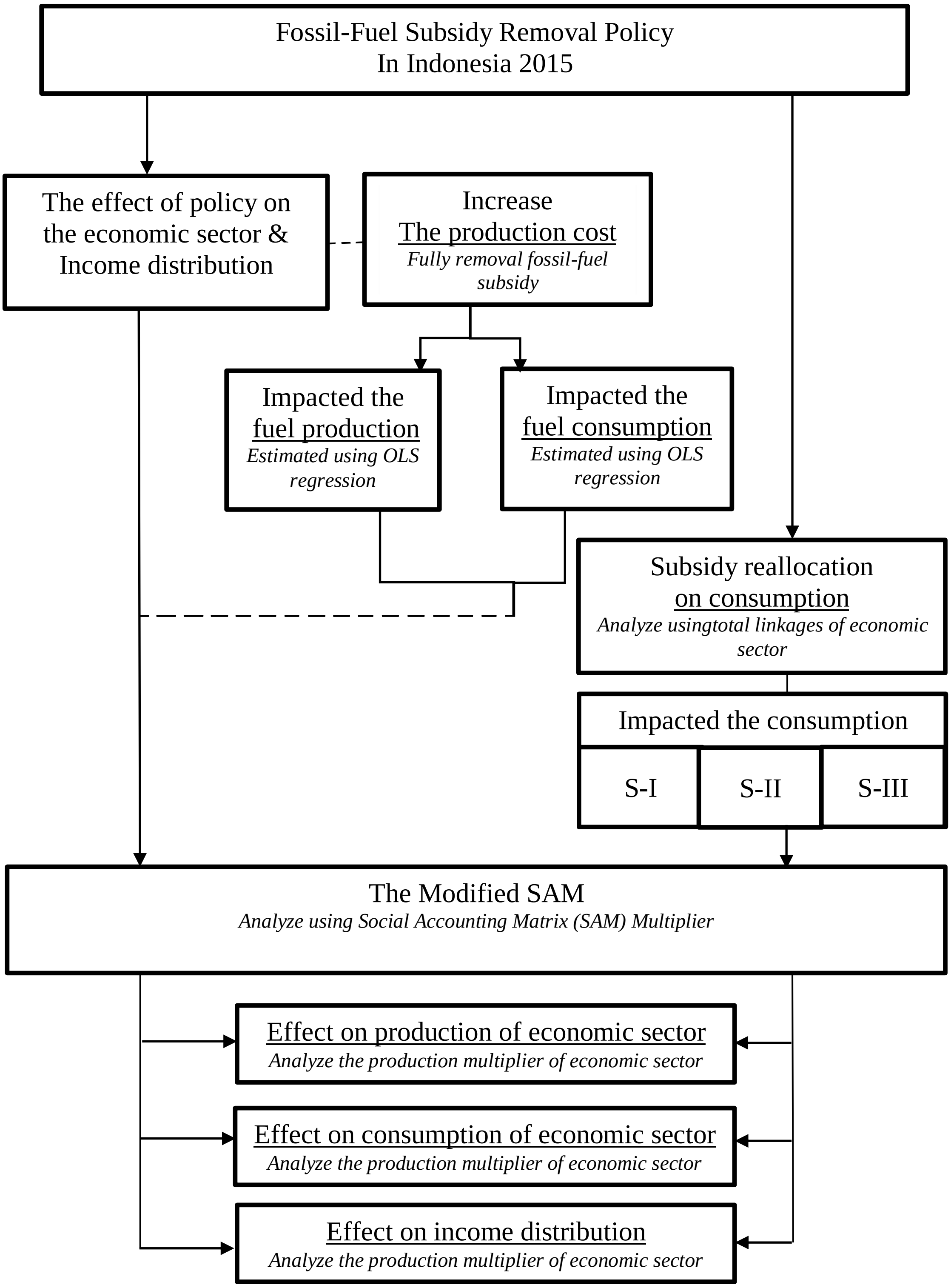
n. Agricultural labor (TK I) is a labor in administrative, sales, services including plantation, fisheries, forestry, and hunting. The labor force in this category consists the business on behalf of them-selves or with other parties, oversee or implement of the business, sales, services, breeding and forestry, fisheries, hunting and another business associated with it.

o. Production labor, transportation tool operator, low-class labor (TK II) is the labor that carry out the excavation and processing of materials mines, oil and gas, the process of manufacture, construction, maintenance, and repair of various types of road, buildings, machinery, and others. Also including labors who working on materials, piloting the tool transport and other equipment as well as perform duties which mainly requires physical power.

p. **The administrative labor, sales, and services (TK III)**. Administrative labor include a supervisory administrative labor, supervisor in the implementation of the transport and communications, compiling and maintaining the financial record transactions, maintain the office machines telephone equipment, and so on. Also included in this group is organizing a land transportation for passengers, distributing goods shipment and other similar tasks.

q. **Labor in leadership, military, professionals, and technicians (TK IV)**. Leadership and legislative labor include management officer, Manager (general manager, manager in production, except for agricultural production, marketing, finance, administration, human resources, R&D), and director. While professionals and technicians are those who in doing his job by applying science to solve various issues of technological, social, economic, industrial, as well as performing the functions of expertise, technical, Arts, and associated with it in various fields including sports.

