A growing pain: an experimental approach to discover the most acceptable strategy for lifting fuel subsidy scheme in Indonesia

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3 March 2012

A Growing Pain: an Experimental Approach to Discover the Most Acceptable Strategy for Lifting Fuel Subsidy Scheme in Indonesia[1]

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Abstract

Fuel subsidy has been the biggest quandaries in Indonesian economy, as it has been creating a huge opportunity costs to the economy. The subsidy is implemented to a consumer good (i.e. fuels) as oppose to targeted recipients, creating distortion in the efficient resource allocation. It was estimated about 70% of the subsidy were received by 40% of top income households (World Bank, 2007). Although the budget plan for the subsidy in 2011 was Rp129.7 trillion or 10% of the GoI annual budget, the actual subsidy was Rp160.7 trillion (13.3% of the GoI annual budget).

Indeed, no individual prefers to lose the subsidy that has been received for many years, however the Government of Indonesia (GoI) cannot maintain the subsidy policy on fuel price any longer without creating extra budgetary burden. This study use experimental approach to seek the most acceptable exit strategy of eliminating fuel subsidy scheme in Indonesia based on households' perspective. 335 subjects participated in the experiment, ranging from those who do not own motor vehicle, those who have motor cycle(s) and those who have car(s). During the experiment, subjects were given several pair-wise choices and chose the most acceptable policy from each pair-wise policy choices. The results show that the combination of gradual elimination and earmarked reallocation scheme were the most desirable. Subject with very low and low-income background tend to be more receptive for sudden elimination of the subsidy in comparison to their counterpart from medium and high-income backgrounds.

Key Word: Fuel subsidy, experimental economics, analytical hierarchy process (AHP), preference relation, reallocation of resources.

JEL Classifications: **C91, D03, D12, Q48**

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1. Introduction

Subsidy has been used as a method to internalize positive externalities in the market for a particular good. Ideally, the subsidy is distributed to targeted households. In reality, however, subsidy may be given to a particular goods and can be accessed equally by both poor and wealthy households. In the context of consumer's welfare, subsidy to private goods creates inefficiency. Subsidy drives consumers to purchase a good cheaper than the cost of producing it (Rosen, 2010). Consequently, the subsidy to consumer goods may distort income distribution as those who consumed the goods more received more benefits of the subsidy. Obviously those who can consume more consumer goods are those who are affluent.

Indonesia and Nigeria have been implementing subsidy scheme to fuel consumption. Both countries are oil producers, although since 2005 Indonesia has become net importer. Both countries also face similar problems in phasing out the fuel subsidy. The matter is no longer an economic policy issues but has extended to socio-economic policy issues (Adenikinju, 2008).

Empirical study regarding this issue attempted to analyze the relationship between demand of fuel and the subsidy factor i.e. the amount of subsidy for each unit of fuel. The study shows that increase in the amount of subsidy increases the demand of fuel (Nwachukwu and Chike, 2011). The result suggests that the effect of subsidy significantly affect the behavior of the consumers.

Indeed the fuel subsidy in both countries have created burden to their economy, however, any attempt to eliminate the subsidy will be a complicated agenda. Supposedly their government eliminate the fuel subsidy, households with very-low income background may not necessarily perceive elimination of fuel subsidy as a loss since they do not actually consume fuel. On the other hand, medium and high income households are going to experience loss since they consume subsidized fuel on a routine basis. This group of households may already have internalized the subsidy into their daily expenditure plan. Hence, there is a possibility that this group will give greater response to this loss relative

to the other group of households. Status quo[4] and endowment effect[5] bias may be used to explain this phenomenon.
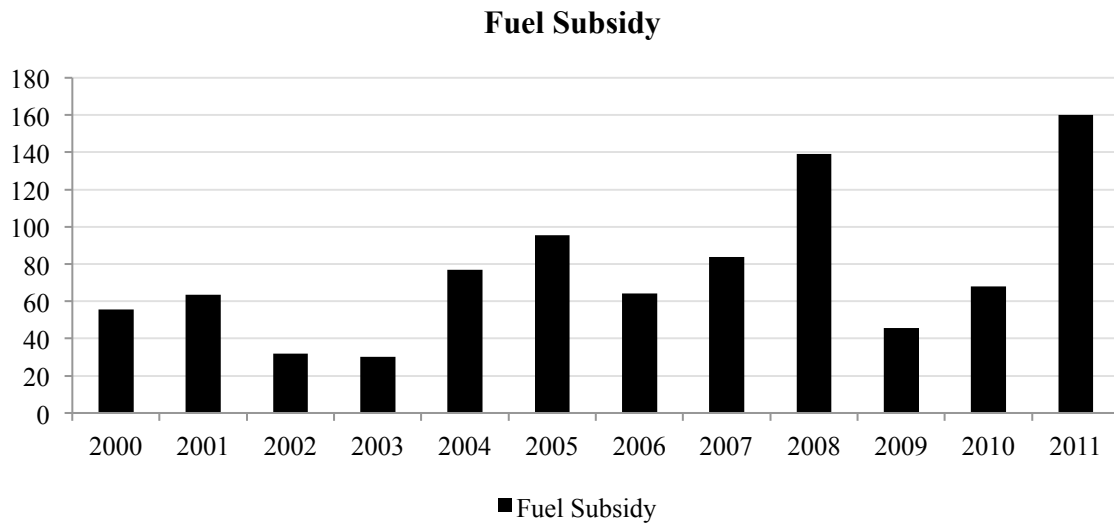
Fuel Subsidy

Figure 1. Fuel subsidy in Indonesia, 2000-2010.

Source: Ministry of Energy and Mineral Resources (2010) and Ministry of Finance (2011).

Subsidized fuels, which include premium with RON 88,[6] automotive diesel oil (ADO), and kerosene, are one of the biggest burden for the Indonesian economy.[7] Fuel consumption is one of the highest—if not the highest—subsidized scheme in Indonesia. Figure 1 shows that the amount of fuel subsidy in Indonesia has been showing an increasing trend during the last decade. Fuel subsidy in year 2010 budget plan accounted for Rp58.9 trillion (US$6.93 billion), roughly fifteen-fold of budget plan for natural resources conservation, four-fold of spending for health-related programs, and nearly twice of budget plan for elementary education system (The Ministry of Finance, 2010). The Government of Indonesia (GoI) allocated 36.5 million kiloliter (or 36.5 billion liter) of subsidized fuel in 2010 (Ministry of Energy and Mineral Resources, 2010).[8]

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[4] Samuelson and Zeckhauser (1988), Kahneman et al (1991).
[5] Thaler (1980), Kahneman et al (1990, 1991).
[6] RON refers to Research Octane Number. The higher the octane number, the more efficient the engine operates. Therefore, higher octane number corresponds to lower emissions.
[7] The government has gradually cut the subsidy for kerosene and expects to fully eliminate the subsidy by 2011.
[8] MEMR, henceforth.

The fuel subsidy has been imposing burden both to the GoI as well as households. For the GoI, the policy to subsidize fuel consumption has been a poor policy tool for assisting the poor but a crowd pleaser for the wealthy. The subsidy is implemented to a consumer good (i.e. fuels) as oppose to targeted recipients or households, creating distortion in resource allocation. These subsidized fuels are available at retail gasoline outlets where both the wealthy and the poor have equal access to purchase the fuels (IEA, 2008). Consequently, those who own more cars and motorcycles (i.e. mid and high-income households) have been receiving more subsidies in comparison to those who do not own or own limited number of cars and motorcycles (i.e. poor and low-income households).

