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Tobacco Economic of Indonesia: Poor Households' Spending Pattern, Tax Regressivity and Economic Wide Impact of Tax Simplification

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Tobacco Economic of Indonesia: Poor Households' Spending Pattern, Tax Regressivity and Economic Wide Impact of Cigarette Excise Tax Simplification[☆]

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Abstract

Policy to reduce cigarette consumption is needed because of the harm to both smokers and the surrounding healthy. In narrow sense, the harm of cigarette consumption for poor households needs to be taken into account into policy consideration as it expected to sacrifies essential spending for the poor. In general, any policy related to any influental sector in the economy, including tobacco sector, needs an economic wide impact consideration. This study aims to justify the policy on three grounds: analysis on poor household with smoker in terms of their spending pattern, an assessment of the cigarette excise tax burden's regressivity and and economic wide impact analysis of a cigarette excise tax simplification. This study find that there is tendency of lower spending on essential good (health and food) of poor household with smoker than without smoker. Secondly, indeed, the tax burden of Indonesia's excise tax is regressive so that it put burden more to the poor than the richer. Lastly, a cigarette tax increase will reduce national output with considerably small impact but moderately increase government revenue to boost the economy through infrastructure spending as the optimum opt.

JEL Classifications: I18, D58

Keywords: Cigarette, Consumption Pattern, Excise Tax, Regressivity, Computable General Equilibrium

1. Introduction

1.1. Background

There are always at least two rationales behind the idea of cigarette taxation increase: to increase government revenue and to reduce consumption of cigarette. Policy to reduce cigarette consumption is needed because of the harm that smoking does to both smokers health and that of others. Moreover, in terms of welfare of poor households in particular, there is also a potential loss for them due to shift in spending from essential expenditures such as education, health, and foods to cigarette consumption. If the shift is evident, it is likely not only smoking behavior that will persist in the future, but also the poor eco-

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nomic condition of the households.

In order to increase government revenue and to reduce consumption of cigarette at the same time, information about price elasticity of demand for cigarette is very important. There have been many studies investigating it, but the results are quite similar. Demand for cigarette has been found to be price inelastic. For Indonesia, studies from Bird (1999), Marks (2003), and Djutaharta et al. (2005), for instance, revealed that the price elasticity of demand for cigarette in Indonesia was ranging from -0.29 to -0.67, meaning that 10 percent increase in cigarette price would reduce its consumption by 2.9 to 6.7 percent. With the inelastic nature of the demand, economic theory suggests that the tax increase in cigarette will increase revenue generated by government, since the increase in price from higher taxation will outsrip the reduction in consumption. However, with the same nature of elasticity, it also implies that consumption can only be significantly affected if the tax is also increased significantly.

Significant tax increase may be increasingly important particularly in concern of the poor households who consume cigarette at present. When the higher tax can only cut back their consumption but not able to make them quit smoking, two different costs might arise. The first cost may result from the higher tax burden born by the poor from consuming cigarette. It is related to the regresssivity nature of the excise tax. Indeed, the regressivity nature may still need to be checked although many economists already tend to agree with the conclusion due to the similarity of the excise tax with any other types of consumption tax. However, the more important observation needed is to identify the regressivity of the tax after its rate is increased, rather than when the rate is as it is now. As will be discussed further in another subsection below, increasing the tax rate may further increase the burden of the poor, thus called regressive, or otherwise, it may reduce the burden. When the former happens, failure in making the poor quit smoking through higher tax would cost them even higher.

The second cost may arise from the shift in the poors priority of spending because of the cigarette consumption as mentioned earlier. When the higher tax cannot induce the poor to quit smoking, they will probably maintain their spending behavior. Therefore, in the future, if the shift from some essential spendings is really evident in the poor households spending pattern, the behavior may sustain their poor social and economic condition as well as their smoking behavior.

At last, although significant tax increase might be needed, particulary to salvage the poor, its wider impact to the economy also needs to be elaborated. The tax increase may harm, not only the poor who smokes, but also the farmers, the labors, and the producers of tobacco and may be the economy as a whole due to the potential reduction in demand of the products. Higher revenue generated from the taxation increase may also not happen as expected, may be because of the complexity of the excise tax structure and other tax administration problems.