2. Framework of study



3. Social Accounting Matrix (SAM) 2008 (in IDR billion)

Description		No.
Sector of Economic	Agriculture, farms, fishery and forestry	1
	Coal mining	2
	Petroleum mining	3
	Gas mining	4
	Other mining and quarrying	5
	Petroleum/oil industry	6
	Transport vehicle industry	7
	Motorcycle industry	8
	Other industry	9
	Electricity	10
	Gas	11
	Water	12
	Construction	13
	Car, motorcycle and spare-part trading	14
	Other trading	15
	Accommodation, eating and drinking services	16
	Communication and information	17
	Transportation and warehousing	18
	Bank and insurance	19
	Real estate and company services	20
	Government, defenses, education, health, entertainment and other social service	21
	Personal services, household and other services	22
Domestic commodity	Agriculture, farms, fishery and forestry	23
	Coal mining	24
	Petroleum mining	25
	Gas mining	26
	Other mining and quarrying	27
	Petroleum/oil industry	28
	Transport vehicle industry	29
	Motorcycle industry	30
	Other industry	31
	Electricity	32
	Gas	33
	Water	34
	Construction	35
	Car, motorcycle and spare-part trading	36
	Other trading	37
	Accommodation, eating and drinking services	38
	Communication and information	39
	Transportation and warehousing	40
	Bank and insurance	41
	Real estate and company services	42
	Government, defenses, education, health, entertainment and other social service	43
	Personal services, household and other services	44
Imported commodity	Agriculture, farms, fishery and forestry	45
	Coal mining	46
	Petroleum mining	47
	Gas mining	48
	Other mining and quarrying	49
	Petroleum/oil industry	50
	Transport vehicle industry	51
	Motorcycle industry	52
	Other industry	53
	Electricity	54
	Gas	55
	Water	56
	Construction	57
	Car, motorcycle and spare-part trading	58
	Other trading	59
	Accommodation, eating and drinking services	60
	Communication and information	61

	Transportation and warehousing				62
	Bank and insurance				63
	Real estate and company services				64
	Government, defenses, education, health, entertainment and other social service				65
	Personal services, household and other services				66
Factor of production	Labor	Agriculture	Recipient of wages & salaries	Rural	67
				Urban	68
			Non-recipient of wages and salaries	Rural	69
				Urban	70
		Production, transportation operator, manual and low-skilled labor	Recipient of wages & salaries	Rural	71
				Urban	72
			Non-recipient of wages and salaries	Rural	73
				Urban	74
		Administrative officer, sales and services	Recipient of wages & salaries	Rural	75
				Urban	76
			Non-recipient of wages and salaries	Rural	77
				Urban	78
		Leadership, military, professional and technician	Recipient of wages & salaries	Rural	79
				Urban	80
			Non-recipient of wages and salaries	Rural	81
				Urban	82
	Non-labor (Capital)				83
Institutions	Household	Agricultural		Type I	84
				Type II	85
		Non-agricultural	Rural	Type III	86
				Type IV	87
				Type V	88
			Urban	Type III	89
				Type IV	90
				Type V	91
	Firms				92
	Government				93
Capital account					94
Export import account					95
Trading margin					96
Transport margin					97
Indirect tax					98
Subsidy					99
Total					100

	1	2	3	4	5	6	7	8
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
8	-	-	-	-	-	-	-	-
9	-	-	-	-	-	-	-	-
10	-	-	-	-	-	-	-	-
11	-	-	-	-	-	-	-	-
12	-	-	-	-	-	-	-	-
13	-	-	-	-	-	-	-	-
14	-	-	-	-	-	-	-	-
15	-	-	-	-	-	-	-	-
16	-	-	-	-	-	-	-	-
17	-	-	-	-	-	-	-	-
18	-	-	-	-	-	-	-	-
19	-	-	-	-	-	-	-	-
20	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-
23	154,228.27	62.59	-	-	88.94	71.41	-	-
24	-	1,717.16	3.76	0.86	1,735.38	603.85	8.18	3.16
25	-	-	2,065.51	5,367.66	7,433.17	47,049.18	-	-
26	-	-	6,070.97	5,655.95	11,726.92	35,165.67	10.58	4.00
27	2.14	5,910.62	2,928.17	820.28	13,279.85	15.19	1.30	5.08
28	9,337.46	1,741.00	839.11	88.95	6,150.03	8,066.87	547.21	509.03
29	1,825.19	366.82	212.62	41.56	1,207.32	1,061.16	12,968.02	49.71
30	323.59	55.98	47.82	25.29	202.14	140.91	28.39	24,621.22
31	128,301.30	2,471.12	2,290.40	353.53	12,889.70	3,459.71	7,763.91	4,370.17
32	644.66	20.55	112.63	11.47	159.60	662.16	247.56	185.73
33		-	-	-	0.73	106.49	88.18	230.92
34	119.31	3.61	4.15	1.49	52.46	16.12	67.97	48.56
35	8,234.93	1,112.32	1,459.64	263.28	5,073.46	565.05	1.75	1.58
36	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-
38	623.30	36.80	188.14	106.95	444.33	180.90	297.15	162.57
39	3,404.57	852.93	484.01	105.79	2,512.16	1,568.42	806.04	570.44
40	913.43	55.44	134.54	13.29	333.04	1,179.87	427.03	514.24
41	9,855.77	277.17	735.33	120.88	1,373.18	1,224.78	1,562.26	713.38
42	1,896.19	459.77	319.16	416.40	1,564.10	1,090.16	163.17	716.73
43	-	-	-	-	-	996.20	790.67	377.97
44	4,851.12	1,284.59	974.54	346.39	2,989.66	2,316.10	653.05	555.43
45	1,562.64	-	-	-	-	6.36	-	-
46	-	514.35	1.13	0.26	519.81	289.18	3.92	1.51
47	-	-	618.70	1,607.82	2,226.52	22,531.84	-	-
48	-	-	1,818.49	1,694.17	3,512.66	16,840.83	5.06	1.92
49	-	1,770.46	877.10	245.70	3,977.82	7.28	0.62	2.43
50	2,245.46	117.13	56.45	5.98	413.74	4,127.20	279.97	260.43
51	438.92	24.68	14.30	2.80	81.22	542.92	6,634.74	25.43
52	77.82	3.77	3.22	1.70	13.60	72.09	14.52	12,596.80
53	30,853.70	166.24	154.09	23.78	867.15	1,770.07	3,972.20	2,235.88
54	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-