The GoI always fulfills the demand of fuel at subsidized price at all costs, since the policy has been implemented since President Suharto's era. It may not be surprising if the burden of the fuel subsidy increase every year since the increase of the subsidy may be triggered by either increasing demand in fuel consumption, an increase in international crude oil price (ICP), or both. The demand of the fuel consumption may be driven by economic growth, however, it may also be driven by an increase in the activities of smuggling fuel since the price of subsidized fuel in Indonesia is the lowest in South East Asia.
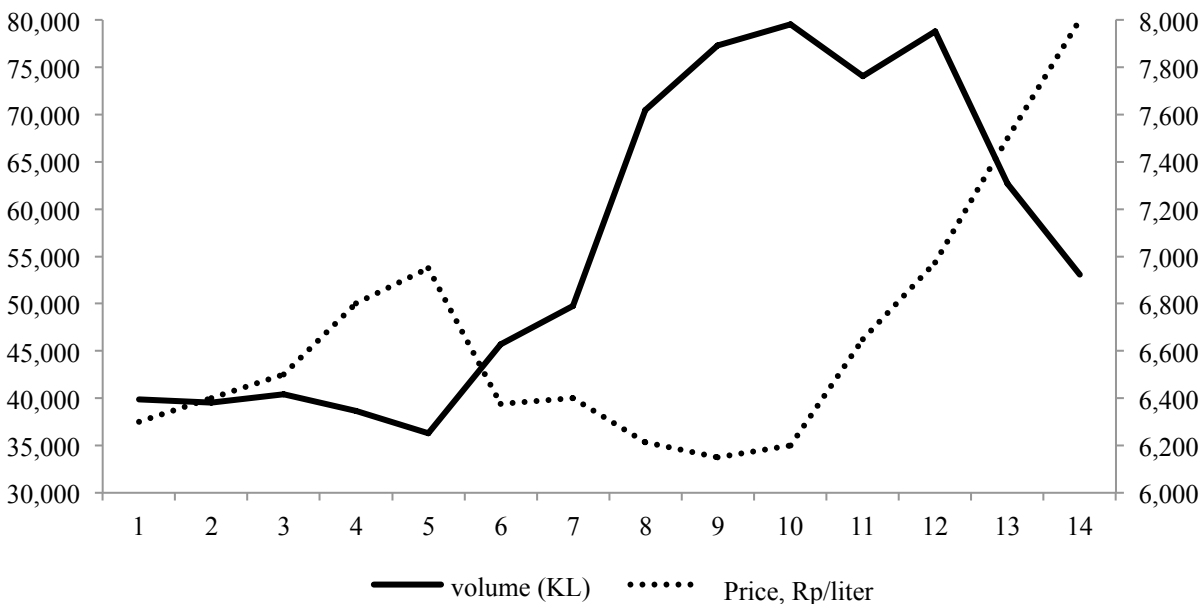

Figure 2. Sales volume of nonsubsidized fuel and its retail price, 2010-11.

Source: Ministry of Energy and Mineral Resources (2010)

Coordinating Ministry for Economic Affairs of Indonesia (2008) reported that the wealthiest 40% of households enjoyed 70% of the subsidies while the bottom 40% of low-income households benefit from only 15% of the subsidies.[9] Recent report from World Bank (2011) showed a more alarming figure. They reported that 50% of the wealthy households consumed a hefty 84% of subsidized fuel with the top 10% consuming 40% of total subsidy. The bottom 10%, on the other hand, consumed less than 1% of total subsidy. Further analysis suggests that two-third of poor households do not consume fuel at all.

Since the fuel subsidy has been implemented to commodity (i.e. fuel) as opposed to households, the impacts of the subsidy are as follows:

1. The middle and high-income households tend to use personal vehicles excessively since the operating cost, due to the subsidy, is relatively low for them. There is also a concern that the fuel consumption pattern of these classes of households became illusionized, as they are not aware that they are being subsidized. As for low income and poor households, they receive less benefit from the subsidy as it is not a targeted policy.

2. The ever-increasing fuel subsidy produces budgetary pressures to the GoI. It hinders the GoI ability to finance other programs, for instance poverty alleviation programs, credits for small and micro enterprises, and provision of infrastructure (Beaton and Lontoh, 2010). The fuel subsidy scheme creates constraints for the GoI to implement expansion of more strategic and established programs which target the poors, such as PNPM (Community Empowerment Based Poverty Reduction Program), PIN (National Vaccination Program), KUR (Credit for Small Enterprise, Raskin Rice for the Poor Family), Askeskin (Health Insurance for the Poor), and BOS (School Operating Grants).[10] Coordinating Ministry for People's Welfare (2008) reported that Rp3.6 trillion (US$423.5 million)[11] allocation of national budget for PNPM was able to reach 31.92 million poor people and created 12.5-14.4 million employment opportunities.

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[9] Granado, Coady, and Gillingham (2010) reported that there were evidences of fuel subsidies in developing countries including Indonesia also find similar pattern. They suggest that, on average, top income quintile receives about six times more in subsidies than the bottom quintile. Subsidy benefits to the top income groups is even more stark in the case of gasoline; top income quintile receives, on average, 20 times than that of the bottom quintile, respectively.

[10] These programs are strategic since they have indeed targeted poor people.

[11] It is accounted for about 6.1% of the fuel subsidy in 2010.

3. The fuel subsidy could have been reallocated to alternative source of energy, for instance gas, solar cell and also geo thermal and related technology which support the use of the alternative energy.

4. The fuel subsidy could have been reallocated to non-energy subsidies such as food, vaccines, fertilizer, and public service obligation (PSO). Fuel subsidy could have also been reallocated to improve DAK (*Dana Alokasi Khusus* or Specific Allocation Fund) which is a transfer of fund from central to regional governments to supplement the provision of physical facilities and infrastructure. These provisions aim to decrease imbalances among regions.[12]

In spite of facing extra budgetary burden due to sharp increase in oil price, the GoI is still reluctant to increase price of subsidized fuel. There have been many arguments for and against the plan to increase the price of subsidized fuel and to eventually eliminate the scheme. The arguments for the plan are based on the fact that the GoI has been facing tremendous budgetary pressure due to fluctuations in international oil price. The arguments against the plan are based on the adverse impact of the plan to the welfare of low-income households.[13] Unfortunately, little attempt has been made to make an inquiry to low-income households about their preferences on the alternative policies to tackle budgetary burden due to a sharp increase in international oil prices.

Indeed, no individuals or households prefer to lose the subsidy that have been received, although indirectly, for many years. On the other hand, Indonesia cannot sustain to keep the current policy on fuel price without creating extra budgetary burden. Therefore, several exit strategies of eliminating fuel subsidy scheme should be formulated based on acceptability rather on the basis of popularity.

This study aims to seek the most acceptable exit strategy for eliminating fuel subsidy scheme in Indonesia based on households' perspective. It is envisaged that the results of this study may be used as guidance to develop a larger-scale research project regarding elimination of the fuel subsidy scheme. The results will also be useful as a recommendation for policy makers to choose the most preferable policy in eliminating fuel subsidy scheme. The research aims to answer the following question: what are the

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[12] Non-energy subsidy and DAK accounted for Rp44.9 trillion (US\$5.2 billion) and Rp20.5 trillion (US\$2.4 billion) in 2010 respectively (Ministry of Finance, 2010).

[13] Indonesia has experience regarding formulation of exit strategy from particular subsidy. Indonesia gradually eliminated subsidy on kerosene from 2008. Kerosene was widely used and became essential part of low-income households. Nowadays, households have been using gas in replace of kerosene.

preferences of the subjects regarding the most acceptable exit strategy for eliminating fuel subsidy scheme?