Despite the fact that many careful considerations are required before implementing the policy, from the law perspective, room to increase tax rate of tobacco product in Indonesia still opens. The current rate is still below the threshold allowed by the law, which is up to 55 per cent of retail price. In 2009, for tobacco product, on average total excise rate is 42,7 percent and total tax rate is 51,1 percent. The figures are nearly twice those in India and Russia but lower than in Egypt (Ministry of Finance, 2012).

1.2. Objectives of Study

From the backgrounds presented previously, this study is aimed at evaluating certain aspects of cigarette taxation in Indonesia. More

specifically, the study is trying to answer the following research questions:

1. Is there any significant difference between poor households with and without smokers in terms of their spending on such essential expenditures as education and health? With the current spending pattern, does it affect the persistence of smoking behavior in the poor households in the future?
2. Are the current cigarette taxes (i.e. excise tax and value-added tax) regressive? When the excise tax is increased, how does it affect the demand for cigarette and the regressivity of the taxation?
3. What are the impacts of the increase in excise tax for cigarette on the economy regarding government revenue, employment, and household income?

2. Literature Review

2.1. Spending Pattern of Smoking and Non-Smoking Family

Ahsan and Tobing (2008, p.28) revealed the spending structure of the poorest household with smokers from 2003 to 2005. Compared to other expenditures, spending for cigarettes in this group of household was around 12 percent of their total spending. Similar information can also be obtained in Barbara S. et al. (2008, p.9), but for data in 2005 and with smaller number of expenditure category. Moreover, the study of Ahsan and Tobing (2008) also estimated the impact of household smoking status to their essential expenditures, namely expenditure of sources of protein, expenditure for education, and expenditure for health. The estimation was using log-linear regression with smoking status of the household represented by a dummy variable. The results show that smoking family tends to spend less for education and health compared to non-smoking family, but they spend more for expenditure of sources of protein.

Similar to the study of Ahsan and Tobing above, Terblanche (2012) attempted to find significant difference in spending behavior from smoking and non-smoking families in South Africa. She used a rather simple method using a parametric T-test. The results seem to replicate condition in Indonesia, in that smoking family again tends to spend less for education and health compared to non-smoking family. However, further estimation was also conducted in the study to find determinants that affect people's decision to smoke in South Africa. From the estimation, Terblance found that less spending on education by the smoking family would imply to lower level of education attained by the family's next generation and thus prolong the smoking behavior of the family in the future. The estimation from the previous studies above has not yet observed the possible different pattern between smoking and non-smoking family among the poorest group. Ahsan and Tobing (2008) only observed that households with different income level might have different patern of spending, while Terblanche (2012) did not touch this matter at all.

2.2. Tax Burden Regressivity

One particular tax system is considered regressive if the tax payments increase less proportionately with income (Stiglitz 2000, p.159). It suggests that lower income people will have to bear more tax burden in their income relative to those who have higher income, thus they are unfairly treated by the tax system.

Excise tax for cigarette naturally has the regressive nature of taxation. As all other types of tax that tax consumption, it becomes regressive since the propensity to consume tends to decrease as income rises (Tamaoka 1994, p.57). The regressivity of consumption tax is also evident whatever the time horizon (Chernick & Reschovsky 2000, p.60). No matter when the tax is implemented, the regressivity nature will still persist. Moreover, since the prevalence of smoking is higher among the poor, cigarettes

are disproportionately consumed more by the poor. Removing the regressivity of the excise tax is hardly done, particularly when government only targets excise tax and ignores the other kinds of consumption tax. Some advocates of high cigarette taxes, while acknowledging their regressivity, however, suggesting that increasing cigarette taxation may result in progressive tax. It means, after the tax increase, poorer people will bear a lower tax burden relative to their income.

Borren and Sutton (1992) and Townsend (1987) evaluated the overall increase in cigarette taxation in the United Kingdom. In so doing, their works put strong emphasis on estimating the cigarette demand for different social class based on a log-linear single equation model. Since the increase in cigarette taxation would affect number of cigarette consumption through the price channel, the estimated demand function would provide the necessary information about the price-elasticity of demand. While Borren and Sutton (1992) with the extended data set did not find evidence of increasing price-elasticity by social class (from the highest to the lowest class), the former work of Townsend (1987) found the opposite. As a consequence, the two studies came up with different suggestion. Borren and Sutton suggested that increasing the levy on cigarettes was a regressive policy, whereas Townsend suggested the opposite due to her observation that the lower social classes were more sensitive to price changes.