58	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-
60	41.63	0.68	3.49	1.99	8.25	9.69	15.92	8.71
61	4.33	324.70	184.26	40.27	956.35	654.79	336.51	238.15
62	4.33	21.11	51.22	5.06	126.78	492.58	178.28	214.69
63	-	38.34	101.72	16.72	189.96	56.94	72.62	33.16
64	237.68	215.62	149.68	195.28	733.52	286.09	42.82	188.09
65	-	-	-	-	-	40.77	32.36	15.47
66	70.94	16.98	12.88	4.58	39.51	90.36	25.48	21.67
67	131,127.84	-	-	-	-	-	-	-
68	35,006.17	-	-	-	-	-	-	-
69	387,957.54	-	-	-	-	-	-	-
70	40,419.47	-	-	-	-	-	-	-
71	5,021.97	36,236.57	29,460.67	21,911.36	11,380.92	7,226.79	2,880.84	1,804.95
72	3,372.53	29,890.93	24,301.61	18,074.31	9,387.93	17,409.06	11,919.16	7,467.79
73	1,709.63	41,197.27	33,493.77	24,910.98	12,938.94	6,277.86	2,902.89	1,818.77
74	447.07	22,081.19	17,952.21	13,351.95	6,935.10	2,131.43	1,865.50	1,168.80
75	3,871.13	1,294.04	1,052.07	782.47	406.42	815.17	383.63	240.36
76	3,346.44	3,459.30	2,812.44	2,091.75	1,086.47	7,102.60	4,011.11	2,513.11
77	1,265.10	3,062.97	2,490.22	1,852.10	961.99	419.90	79.51	49.82
78	548.91	1,809.97	1,471.52	1,094.44	568.46	75.86	139.64	87.49
79	1,346.58	1,964.93	1,597.51	1,188.14	617.13	329.81	100.55	63.00
80	1,519.23	1,736.33	1,411.66	1,049.92	545.34	3,204.91	1,052.73	659.57
81	1,574.30	5,891.89	4,790.16	3,562.68	1,850.48	377.51	146.01	91.48
82	491.95	213.40	173.50	129.04	67.02	929.53	764.26	478.84
83	191,185.04	52,178.92	42,421.95	31,551.31	16,387.98	104,164.65	36,879.05	23,106.09
84	-	-	-	-	-	-	-	-
85	-	-	-	-	-	-	-	-
86	-	-	-	-	-	-	-	-
87	-	-	-	-	-	-	-	-
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96	-	-	-	-	-	-	-	-
97	-	-	-	-	-	-	-	-
98	-	-	-	-	-	-	-	-
99	-	-	-	-	-	-	-	-
100	1,170,309.58	220,660.21	186,346.52	139,136.57	146,017.28	303,824.27	101,172.33	89,034.35

	9	10	11	12	13	14	15	16
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
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21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-
23	489,982.97	0.02	-	-	24,478.51	201.78	324.97	110,285.83
24	10,860.19	7,636.64	422.40	-	0.07	-	-	8.34
25	58,067.17	35.49	4.30	-	13.03	-	-	-
26	47,426.63	9,840.33	3,809.64	-	0.05	-	-	-
27	45,756.90	0.00	-	-	88,374.49	4.45	38.91	-
28	30,306.66	25,289.76	1,289.75	25.77	44,247.51	4,551.85	45,220.93	777.31
29	20,215.78	179.23	85.32	30.09	4,487.51	967.57	2,367.22	325.59
30	26,224.16	100.97	10.97	7.27	595.52	1,107.23	480.89	413.47
31	707,787.74	3,052.26	247.33	1,677.49	411,038.10	9,089.57	35,264.61	67,221.70
32	13,341.58	12,280.46	1.68	46.11	227.86	4,722.84	16,896.22	473.61
33	9,895.05	392.18	7.32	0.17	138.50	5.01	0.75	86.95
34	5,082.91	13.37	0.12	69.70	39.55	724.43	1,837.21	62.49
35	3,365.44	60.08	799.91	143.74	1,203.12	3,112.10	25,099.50	82.68
36	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-
38	10,315.16	65.71	3.96	4.25	8,208.82	1,571.45	13,970.44	267.67
39	22,766.61	195.24	17.63	21.25	8,172.43	9,447.75	40,977.34	126.64
40	16,815.78	101.14	1.71	2.35	1,955.53	5,357.18	28,668.27	319.20
41	34,268.35	880.51	104.33	35.55	13.72	7,859.26	53,863.45	880.37
42	22,986.72	1,090.63	352.05	56.51	108.49	14,451.34	67,418.55	965.51
43	9,314.79	13.50	0.36	14.41	-	148.75	630.03	442.56
44	13,896.59	138.79	11.42	9.08	7.48	5,872.29	20,272.12	147.55
45	43,618.73	-	-	-	-	-	-	257.73
46	5,200.94	54.11	2.99	-	0.00	-	-	8.14
47	27,808.35	0.25	0.03	-	0.30	-	-	-
48	22,712.60	69.72	26.99	-	0.00	-	-	-
49	21,912.97	0.00	-	-	2,016.41	-	-	-
50	15,505.61	5,594.90	285.33	5.70	14,601.81	515.20	5,118.31	16.39
51	10,342.87	39.65	18.87	6.66	1,480.89	109.51	267.93	6.87
52	13,416.90	22.34	2.43	1.61	196.52	125.32	54.43	8.72
53	362,121.00	675.26	54.72	371.11	135,643.76	1,028.80	3,991.41	1,417.82
54	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-