2. Fuel Subsidy in Indonesia

There are two types of fuel in Indonesia, which are the nonsubsidized and subsidized fuels. Non-subsidized fuels include *Pertamax* with RON 92 and *Pertamax Plus* with RON 95. These types of fuel are intended for new generations of cars, which require fuel with higher-octane count. Pertamina, an Indonesian state-own enterprise which produce fuel in Indonesia, as well as multinational firms such as Shell, Petronas, Total, and British Petroleum, retail nonsubsidized fuel in Indonesia. Mid-Oil Platt Singapore (MOPS) plus tax, retail margin determine the price of this type of fuel, and distribution cost.

Subsidized fuels in Indonesia include *Premium* with RON 88 and *Solar* (Automotive Diesel Oil). *Premium* and *solar* accounted for two-third of total daily retail of fuel in Indonesia. Subsidized fuel in Indonesia is one of the cheapest in the world, accounting for approximately 30% of the world market price. The GoI always fulfills the demand of subsidized fuel, even if the consumption of fuel and international crude price (ICP) has increased substantially. This obligation is due to Article 8 Verse 1 in Laws Number 22 of Year 2001, which states that the GoI must guarantee the provision and the distribution of gasoline. The implication of this obligation can be analyzed through the calculation of fuel subsidy given below (MEMR, 2010).

$$\textit{Fuel Subsidy = Quantity x (reference price – selling price)} \qquad (1)$$

The quantity refers to the amount of subsidized fuel that is distributed out of Pertamina, Indonesia's state-owned oil company. The selling price for both subsidized fuels is pegged at Rp4,500 per liter (Figure 3). The formula for determining the reference price is,

$$\textit{Reference price = [Y x price index of gasoline + (1-Y) x price index of biofuel] + α} \qquad (2)$$

where *Y* indicates fraction of gasoline volume and *α* indicates cost of distribution plus margin. The reference price reflects the market price for every liter of gasoline and it varies according to the Mid Oil Platt Singapore (MOPS). Assuming constant *α*, fuel subsidy will continue to increase with the quantity of fuel distributed by Pertamina, as a

response to increase in consumption, and with the ICP reflected by the MOPS. In practice, MOPS is attainable only by the government. Therefore, the price of non-subsidized fuel or Pertamax is commonly used as the reference price to determine the subsidy per liter (Figure 3).

Retail gasoline outlets, especially those in cities of Java, Bali, and Sumatera, already market nonsubsidized fuels such as Pertamax with RON 92 and Pertamax Plus with RON 95. These fuels are intended for middle and high-income households who own certain types of cars, which require fuel with higher RON. These classes of households, however, still tend to buy subsidized fuel if their cars are suitable to use Premium with lower RON. There is a tendency that those who buy nonsubsidized fuel will switch to subsidized fuel if the price of nonsubsidized fuel exceeds certain threshold (Figure 2). These behaviors are rational since the price of subsidized fuels is about half of the nonsubsidized and there is no legal restriction in buying the nonsubsidized fuels. Premium-class taxi companies, which operate luxurious cars that ideally use Pertamax, decided to alter a particular element of the car in order to be able to use Premium.
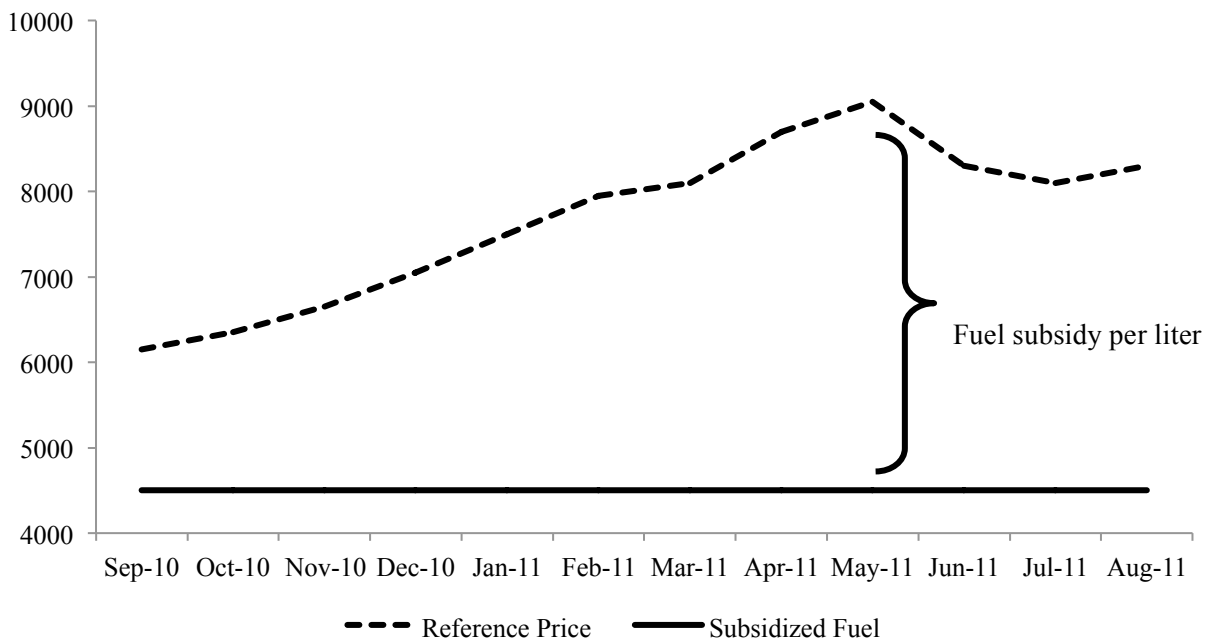

Figure 3. Illustration of fuel subsidy per liter, 2010-11.
Source: Ministry of Energy and Mineral Resources (2010).

Table 1. Subsidy expenditure in Indonesia, 2005-2012

Subsidy Expenditure	2005	2006	2007	2008	2009	2010	2011	2012
Energy								
Fuel subsidy (A)	95.6	64.2	83.8	139.1	45	82.4	129.7	123.6
Electricity	8.9	30.4	33.1	83.9	49.5	57.6	65.6	45
Total Energy (1)	**104.5**	**94.6**	**116.9**	**223**	**94.5**	**140**	**195.3**	**168.6**
Non-energy								
Food	6.4	5.3	6.6	12.1	13	15.2	15.3	15.6
Fertilizer	2.5	3.2	6.3	15.2	18.3	18.4	18.8	16.9
Plant seed	0.1	0.1	0.5	1	1.6	2.2	0.1	0.3
Public Service Obligation	0.9	1.8	1	1.7	1.3	1.4	1.8	2
Credit assistance	0.1	0.3	0.3	0.9	1.1	0.8	1.9	1.2
Tax subsidy	6.2	1.9	17.1	21	8.2	14.8	4	4.2
Other subsidy	0	0.3	1.5	0.3	0	0	0	0
Total Non-Energy (2)	**16.2**	**12.9**	**33.3**	**52.2**	**43.5**	**52.8**	**41.9**	**40.2**
Total Subsidy Expenditure (3=1+2)	120.7	107.5	150.2	275.2	138	192.8	237.2	208.8
Ratio (%) Fuel Subsidy/Total Subsidy (=A/3)	79.2	59.7	55.8	50.5	32.6	42.7	54.7	59.2

Source: Coordinating Ministry of the Economy and Bank Indonesia, 2011.