58	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-
60	552.76	7.40	0.45	0.48	475.73	677.87	6,026.34	60.73
61	9,504.70	20.50	1.85	2.23	514.58	1,054.42	4,573.27	8.23
62	7,020.32	10.62	0.18	0.25	477.57	597.89	3,199.52	20.75
63	1,593.03	6.02	0.71	0.24	450.51	220.64	1,512.17	20.22
64	6,032.37	349.66	112.87	18.12	8,779.74	4,243.91	19,798.71	306.56
65	381.23	0.81	0.02	0.87	-	2.78	11.77	12.41
66	542.15	8.33	0.69	0.55	146.00	142.54	492.06	4.78
67	-	-	-	-	-	-	-	-
68	-	-	-	-	-	-	-	-
69	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-
71	96,681.92	1,570.63	426.08	262.77	74,258.85	966.50	3,509.77	312.43
72	173,413.62	2,450.11	664.67	409.91	73,167.19	3,482.00	12,644.57	2,130.58
73	70,364.82	153.41	41.62	25.67	11,830.10	717.22	2,604.53	984.88
74	63,480.63	294.35	79.85	49.24	10,749.93	2,384.32	8,658.44	1,606.65
75	13,727.08	628.26	170.44	105.11	1,137.16	4,795.06	17,412.84	9,118.48
76	43,984.21	3,270.01	887.09	547.08	10,610.40	21,191.94	76,956.68	39,620.19
77	4,717.04	161.41	43.79	27.00	528.01	25,055.89	90,988.26	19,328.09
78	7,147.55	139.49	37.84	23.34	2,927.28	33,893.49	123,081.24	37,158.08
79	2,231.51	369.09	100.13	61.75	954.90	224.44	815.03	242.49
80	17,417.12	2,043.74	554.43	341.92	7,727.41	2,016.62	7,323.17	2,207.97
81	1,355.29	53.14	14.42	8.89	1,516.02	236.00	857.03	101.79
82	3,183.36	246.22	66.80	41.19	5,496.61	353.89	1,285.14	709.63
83	689,045.18	77,312.50	20,973.40	12,934.50	226,751.20	12,615.72	45,812.87	26,076.55
84	-	-	-	-	-	-	-	-
85	-	-	-	-	-	-	-	-
86	-	-	-	-	-	-	-	-
87	-	-	-	-	-	-	-	-
88	-	-	-	-	-	-	-	-
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90	-	-	-	-	-	-	-	-
91	-	-	-	-	-	-	-	-
92	-	-	-	-	-	-	-	-
93	-	-	-	-	-	-	-	-
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95	-	-	-	-	-	-	-	-
96	-	-	-	-	-	-	-	-
97	-	-	-	-	-	-	-	-
98	-	-	-	-	-	-	-	-
99	-	-	-	-	-	-	-	-
100	3,333,693.09	156,918.24	31,738.87	17,389.92	1,185,749.17	185,846.81	790,326.89	324,634.61

	17	18	19	20	21	22	23	24
1	-	-	-	-	-	-	1,169,324.3	-
2	-	-	-	-	-	-	-	162,682.3
3	-	-	-	-	-	-	-	-
4	-	-	-	-	-	-	-	-
5	-	-	-	-	-	-	-	-
6	-	-	-	-	-	-	-	-
7	-	-	-	-	-	-	-	-
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9	-	-	-	-	-	-	-	-
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20	-	-	-	-	-	-	-	-
21	-	-	-	-	-	-	-	-
22	-	-	-	-	-	-	-	-
23	-	-	0.07	331.51	46,027.86	1,085.72	-	-
24	2.51	-	-	-	-	-	-	-
25	61.08	-	-	-	-	-	-	-
26	-	-	-	-	-	-	-	-
27	-	2.33	-	-	1,162.46	-	-	-
28	2,189.46	391.29	233.48	879.63	10,231.10	7,362.49	-	-
29	7,391.46	13.46	1,050.32	245.57	323.98	1,415.69	-	-
30	3,195.58	4.71	126.93	104.30	90.84	723.28	-	-
31	16,593.95	2,970.44	12,893.84	3,956.25	107,362.74	21,280.62	-	-
32	1,672.19	2,514.96	1,418.83	1,352.08	1,410.26	2,604.63	-	-
33	680.89	158.30	14.06	189.74	21.88	9.66	-	-
34	261.03	90.59	28.14	108.22	315.22	614.20	-	-
35	6,096.45	4,403.13	1,641.88	15,685.19	3,474.03	855.24	-	-
36	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-
38	3,725.81	728.59	1,251.65	2,114.13	1,347.55	1,419.59	-	-
39	4,446.06	1,784.66	352.32	86.25	6,826.96	1,865.05	-	-
40	3,354.69	23,557.11	3,450.43	574.02	5,137.15	2,930.56	-	-
41	3,382.31	11,187.84	52,440.61	9,727.80	2,647.63	1,764.89	-	-
42	1,348.07	10,518.95	6,607.43	5,051.38	6,812.95	6,115.34	-	-
43	216.52	1,955.96	1,863.25	3,189.42	9,828.04	1,741.79	-	-
44	6,730.15	49,295.10	5,611.37	14,555.55	3,050.11	1,747.31	-	-
45	-	-	-	-	55.32	2.21	-	-
46	0.22	-	-	-	-	-	-	-
47	5.47	-	-	-	-	-	-	-
48	-	-	-	-	-	-	-	-
49	-	0.21	-	-	-	-	-	-
50	6,705.64	208.12	10.46	1,919.31	538.63	9,130.95	-	-
51	2,401.69	79.60	47.07	535.83	17.06	1,755.73	-	-
52	1,038.33	64.46	5.69	227.59	4.78	897.01	-	-
53	5,391.84	7,825.31	577.82	8,632.36	5,652.27	26,392.18	-	-
54	-	-	-	-	-	-	-	-
55	-	-	-	-	-	-	-	-
56	-	-	-	-	-	-	-	-
57	-	-	-	-	-	-	-	-

58	-	-	-	-	-	-	-	-
59	-	-	-	-	-	-	-	-
60	365.48	71.47	192.24	138.45	176.25	129.76	-	-
61	3,586.22	443.04	497.16	369.10	552.64	401.64	-	-
62	832.80	5,848.02	462.14	329.70	439.16	388.14	-	-
63	569.76	411.49	2,451.26	127.67	244.37	51.16	-	-
64	1,310.54	4,713.75	2,470.61	2,554.61	1,352.24	1,575.97	-	-
65	16.07	57.78	106.70	143.87	2,032.71	36.96	-	-
66	554.08	362.11	321.35	656.59	156.34	109.78	-	-
67	-	-	-	-	-	-	-	-
68	-	-	-	-	-	-	-	-
69	-	-	-	-	-	-	-	-
70	-	-	-	-	-	-	-	-
71	9,396.81	7,676.17	383.46	1,228.30	3,057.47	5,391.42	-	-
72	18,374.30	15,009.81	1,461.90	4,913.48	14,453.49	15,070.86	-	-
73	12,956.11	10,583.73	32.95	168.03	1,439.79	2,755.06	-	-
74	18,578.57	15,176.67	159.96	287.92	3,779.10	5,100.08	-	-
75	4,672.84	3,817.20	6,883.44	1,792.50	18,213.74	6,518.23	-	-
76	21,834.78	17,836.63	33,084.13	16,449.11	66,698.61	34,877.20	-	-
77	2,327.55	1,901.35	291.39	650.69	1,846.42	1,755.06	-	-
78	3,223.93	2,633.60	431.25	7,256.16	7,274.71	3,974.58	-	-
79	323.97	264.65	771.09	493.83	58,681.78	1,142.43	-	-
80	4,236.64	3,460.88	9,155.63	8,692.29	100,547.37	6,823.74	-	-
81	163.44	133.51	152.46	151.36	2,785.88	452.46	-	-
82	670.94	548.08	338.07	3,459.33	7,433.22	2,243.11	-	-
83	77,891.77	63,629.09	21,812.71	52,537.86	44,429.38	55,869.00	-	-
84	-	-	-	-	-	-	-	-
85	-	-	-	-	-	-	-	-
86	-	-	-	-	-	-	-	-
87	-	-	-	-	-	-	-	-
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96	-	-	-	-	-	-	251,493.41	1,877.09
97	-	-	-	-	-	-	29,290.35	1,090.34
98	-	-	-	-	-	-	12,357.92	5,422.71
99	-	-	-	-	-	-	-	-
100	368,778.0	272,334.13	271,085.53	271,866.97	547,933.48	236,380.81	1,462,466.0	171,072.48

	25	26	27	28	29	30	31	32
1	-	-	-	-	-	-	-	-
2	-	-	-	-	-	-	-	-
3	85,503.20	-	-	-	-	-	-	-
4	-	135,986.84	-	-	-	-	-	-
5	-	-	207,988.20	-	-	-	-	-
6	-	-	-	420,276.55	-	-	-	-
7	-	-	-	-	134,424.10	-	-	-
8	-	-	-	-	-	86,538.50	-	-
9	-	-	-	-	-	-	,073,403.79	-
10	-	-	-	-	-	-	-	104,235.84
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36	-	-	-	-	-	-	-	-
37	-	-	-	-	-	-	-	-
38	-	-	-	-	-	-	-	-
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96	2,155.92	1,847.18	8,101.45	72,932.52	22,755.00	14,688.19	465,814.78	-
97	1,252.30	1,072.96	4,705.86	15,338.26	4,785.55	3,089.04	97,964.36	-
98	3,068.38	533.60	16,297.62	1,006.77	6,349.18	1,284.68	75,874.89	1,841.69
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100	91,979.81	139,440.58	237,093.13	509,554.10	168,313.83	105,600.40	3,713,057.8	106,077.53

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98	18.86	489.65	23,986.63	6,029.38	27,634.11	12,464.63	15,315.91	4,980.47
99	-	-	-	-	-	-	-	-
100	9,113.09	9,300.09	1,243,975.54	187,596.08	811,526.66	337,099.24	384,410.20	275,691.42