The consequence of the fuel subsidy policy is the GoI's budgetary burden. Table 1 shows that fuel subsidy expenditure has been continously increasing and in 2011 passed the Rp100 trillion mark. The fuel subsidy expenditure has been dominating the total subsidy expenditure. Fuel subsidy accounted for at least 54% of total subsidy in 2011, way higher than strategic non-energy subsidy such as food, fertilizer, and plant seed, and credit assistance. The realization of fuel subsidy expenditure has been exceeding the approved number in GoI annual budget at least in the last 2 years. For example, the realization of fuel subsidy in 2011 accounted for Rp160 trillion, 23.4% higher than the approved number of Rp129.7 trillion. The fuel subsidy expenditure also prone to increase in ICP such as those evidenced during 2005 and 2008.

3. Roadmap to Phase Out Fuel Subsidy in Indonesia

Continuous increase in ICP since 2003 drove the expenditure for fuel subsidy to increase by US$8 billion in 2004. The GoI, under President Susilo Bambang Yudhoyono, decided to decrease the fuel subsidy twice in 2005. The GoI increased the price of subsidized fuel

by 29% in March 2005 from Rp1,810 per liter to Rp2,400 per liter. In the following October, the GoI adjusted the price by 114% to Rp4,500 per liter. World Bank (2007) recorded that the GoI saved US$4.5 billion and US$10 billion of budget deficit in 2005 and 2006 respectively.

The peak of ICP was evidenced in 2008, which accounted for US$147.3 per barrel. The GoI expenditure for subsidy inflated to US$17.6 billion from the estimated US$5 billion since the GoI set the ICP to US$95 per barrel in the budget assumption (Dillon, Laan, & Dillon, 2008). The GoI, again, opted to increase the price of subsidized fuel to Rp6,000/liter in May 2012. This was deemed as the perfect momentum to phase out, if not to completely eliminate, the fuel subsidy.

Unfortunately, owing to an attempt to gain support in general election by the ruling party, the GoI came to a decision to decrease the price of subsidized fuel from Rp6000 per liter to Rp5,500 per liter in December 1st 2008 and to Rp5,000 per liter in December 15th 2008. Just as the oil price went to square one in 2009, the GoI decided to reduced the subsidized fuel back to its original price Rp4500. This policy was driven primarily to gain support for the ruling party prior to the general election. The policy has been financed by the GoI's record of a budget surplus owing to decrease in subsidy and increase in oil revenue during the time. By the end of 2010, the ICP price increased sharply imposing pressure to the GoI to propose implementation of fuel rationing. The plan was to implement closed distribution scheme, in which only targeted individuals allowed to purchase subsidized fuels, starting in 2011. The plan, however, did not materialize.

As the oil price had increased sharply in the end of 2010 until the first semester of 2011, the price for non-subsidized fuel is about Rp8500/liter. This implies that the price of non-subsidized fuel is about two fold of that of the subsidized one. There is an interesting consumers' behavior worthy to note. About 10% of nonsubsidized fuel consumers switched back to consume subsidized fuel when the price differences between two types of fuel exceed Rp3,000/liter in February 2011.

The Ministry of Energy and Mineral Resources had established a roadmap to phase out fuel subsidy in 2008 as an attempt to reduce the budgetary burden of the GoI. Research

consortium of three state universities (i.e. Universitas Indonesia (UI), Institut Teknologi Bandung (ITB) and Universitas Gadjah Mada (UGM)) also suggests the optimal strategy to phase out the subsidy, as mandated by the Law Number 10, 2010. The GoI, as expected by many, opted to keep the price of subsidized fuel at the current level mostly due to political pressures.

3.   Experimental Design

This study used experimental method to seek the most acceptable policy, from households' perspective, in order to eliminate the fuel subsidy. The experiment involved 335 subjects who come from households with different characteristics. No student was allowed to participate in the experiment since their behaviour may not represent the behaviour of households. It should be noted that the majority of students in Indonesia are fully funded by their parents, thus their consumption decisions are different from households. The classification of the subjects is given as follows:

1. Households who do not possess motorcycle or car. This group represents households with the very-low income background.
2. Households who only posses motorcycle. This group represents households with low-income background.
3. Households who posses low-budget MPV e.g. Toyota Avanza or Nissan Livina. This group represents households with medium income background.
4. Households who posses cars, which price is twice of those in the third sample group. This group represents households with high-income background.

This classification aims to represent the different types of households with regard to the subsidy policy. Several demographic variables, such as income, gender, age, occupation, educational attainment, and marital status from these subjects are going to be observed from the subjects.

The experiment consists of three sessions. In the first session, subjects faced 10 questions of a pair-wise choices. The subjects to determine which one is more acceptable than the others. The questions were formulated from five alternative scenarios of eliminating the fuel subsidy and reallocating the resources saved from the subsidy. Each pair-wise choice includes hypothetical policy schemes that would have been implemented by the government in eliminating fuel subsidy. Hypothetical policy schemes were formulated

based on interview reports with the relevant stakeholders. It should be noted that each pair-wise choice contains different information.

In session 2, a similar method was used to ask 45 pair-wise choices which were formulated from 10 different alternative policy scenarios. Those five policy scenarios which were already asked in session 1 were included in session 2. The strategy to repeat some questions in two sessions aims to check the consistency of choices made by the subjects.

The third session of the experiment had been designed to provide compensation for the subjects. In this session, 32 pair-wise choices of risky prospects were asked and subjects should choose their preferences toward the prospects. This paper focuses on the analyses of households' preferences toward various methods of elimination of fuel subsidy. Therefore, the analysis is limited only on the results from sessions 1 and 2, whereas the results from session 3 will not be discussed in this article.

The experiment was conducted in 10 different sessions, each ran for about 60-75 minutes. The experiment procedure is shown in Figure 4. The experiment was conducted in the computer laboratory in Faculty of Economics and Business Universitas Gadjah Mada. The laboratory consists of three rooms comprising a total of 125 computers, although during the experiment only two rooms could be used because the other room was used for other activities. Experimenter played powerpoint with audio presentation regarding details of the experiment, including explanations for each session. The powerpoint and audio presentation also include the prologue regarding fuel subsidy, children vaccination, mass rapid transportation, and foreign debt. Experimenter offered time for questions and answers before the experiment commence.
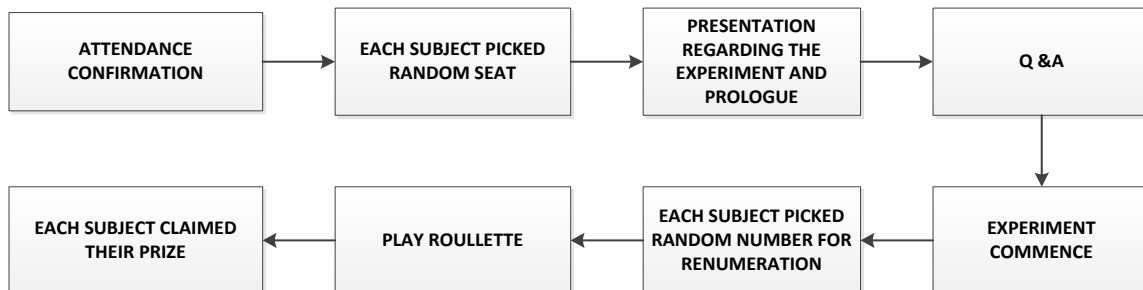

Figure 4. Experiment procedure

After finishing all three sessions of the experiment, subjects reported to the experimenter to select a random number. The number selected refer to the prospect that the subject played in the third session. Subject's choice to the randomly selected prospect determine the respective prospect that they would be played in a roullette. Subject then played the roullette and claimed their prize to experimenter. Subjects who randomly selected a prospect without endowment and earned a negative payoff will receive a voucher, indicating they do not owe any money to the experiment and will be rewarded with a souvenir.