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95	-	-	-	-	54,385.87	21,534.60	2,660.67	1,157.53
96	-	-	-	58.85	5,852.15	95.64	109.85	94.12
97	-	-	-	160.05	537.68	60.06	68.98	59.10
98	2,506.12	9,441.99	3,429.70	6,763.69	6,474.26	299.77	169.62	29.50
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100	270,696.10	295,933.47	496,717.10	86,239.82	67,249.96	21,990.07	33,009.12	1,340.24

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96	412.79	13,780.08	4,455.89	1,449.15	131,148.24	-	-	-
97	259.21	1,107.48	358.11	116.47	10,540.18	-	-	-
98	900.94	12,653.56	3,947.92	2,548.35	80,817.40	-	-	-
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100	6,887.28	39,027.15	81,198.42	18,770.64	1,088,147.35	-	-	-

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95	-	-	-	24,797.59	45,769.43	32,579.86	9,841.92	50,849.23
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100	-	-	-	24,797.59	45,769.43	32,579.86	9,841.92	50,849.23

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84	-	-	25,831.35	20,332.85	8,860.65	7,639.78	9,637.09	10,851.54
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86	-	-	20,563.10	-	23,787.85	-	43,363.58	-
87	-	-	11,699.74	-	33,569.24	-	20,363.61	-
88	-	-	15,511.52	-	83,547.35	-	17,695.94	-
89	-	-	-	3,052.13	-	4,564.47	-	269,647.56
90	-	-	-	1,344.27	-	3,857.17	-	65,414.09
91	-	-	-	8,307.80	-	7,365.36	-	30,565.05
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95	4,290.11	10,354.04	-	-	-	-	-	1,260.46
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97	-	0.52	-	-	-	-	-	-
98	-	0.00	-	-	-	-	-	-
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100	4,290.11	10,355.01	131,127.84	35,006.17	387,957.54	40,419.47	220,335.46	413,958.38

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84	997.93	350.93	2,694.66	11,979.44	1,078.15	2,002.09	641.14	2,331.54
85	37,141.19	3,651.93	5,002.59	41,935.80	15,348.24	4,957.01	4,823.14	22,458.49
86	18,691.31	-	30,741.51	-	84,078.06	-	5,957.94	-
87	27,270.38	-	3,692.76	-	4,782.69	-	9,836.41	-
88	47,946.63	-	50,155.11	-	45,160.03	-	8,922.31	-
89	-	69,722.80	-	19,442.17	-	35,269.34	-	8,787.88
90	-	4,345.90	-	58,849.58	-	24,109.33	-	11,182.24
91	-	42,192.20	-	01,275.72	-	60,188.62	-	44,902.61
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100	132,047.45	120,263.76	92,286.63	435,131.74	150,447.17	226,526.39	70,180.94	192,172.92

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23	-	-	-	44,315.45	147,275.50	02,009.48	28,194.90	64,383.73
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27	-	-	-	27.05	156.73	191.47	52.77	227.47
28	-	-	-	2,238.45	8,055.09	12,852.34	4,891.23	11,032.57
29	-	-	-	2,234.58	11,851.36	8,653.01	3,227.45	9,255.25
30	-	-	-	1,749.00	9,276.00	6,772.67	2,526.11	7,244.04
31	-	-	-	80,290.06	248,771.74	53,854.86	44,950.59	115,418.32
32	-	-	-	567.67	5,553.91	4,517.39	1,879.10	4,538.91
33	-	-	-	1.30	12.68	10.31	4.29	10.36
34	-	-	-	41.53	406.28	330.46	137.46	332.03
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38	-	-	-	3,522.75	35,073.59	24,750.93	13,902.49	31,899.72
39	-	-	-	5,248.69	29,347.96	19,186.97	6,287.80	16,840.23
40	-	-	-	405.27	11,504.98	8,257.15	1,744.49	9,632.01
41	-	-	-	338.29	9,496.60	6,631.57	1,167.13	8,854.44
42	-	-	-	3,593.71	12,802.26	15,860.82	2,689.62	11,077.76
43	-	-	-	18,876.97	51,310.90	42,060.11	14,138.14	21,060.98
44	-	-	-	3,921.47	16,717.22	15,698.96	3,524.78	11,847.39
45	-	-	-	409.47	3,055.24	1,062.39	1,731.99	2,716.51
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50	-	-	-	331.72	2,137.65	652.30	596.27	1,321.96
51	-	-	-	20.97	135.16	41.25	37.70	83.59
52	-	-	-	110.43	711.63	217.15	198.50	440.09
53	-	-	-	9,169.98	59,092.02	18,031.90	16,483.02	36,543.45

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60	-	-	-	80.71	1,801.15	647.86	1,536.25	2,598.64
61	-	-	-	158.71	3,265.25	809.25	1,404.70	2,625.08
62	-	-	-	95.49	2,749.28	617.18	1,105.79	2,149.46
63	-	-	-	7.19	100.11	66.31	134.09	265.81
64	-	-	-	17.14	493.41	110.76	198.45	385.76
65	-	-	-	200.02	684.30	488.82	750.22	1,420.75
66	-	-	-	49.92	649.67	454.02	227.48	795.13
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84	157.03	20.28	11,397.23	190.27	1,182.64	837.59	27.40	1,182.56
85	2,159.18	776.89	132,332.16	140.87	773.56	492.89	26.81	780.03
86	6,511.52	-	91,317.66	140.84	611.30	573.84	40.86	836.96
87	459.48	-	36,819.53	98.75	495.23	311.49	26.96	475.18
88	3,724.81	-	141,625.00	19.56	84.50	52.38	9.21	141.14
89	-	7,204.38	130,554.07	167.85	977.31	411.62	68.63	863.15
90	-	1,547.51	52,785.03	56.20	258.68	167.76	19.40	250.14
91	-	23,902.01	191,719.25	15.99	73.20	55.62	10.83	80.28
92	-	-	,591,198.03	739.91	8,343.98	3,370.35	1,539.44	6,168.65
93	-	-	-	3,796.10	11,953.62	9,486.90	3,069.67	13,760.48
94	-	-	-	9,232.73	61,623.79	25,986.69	9,647.61	56,251.78
95	-	-	91,226.99	136.19	2,857.86	1,978.76	649.76	2,327.20
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100	13,012.01	33,451.07	2,470,974.96	192,759.25	761,723.33	488,563.58	168,859.40	458,118.96

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7	-	-	-	-	-	-
8	-	-	-	-	-	-
9	-	-	-	-	-	-
10	-	-	-	-	-	-
11	-	-	-	-	-	-
12	-	-	-	-	-	-
13	-	-	-	-	-	-
14	-	-	-	-	-	-
15	-	-	-	-	-	-
16	-	-	-	-	-	-
17	-	-	-	-	-	-
18	-	-	-	-	-	-
19	-	-	-	-	-	-
20	-	-	-	-	-	-
21	-	-	-	-	-	-
22	-	-	-	-	-	-
23	13,858.32	36,139.41	90,938.37	-	49.49	(21,121.55)
24	-	-	-	-	-	6,297.81
25	-	-	-	-	-	61,777.15
26	-	-	-	-	-	7.74
27	261.97	53.78	341.72	-	-	(89.46)
28	14,419.81	6,182.88	13,888.36	-	1,135.18	(1,899.27)
29	17,610.13	6,186.59	20,284.72	-	-	372.96
30	13,783.37	4,842.21	15,876.75	-	-	1,999.44
31	16,571.75	68,386.79	193,971.71	-	25,521.72	104,531.78
32	7,378.33	1,843.73	10,031.78	-	-	-
33	16.84	4.21	22.90	-	-	-
34	539.74	134.87	733.84	-	2,845.48	-
35	-	-	-	-	17,135.07	1,144,105.97
36	-	-	-	-	-	-
37	-	-	-	-	-	-
38	54,780.59	16,383.79	54,421.90	-	15,996.76	-
39	26,341.01	7,507.99	27,153.26	-	11,060.44	-
40	11,715.11	3,372.94	15,316.33	-	4,168.58	-
41	9,642.45	1,771.28	16,162.23	-	5,898.94	-
42	26,373.09	5,023.69	21,814.89	-	2,574.94	2,445.99
43	61,299.16	10,516.03	46,055.58	-	176,515.16	1,803.51
44	26,162.41	5,711.90	30,697.41	-	15,430.48	13,907.40
45	1,340.70	2,150.05	4,899.40	-	-	4,381.23
46	-	-	-	-	-	390.42
47	-	-	-	-	-	3,829.76
48	-	-	-	-	-	0.48
49	-	-	-	-	-	-
50	751.28	873.56	2,406.92	-	295.49	6,334.14
51	47.50	55.24	152.19	-	18.68	400.51
52	250.10	290.81	801.27	-	98.37	2,108.66
53	20,767.93	24,148.24	66,535.41	-	8,168.26	175,097.25

54	-	-	-	-	-	-
55	-	-	-	-	-	-
56	-	-	-	-	-	-
57	-	-	-	-	-	-
58	-	-	-	-	-	-
59	-	-	-	-	-	-
60	1,539.08	2,290.86	4,911.97	-	901.04	-
61	1,068.67	1,911.69	5,406.78	-	2,159.54	-
62	855.40	1,496.03	4,418.61	-	2,054.51	-
63	99.38	184.76	570.96	-	695.09	-
64	153.52	268.49	793.00	-	1,540.02	-
65	599.95	1,681.18	3,991.55	-	1,347.49	233.25
66	469.00	375.73	1,703.54	-	198.13	1,798.65
67	-	-	-	-	-	-
68	-	-	-	-	-	-
69	-	-	-	-	-	-
70	-	-	-	-	-	-
71	-	-	-	-	-	-
72	-	-	-	-	-	-
73	-	-	-	-	-	-
74	-	-	-	-	-	-
75	-	-	-	-	-	-
76	-	-	-	-	-	-
77	-	-	-	-	-	-
78	-	-	-	-	-	-
79	-	-	-	-	-	-
80	-	-	-	-	-	-
81	-	-	-	-	-	-
82	-	-	-	-	-	-
83	-	-	-	-	-	-
84	3,118.57	163.35	5,273.39	1,654.92	42,495.54	-
85	1,827.71	182.66	2,787.13	4,755.34	52,014.65	-
86	2,249.91	196.18	3,743.35	3,197.98	42,276.92	-
87	1,118.33	99.52	1,762.69	785.42	13,987.98	-
88	196.21	26.18	202.78	7,724.00	3,370.71	-
89	849.93	268.54	3,817.94	9,397.35	30,009.74	-
90	635.63	27.28	1,210.00	3,951.74	11,555.36	-
91	173.01	34.32	370.48	11,618.23	3,323.02	-
92	6,177.43	1,752.63	7,071.99	176,469.94	89,692.45	-
93	18,517.46	5,850.93	18,638.33	650,052.59	181,676.37	-
94	37,994.53	20,056.51	104,650.46	990,597.28	229,473.13	-
95	4,137.81	1,479.33	5,726.38	56,496.89	28,699.72	36,683.94
96	-	-	-	-	-	-
97	-	-	-	-	-	-
98	-	-	-	-	-	-
99	-	-	-	-	240,891.47	-
100	705,693.12	239,926.15	809,558.28	1,916,701.70	1,265,275.90	1,545,397.76