The policy options for elimination strategies were divided into two groups i.e. those with straight elimination plan and those with gradual elimination method (Figure 5). Individuals tend to smooth their consumption path and the phenomena were modelled in the permanent-income hypothesis of Modigliani and Brumberg (1954) and Friedman (1957). From the perspective of households, the elimination of fuel subsidy would be considered as a loss that decreases the current income by Z, although it decreases the permanent income by only Z/T (Romer, 2006). The impact of the loss depended on the length of consumption horizon and the proportion of the loss to total income. Consequently, households would not regard this loss as much if Z is only a small proportion of their income or if their horizon is relatively long.[14]

Straight elimination will be regarded as a higher decrease in current income relative to gradual elimination. This is relevant to households who have relatively high consumption of subsidized fuel and higher proportion of fuel consumption in their expenditure plan. This type of households may well carefully calculate the effect of both prospects to their consumption. In contrast, households who do not consume subsidized fuels may feel indifferent between the two prospects of subsidy elimination.

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[14] In this experiment, we assume that households have similar consumption horizon.

S — Straight Elimination or Gradual Elimination

Reallocation of subsidy to other government programs

Reallocation of subsidy to fund vaccination for all children and various government programs

Reallocation of subsidy to fund development of mass rapid transportation and other government programs

Reallocation of subsidy to repay debt and its interest and other government programs

Reallocation of subsidy to fund vaccination for all children

Reallocation of subsidy to fund development of mass rapid transportation

Reallocation of subsidy to repay foreign debt and its interest

Reallocation of subsidy to fund vaccination for all children and development of mass rapid transportation
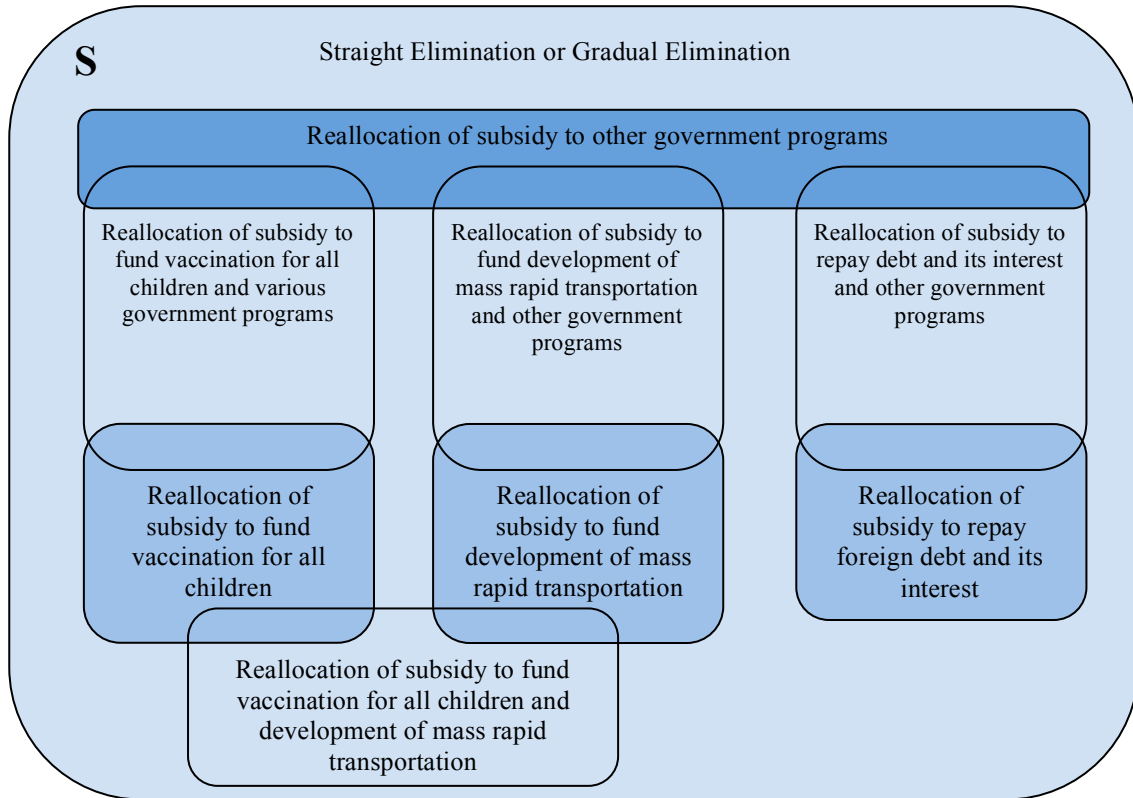
Figure 5. Set of policy choices

The policy options were also derived with respect to the reallocation scheme of the fuel subsidy. There were two schemes of reallocation of resources saved from the elimination of the fuel subsidy, namely unspecified (various) government programs or to some earmarked programs (i.e. vaccinnes, mass rapid transportation (MRT), etc). Two different schemes reflect two different agents, namely, the GoI and the households, who may have different utility functions and sometime their utility functions may be conflicting from one to another. What the GoI perceive as the first best option of reallocating the fuel subsidy fund may not necessarily perceived as the best option by the households. This occurs mainly owing to different utility functions between both parties. The GoI may seek to maximize the welfare of the society given certain budget constraint. It will allocate its budget to wide-ranging government's programs, which ideally, each program has been supported with evidence-based policy. On the other hand, households seek to maximize its utility by consuming observable good or cash. The downside of various

government programs is that households cannot observe directly the benefit that they will receive.[15]

One of the policy choices offered in this experiment also include earmarked reallocation alternative that is repayment of foreign debt including its interest. Contrary to the vaccination and MRT development program, repayment of foreign debt is an indirect reallocation program. Households would not receive immediate benefit if the subsidy fund were reallocated to repay the debt. Therefore, the decision to choose such alternative would be considered as intergenerational decision making process.

1. The fuel subsidy would be reallocated to child vaccination in several policy choices. There are several rationale for choosing this program for the experiment. First, child vaccination is a straightforward example of direct reallocation program for households. Every households need vaccination program, provided that each of them has child(ren). Second, child vaccination program has a widespread coverage. Every household, with different income background, are able to receive the benefit from vaccination program. Furthermore, the poor and low-income households have an equal opportunity to receive the benefit of child vaccination program as the high-income households. Third, even though child vaccination is a direct allocation program, households cannot experience the benefit immediately. The benefit of vaccination, that is prevention of diseases, mortality, or disability for a single child, cannot be valued directly into monetary unit.

   The World Health Organization (WHO) recommends ten vaccines for children, which include Hepatitis B, DTP, Polio, BCG, Mumps, Measles, & Rubella (MMR), Varicella, Hib, Pneumococcal Conjugation, Influenza, and Hepatitis A. The Ministry of Health Indonesia provides free vaccines for children in Indonesia through *Program Imunisasi Nasional* (National Immunization Program). There are, however, only five vaccines provided by the program, which are BCG, DTP, Mumps, Polio, and Hepatitis B. These vaccines can be easily obtained in Posyandu (Integrated Health Service Center) and Puskesmas (Community Health Center). A household in Indonesia must incur a cost about Rp1.8 million or about US$211 to obtain the other 5 vaccines for a single child (assuming US$1=Rp8,500). The cost for each vaccine might be higher than that shown in Table 3 since these vaccines has not been produced domestically.

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[15] Subjects will be given pair-wise choices regarding two monetary prospects in the third session. This session will determine the amount of money that subjects can earn from this experiment. It is interesting to see whether there is a systematic link between particular expected utility function and the choices that households make in the experiment.