	95	96	97	98	99	100
1	-	-	-	-	985.25	1,170,309.58
2	-	-	-	-	-	162,682.34
3	-	-	-	-	-	185,503.20
4	-	-	-	-	-	135,986.84
5	-	-	-	-	-	207,988.20
6	-	-	-	-	-	420,276.55
7	-	-	-	-	-	134,424.10
8	-	-	-	-	-	86,538.50
9	-	-	-	-	113,081.10	3,186,484.89
10	-	-	-	-	83,906.51	188,142.35
11	-	-	-	-	-	9,094.23
12	-	-	-	-	-	8,810.44
13	-	-	-	-	-	1,219,988.91
14	-	-	-	-	-	181,566.70
15	-	-	-	-	-	783,892.55
16	-	-	-	-	-	324,634.61
17	-	-	-	-	688.42	369,782.71
18	-	-	-	-	1,000.00	271,710.96
19	-	-	-	-	-	268,189.98
20	-	-	-	-	-	286,491.48
21	-	-	-	-	40.70	493,328.10
22	-	-	-	-	-	279,257.24
23	28,870.93	-	-	-	-	1,462,084.47
24	306,817.00	-	-	-	-	336,117.31
25	,009,660.00	-	-	-	-	3,191,533.75
26	377.00	-	-	-	-	120,095.48
27	-	-	-	-	-	159,525.67
28	146,320.42	-	-	-	-	499,393.70
29	22,136.41	-	-	-	-	158,643.65
30	2,505.37	-	-	-	-	125,206.41
31	898,676.60	-	-	-	-	3,713,282.39
32	-	-	-	-	-	97,318.51
33	-	-	-	-	-	12,109.66
34	-	-	-	-	-	15,062.53
35	-	-	-	-	-	1,243,975.54
36	-	178,950.39	-	-	-	178,950.39
37	-	820,172.36	-	-	-	820,172.36
38	39,331.80	-	-	-	-	337,099.24
39	33,267.51	-	149,509.20	-	-	449,141.60
40	26,699.50	-	22,347.66	-	-	210,960.02
41	3,776.96	-	-	-	-	258,659.24
42	13,954.04	-	-	-	-	268,720.43
43	21,556.35	-	-	-	-	496,717.10
44	974.16	-	-	-	-	279,909.38
45	-	-	-	-	-	67,249.96
46	-	-	-	-	-	6,987.00
47	-	-	-	-	-	58,629.04
48	-	-	-	-	-	46,682.93
49	-	-	-	-	-	30,811.00
50	-	-	-	-	-	103,364.04
51	-	-	-	-	-	25,868.05
52	-	-	-	-	-	34,076.68
53	-	-	-	-	41,189.50	1,075,045.70

54	-	-	-	-	-	-
55	-	-	-	-	-	-
56	-	-	-	-	-	-
57	-	-	-	-	-	-
58	-	-	-	-	-	-
59	-	-	-	-	-	-
60	-	-	-	-	-	25,273.33
61	-	-	-	-	-	43,078.61
62	-	-	-	-	-	36,262.83
63	-	-	-	-	-	10,292.43
64	-	-	-	-	-	59,628.97
65	-	-	-	-	-	14,290.11
66	-	-	-	-	-	10,501.01
67	-	-	-	-	-	131,127.84
68	-	-	-	-	-	35,006.17
69	-	-	-	-	-	387,957.54
70	-	-	-	-	-	40,419.47
71	-	-	-	-	-	321,046.64
72	386.76	-	-	-	-	459,856.55
73	-	-	-	-	-	239,908.04
74	-	-	-	-	-	196,318.97
75	-	-	-	-	-	97,837.68
76	673.98	-	-	-	-	414,945.25
77	-	-	-	-	-	159,803.55
78	-	-	-	-	-	234,998.83
79	-	-	-	-	-	73,884.72
80	646.45	-	-	-	-	184,375.07
81	-	-	-	-	-	26,266.22
82	-	-	-	-	-	29,323.13
83	6,657.51	-	-	-	-	2,132,224.22
84	3,826.77	-	-	-	-	176,756.68
85	17,023.29	-	-	-	-	731,562.84
86	15,353.55	-	-	-	-	494,234.22
87	5,496.46	-	-	-	-	173,151.87
88	2,339.13	-	-	-	-	468,454.52
89	15,418.61	-	-	-	-	710,495.47
90	2,338.17	-	-	-	-	243,905.49
91	1,709.89	-	-	-	-	827,883.49
92	24,176.91	-	-	-	-	1,916,701.70
93	2,291.08	-	-	344,939.89	-	1,264,033.40
94	-	-	-	-	-	1,545,514.51
95	-	-	-	-	-	4,653,262.62
96	-	-	-	-	-	999,122.75
97	-	-	-	-	-	171,856.86
98	-	-	-	-	-	344,939.89
99	-	-	-	-	-	240,891.47
100	4,653,262.62	999,122.75	171,856.86	344,939.89	240,891.47	43,518,186.44