2. The other earmarked policy choice for reallocation of fuel subsidy saved is the development of mass rapid transportation (MRT). The growth of Indonesia economy has been hindered by lack of insfrastructure, especially for transporation. Land transportation sector consumed 47.5% of total fuel consumption, higher than industry and electricity sector. Most of the consumption of the land sector, which accounted for 88% is contributed by road transport. Growth of vehicle also caused traffic congestion such as physical bottlenecks, capacity reduction at intersection, loading and unloading of bus on the road, and bad driving practice. The quality of public transport is still low in many aspects e.g. lack of punctuality, long waiting time and insecurity on board. Public transportation still utilizes old vehicles (Ministry of Transportation and Ministry of Environment, 2008).

   President's Decree Number 5 Year 2010 mandated 6 priorities regarding urban transportation infrastructure. The mandate calls for improvement in transportation system in four metropolitans which are Jakarta, Bandung, Surabaya, and Medan. The mandate also demands the completion of MRT and monorail in Jakarta at the end of 2014. Coordinating Ministry of the Economy has been promoting megaprojects for development including the establishment of MRT system in six metropolitans and their peripheries. These major metropolitans include Jakarta, Bandung, Surabaya, Medan, Denpasar, and Makassar. The master plan also includes improvement in the current transportation system thus it can accommodate the development of train, subway, and feeder bus.

   The MRT would provide benefit to the household irrespective of their income background. Establishment of MRT would serve as the optimum alternative to private vehicle usage. The most apparent difference is that the coverage of MRT is not as vast since the MRT would be built only in several cities and districts. Each household would also value the MRT differently. For example, households who commute in workdays would value the project higher than those whose activities are home-based, such as home industry owner. Additionally, the execution of the MRT development would not be as swift as that of the vaccine thus households cannot experience its benefits in near future.

3. Government debt is an integral part of the fiscal policy, which are the consequences of the budget to increase people's welfare. Debt, both foreign and domestic, is utilized to finance government's budget deficit and debt refinancing. Debt ratio to GDP has declined from 40.4% in 2006 to 25.2% in 2011, however, the outstanding debt still accounts for a very large number. The total debt that the GoI owes is accumulation of legacy debts, debts from 1997/98 economic crises, and budget deficit financing at least in the last decade. Foreign debts, which include debt from World Bank, Asian Development Bank, Islamic Development

Bank, and bilateral debt, are mostly earmarked debt. The debt is used to finance strategic project such as poverty alleviation and infrastructure program. Foreign debts also include past debts particularly those obtained to ease the economy during the 1997/98 crises.

Foreign debt outstanding accounted for US$67.8 billion in December 2011 or 34% of the total government's debt. The debt increased about US$5.8 billion from that in 2006. The GoI had to disburse Rp29.9 trillion in 2011 to pay the interest of the foreign debt. This payment accounted for 28% of the total government debt repayment. The foreign debt interest payment range from Rp25.7 trillion to Rp30.3 trillion during 2007-2011 (Debt Management Office, 2011).

The last policy option is reallocation of the fuel subsidy fund to various (unspecified) government programs. In this scheme, indeed, households would not be able to observe the types of benefit they would receive. This implies that households do not observe the timing of the disbursement of the program. Unlike the other three alternatives, households would find this alternative difficult to internalize into their utility function. Furthermore, households' decision to vote for this alternative depends on their valuation of the government i.e. the institution that would actually formulate and execute the reallocation program.

The dataset from this experiment corresponds to households' preferences regarding the acceptability of various exit strategies for eliminating the fuel subsidy scheme. Indeed, these valuations, regarding acceptable exit strategies, are subjective in their nature, however, they can be formulated into objective data using Analytical Hiearchial Process or AHP (Saaty, 2008). Pair-wise choices are aggregated , taking account of the relative degree of importance of each alternative in a given pair-wise (Sato, 2009).

Saaty (2009) argued that this analitical tool is capable of expressing households' preferences quantitatively. These preferences are ordered in a common absolute scale, thus the most prefered option can be derived. The outcome of AHP is priority scale of households' preferences. Priorities in this scale are similar to probabilities e.g. a priority of 0.50 is twice a priority of 0.25. This scale, however, is unique in the sense that it is valid for given policy attributes and factors. This scale reflect the importance of attributes in the alternatives (Saaty, 2009).

4. Complexity of the Experiment

Figure 5 shows the pool of subjects management for the experiment. Registrants collected from direct registration and internet are grouped according to ownership of motor vehicle. Each individual in each group was assigned with an identification number which would be used for randomization. Individuals who were selected from the randomization process were notified with text messages. The shortcoming of this process was that a lot of selected individuals did not come to the actual experiment. Owing to this shortcoming, experimenter decided to call all individuals in the pool of subjects to participate in the experiment.
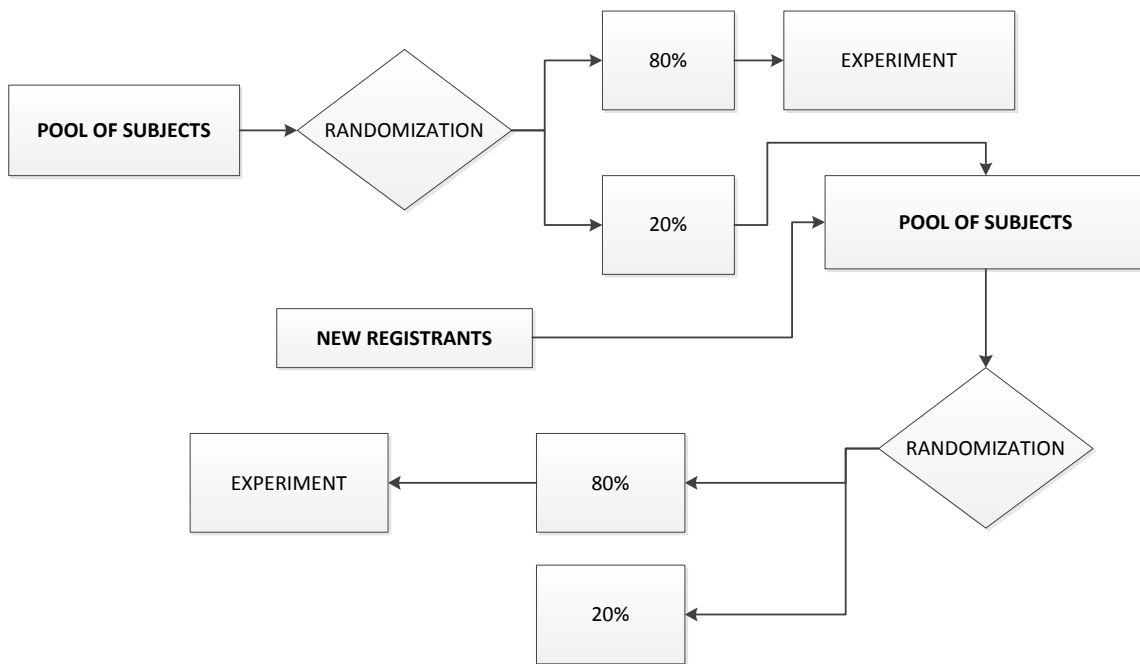
Figure 5. Pool of subjects management

Sampling of subjects was the most challenging part during the preparation of the experiment. It took about three weeks to distribute brochures and registration forms both directly or via internet and collect pool of subjects. Subjects were defined as those who live or work within 5 km radius from Faculty of Economics and Business, Universitas Gadjah Mada. Experimenter spread words and brochures for call for participations from university and faculties' employees to community gatherings. Call for participations were

also published through emails and internet through experimenters' website. Individuals can either sign up to be included in the pool of subjects in paper or through the available web form. Individuals read the informed consent at registration and they signed the form for confirmation and to be included in the pool of subjects. Individuals also choose the desired session from the available sessions set by experimenter.

We developed a computer application for the experiment. This application includes queries for subjects' basic information details, prologue, and the pair-wise choices for the first, second, and third session of the experiment. Subjects were asked to fill in the answers in the computer for each pair-wise question by using a mouse. The computer application went through two pre-tests for validation of the software and its content

Although the computer application has been designed and developed as simple as possible for users, as they only need to use click in the mouse, nevertheless some complexities still arose during the experiment. Some subjects in group 1, who come from very-low income backgrounds, were illiterate, had difficulties in understanding the instruction since it was writen in Indonesian language (as their mother tounge is Javanese language) or they had difficulties in operating computer. Fortunately, this problems were identified four days prior the real experiment. In order to tackle these problems, 15 students from Department of Javanese Literature, who are fluent in Highly Javanese language (*Kromo*) were recruited as helpers in the experiment. Their tasks were provided assistance to subjects who had difficulties in reading the instruction, in understanding the instruction and also in operating computer.

5.   Results of the Experiment

The average age of the experiment subjects was 38 years old, indicating that the average subjects were within the productive age. Majority of the subjects possessed motorcycle only, accounting for 48% of the total number of subjects. The average income for this group was Rp1,835,038 or about US$201.7 each month, lower than the total average income. Most of the subjects were male, accounting for 60.6% of the total participants (Table 2). Note that we combined subjects with car(s) into one group since there were not

many subjects who posses more than 1 car. Individuals in this group earn an average of Rp6,397,491 or US$710.8 each month, almost ten times of individuals in group one.

Table 2: Profile of Eperiment Subjects

| Group | Age (average) | Gender | | | | Total | Income (Average) |
| | | Male | | Female | | | |
		N	%	N	%		
No motor vehicle	42.17	34	36.2	60	63.8	94	Rp677,431
Motorcycle only	31.97	115	71.4	46	28.6	161	Rp1,835,038
Car	39.13	54	67.5	26	32.5	80	Rp6,397,491
Total	**38.1**	**203**	**60.60%**	**132**	**39.40%**	**335**	**Rp2,517,399**

Source: calculated from experiment data

Most of subjects obtained 9-12 years of schooling or high-school (41%), followed by those who obtained more than 12 years of schooling or higher education (27%). Table 3 shows that those with lower education level tend to have no vehicle or only motorcycle. On the other hand, subjects who went to high school and higher education tend to have car(s).

Table 3: Education Profil of Experiment Subjects

| Group | Education level | | | | | | | | | |
| | No formal education | | Elementary | | Junior-high | | High-school | | Higher education | |
	N	%	N	%	N	%	N	%	N	%
No motor vehicle	11	11.7	31	33	28	29.8	23	24.5	1	1.1
Motorcycle only	1	0.6	7	4.3	27	16.8	93	57.8	33	20.5
Car	0	0	1	1.3	3	3.8	21	26.3	55	68.8
Total	**12**	**3.6**	**39**	**11.6**	**58**	**17.3**	**137**	**40.9**	**89**	**26.6**

Note: elementary school indicates up to 6 years of schooling; junior high indicates up to 9 years of schooling; high school indicates up to 12 years of schooling; diploma and higher indicates more than 12 years of schooling

Source: calculated from experiment data

Table 4 shows the overall result of the experiment in session 1. The result, in general, suggests that subjects focused more on the reallocation scheme rather than the

elimination method i.e. gradual or immediate. Indeed, subjects chose gradual elimination scheme but the first two choices suggest that earmarked reallocation schemes were an important feature in the policy. Direct reallocation scheme through children vaccination was also the most desirable among other schemes. Reallocations of subsidy fund to repay foreign debt and wide-ranging programs were not preferable for the majority of subjects.

Table 4: Overall result in session 1

Rank	Policy Choices	Vector of Priority or VP (%)
1	Gradual reduction of fuel subsidy and the subsidy saved is reallocated to finance vaccines for all children and development of mass rapid transportation	30.9
2	Immediate elimination of fuel subsidy and the subsidy saved is reallocated to finance vaccines for all children and other government programs	22.6
3	Gradual reduction of fuel subsidy and the subsidy saved is reallocated to finance other government programs	17.6
4	Gradual reduction of fuel subsidy and the subsidy saved is reallocated to repay foreign debt and finance other government programs.	17.6
5	Immediate elimination of fuel subsidy and the subsidy saved is reallocated to finance other government programs	11.2

Source: calculated from experiment data

Table 5 shows the overall result of the 45 pairwise choices in session 2. The result shows that subjects, in general, tend to be consistent between session 1 and 2 particularly regarding their choices of top 5 priorities. It is shown that the combination of gradual elimination and earmarked reallocation scheme, particularly for vaccination and MRT, were the most desirable. Subjects chose reallocation to vaccines for all children, which offers a more immediate implementation. Immediate elimination with earmarked reallocation scheme somewhat made their marks in subjects' preferences. Not surprisingly, immediate elimination and broad reallocation scheme was the least choice among experiment subjects.

Table 5: Overall result in session 2

Rank at 1st session	Rank at 2nd session	Policy Choices	VP (%)
	1	Gradual reduction of fuel subsidy and the subsidy saved is reallocated to finance vaccines for all children and other government programs	17.4
1	2	Gradual reduction of fuel subsidy and the subsidy saved is reallocated to finance vaccines for children and development of mass rapid transportation	16.6
	3	Gradual reduction of fuel subsidy and the subsidy saved is reallocated to finance development of mass rapid transportation and other government programs.	12.2
2	4	Immediate elimination of the subsidy and the subsidy saved is reallocated to finance vaccine for all children and other government programs	10
	5	Immediate elimination of the subsidy and the subsidy saved is reallocated to finance vaccine for all children and mass transportation system.	9.1
4	6	Gradual reduction of the subsidy and the subsidy saved is reallocated to repay foreign debt and to finance other government programs	8.9
3	7	Gradual reduction of the subsidy and the subsidy saved is reallocated to finance government programs.	8.4
	8	Immediate elimination of the subsidy and the subsidy saved is reallocated to finance development of mass rapid transportation and other government programs	6.9
	9	Immediate elimination of the subsidy and the subsidy saved is reallocated to repay foreign debt and to finance other government programs.	5.6
5	10	Immediate elimination of the subsidy and the subsidy saved is reallocated to finance other government programs.	5

Source: calculated from experiment data

Table 6 displays the result of experiment in session 1 for the three groups of subjects. The computation shows consistency of choices among the three groups particularly regarding the top two priorities and the least preferable. Each group chose earmarked reallocation schemes, especially vaccination for children and mass rapid transportation system, and gradual elimination as the top priority. It should be noted that, given other three choices, immediate elimination with earmarked programs was preferable with considerable margin. Each group also deemed immediate elimination with broad-ranging programs as

the least preferable policy options. These results were consistent across gender as well as across educational attainment.[16]

Table 6: Comparison of policy choice across groups in session 1

Policy choices	Group 1		Group 2		Group 3	
	Rank	VP (%)	Rank	VP (%)	Rank	VP (%)
Gradual; vaccine and mass transportation system	1	31.1	1	30	1	31.9
Immediate; vaccine and other government programs	2	24.6	2	21.8	2	22
Gradual; foreign debt and other government programs	3	16.8	4	18.3	4	17.2
Gradual; other government programs	4	14.9	3	19	3	18.6
Immediate; other government programs	5	12.6	5	10.9	5	10.3

Note: the rank for the group 1 serves as a reference point.
Source: calculated from experiment data

Cross groups comparison in session 2 suggest consistencies of choices among groups regarding the two most and least desirable choices (see Table 7). These groups were also consistent in terms of choices being made between session 1 and 2. Those who did not posses any vehicle and only motorcycles, i.e. group 1 and 2, chose reallocation for vaccination and MRT both in gradual and immediate elimination scheme in the top five priorities.

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[16] See Appendix 1 and 2.

Table 7: Comparison of policy choice across groups in session 2

Policy choices	Group 1		Group 2		Group 3	
	Rank	VP (%)	Rank	VP (%)	Rank	VP (%)
Gradual; vaccine and other government programs	1	16.8	1	17.2	1	18.4
Gradual; vaccine and mass rapid transportation	2	16	2	15.9	2	18.3
Gradual; mass rapid transportation and other government programs	3	11.3	3	11.9	3	13.8
Immediate; vaccine and other government programs	4	10.9	4	10.5	6	8.3
Immediate; vaccine and mass transportation system	5	10.7	6	8.8	7	7.9
Gradual; foreign debt and other government programs	6	8.6	5	9.1	5	8.9
Immediate; mass rapid transportation and other government programs	7	7.4	8	6.8	8	6.5
Gradual; other government programs	8	7.3	7	8.7	4	9
Immediate; foreign debt and other government programs	9	6.1	9	5.7	9	4.5
Immediate; other government programs	10	5	10	5.3	10	4.3

Note: the rank for the group 1 serves as a reference point.
Source: calculated from experiment data

Those who owned cars, on the other hand, opted options with gradual elimination scheme in their top five priorities. There are two possible explanations worthy of note. Subjects with cars are those who would experience the most burden if fuel prices increases thus they opted for gradual elimination. On the other hand, this group consists of educated people who may opt gradual elimination by considering others and knowing that the impact of this scheme to the society cannot be negligible. Interestingly, these results are

consistent across education attainment where subjects with diploma degree and higher opted for gradual elimination.[17]

6. Conclusions

The irrationality of fuel subsidy scheme in Indonesia has received little attention to date owing to improper formulation of fuel subsidy scheme and indecisiveness of the government. From households' point of view, the subsidy scheme has been a poor policy for assisting poor households. Every stratum of households particularly the wealthy have equal access to subsidized fuels. Those who own car receive more subsidies compare to those who owns motorcycle or those who does not posses any motor vehicle. As a consequnce, the subsidy on fuel has been creating distortion in efficient allocation since wealthy consumers benefit from the subsidy the most. World Bank (2011) reported that 50% of wealthy households consumed 84% of subsidized fuel with the top 10% consuming 40% of total subsidy. The bottom 10%, on the other hand, only consumed less than 1% of total subsidy.

The fuel subsidy, on the other side, impose heavy burden on government's budget. Expenditure on fuel subsidy has been continuously increasing in the last decade, passing the Rp100 trillion mark in 2011. Expenditure on this scheme undermine expenditures in strategic poverty alleviation program. The government increased the price of subsidized fuel in 2005 and 2008 but reversed the decision due to political reasons. The government remained status quo regarding this matter in the past year albeit budgetary burden reached all-time high.

Fuel subsidy elimination would be regarded as the least preferable policies by majority of households. Indeed, no households would prefer to lose the subsidy that have been received for many years. It is, therefore, interesting to identify the most acceptable policies within these least preferable policies. This study implement experiment approach to seek the most acceptable exit strategy regarding elimination of fuel subsidy scheme based on households' perspective. Several exit strategies, including elimination method and reallocation scheme, are formulated.

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[17] This result is due to correlation between diploma degree holder and possession of cars.

The results of the experiment show that the most acceptable exit strategies were those with gradual elimination method and earmarked reallocation scheme, particularly for vaccination and MRT. The least acceptable exit strategies were those with immediate allocation and undetermined reallocation scheme. These results are consistent across sessions and across groups.

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APPENDICES

Appendix 1. Gender comparison of policy choice in session 1 and 2

Gender comparison of policy choice in session 1

Policy options	Male		Female	
	Rank	VP (%)	Rank	VP (%)
Gradual; vaccine andmass rapid transportation	1	31.3	1	29.9
Immediate; vaccine and other government programs	2	21.1	2	25.7
Gradual; other government programs	3	18.7	4	16
Gradual; foreign debt and other government programs	4	17.9	3	16.7
Immediate; other government programs	5	11	5	11.7

Note: the rank for the group 1 serves as a reference point.
Source: calculated from experiment data

Gender comparison of policy choice in session 2

Policy options	Male		Female	
	Rank	VP (%)	Rank	VP (%)
Gradual; vaccine and other government programs	1	17.4	1	17.1
Gradual; vaccines andmass rapid transportation	2	17.2	2	15.4
Gradual; mass rapid transportation and other government programs	3	12.6	3	11.4
Immediate; vaccine and other government programs	4	9.5	4	11
Gradual; foreign debt and other government programs	5	9	6	8.7
Gradual; other government programs	6	8.8	7	7.7
Immediate; vaccines andmass rapid transportation	7	8.8	5	9.6
Immediate;mass rapid transportation and other government programs	8	6.5	8	7.7
Immediate; foreign debt and other government programs	9	5.2	9	6.2
Immediate;other government programs	10	4.9	10	5.2

Note: the rank for the group 1 serves as a reference point.
Source: calculated from experiment data

Appendix 2. Comparison of policy choice across education level in session 1 and 2
Comparison of policy choice across education level in session 1

Policy options	Elementary School		Junior High School		Senior High School		Higher Education	
	Rank	VP (%)	Rank	VP (%)	Rank	VP (%)	Rank	VP (%)
Gradual; vaccines and mass rapid transportation	**1**	31.8	1	31.7	1	28.8	1	32.5
Immediate; vaccine and other government programs	**2**	23.5	2	24.3	2	23.5	2	20.4
Gradual; foreign debt and other government programs	**3**	17.3	3	16.6	4	16.7	3	19.2
Gradual; other government programs	**4**	15.7	4	15.7	3	18.8	4	18.3
Immediate; other government programs	**5**	11.6	5	11.8	5	12.2	5	9.6

Note: the rank for the group 1 serves as a reference point.
Source: calculated from experiment data

Comparison of policy choice across educationlevel in session 2

Policy options	Elementary School		Junior High School		Senior High School		Higher Education	
	Rank	VP (%)	Rank	VP (%)	Rank	VP (%)	Rank	VP (%)
Gradual; vaccines andmass rapid transportation	1	18.6	2	16.4	2	14.6	1	18.4
Gradual; vaccines and other government programs	2	16.4	1	17.5	1	17.2	2	17.4
Gradual, mass rapid transportation and other government programs	3	11.5	3	11.1	4	11.2	3	14.5
Immediate;vaccines andmass rapid transportation	4	10.5	5	9.7	5	9.2	7	7.7
Immediate; vaccines andother government programs	5	10.5	4	10.6	3	11.6	6	7.8
Gradual;foreign debt and other government programs	6	7.8	6	9.1	7	8.7	4	9.6
Immediate; mass rapid transportation and other government programs	7	7.4	8	6.8	8	7.2	8	6.4
Gradual;other government programs	8	7.1	7	7.8	6	8.8	5	8.8
Immediate; foreign debt and other government programs	9	5.6	9	6	9	5.8	9	4.9
Immediate;other government programs	10	4.6	10	5	10	5.6	10	4.5

Note: the rank for the group 1 serves as a reference point.
Source: calculated from experiment data