Warner (2000), Evans and Farrelly (1998), and Townsend again with Roderick and Cooper (1994), as summarized in Remler (2004), have maintained the proposition of Townsend (1987) that indeed, the poor are more price responsive and thus a tax increase may not be regressive. Remler (2004) himself, supported the idea and literally evaluated the effects of higher cigarette taxes on three types of smokers (i.e. smokers who quit, who does not quit, and who cut back) utilizing three alternative methods of assessing tax burden, namely the accounting measure, the traditional welfare-based measure, and the time-inconsistent welfare based measure.

As has been summarized by Barber S. et al. (2008), some studies have also been conducted to estimate the demand function of cigarette in Indonesia. For instance, Bird (1999), with an error correction model using annual aggregate data from 1970 to 1994; De Beyer and Yurekly (2000), with a log linear model using time series data from 1980 to 1995; Djutaharta et al. (2005), with the similar log linear model but using annual data from 1970 to 2001 and also monthly data from 1996 to 2001; and Marks (2003), with a series of model that take into account population growth, income growth, and substitution between cigarette products using aggregate data from 1999 to 2002. From those studies, the price elasticities of demand for cigarette in Indonesia were ranging from -0.29 to -0.67.

Nevertheless, the price elasticity numbers from all studies above are obtained for aggregate numbers. The estimation of price elasticity of demand for different social class in Indonesia could not be observed up until a study conducted by Ahsan and Tobing (2008). In their study, social class was divided into income quintiles; with quintile I to quintile V represented the lowest to the highest income group. The price elasticities resulted from their conditional cigarette demand estimation varied from -0.06 (quintile II) to -0.41 (quintile IV). The result seems to suggest that there was no clear indication of the increasing price sensitivity for the poorer income people in Indonesia.

2.3. Economic Impacts of Simplification of Cigarette Taxation

Tobacco product is believed to be strongly related to other sectors in the economy so that any tax increase might create wide impact to the economy. Three important indicators related to this shock include unemployment, government revenue and tobacco sector itself.

Some previous studies have tried to measure the impact of particular variable in response to tobacco tax changes. Walbeek (2010) presented a model that predicts changes in cigarette consumption and excise revenue in response to excise tax changes, and demonstrated that, if the industry has market power, the consequences from increases in specific taxes are easier to control than those from increases in ad valorem taxes. Djutaharta et al. (2005) focused on the impacts of tax rate increase on government revenue income and price elasticities using stochastic model. The study found that an increase in the tax level of 10, 50 and 100 percent would increase total tax revenue by 9, 43 and 82 percent respectively. Ahsan and Wiyono (2007) combined the result of elasticities from Djutaharta et. al (2005) and I-O based model to estimate the impact of 100 percent tax increase on the output, employment and income.

Unfortunately, there is limited attempt from the studies above to measure and explain the wide impact of simplification of tobacco product structure to the economy. This study is aimed to fill the void by providing alternative approach using a computable general equilibrium approach that decompose the standard sectors of the *24-social accounting matrix* data to meet the structure of current excise tax of tobacco product layers in Indonesia in order to meet the objective.

3. Methodology

3.1. Household Comparison

3.1.1. Performing T-test

The main question raised in this section is whether there is statistically significance of the difference in socio-economic expenditures between two types of poor households in the economy: households with and without smokers. Therefore, we design a T-test hypothesis testing for expenditure of i^{th} component of household expenditure, where $i \in \{\text{education}, \text{health}\}$, as:

$$H_0 : \mu_i^{NS} = \mu_i^S \quad (1)$$

$$H_1 : \mu_i^{NS} \neq \mu_i^S \quad (2)$$

Where μ_i is the average spending of poor households for particular commodity i.

Both descriptive and t-test analysis in this study utilize data from National Socio-Economic Survey (Susenas) 2010. Sample of the Susenas data is households that spread over all provinces in Indonesia.

Since the study mainly concerns on spending behavior of poor households, the first thing to do is to identify the poor households from the sample. The identification is made by employing distric and city poverty line 2010 of the National Bureau of Statistics (BPS) Indonesia. However, slight adjustment is needed before we can use the BPS poverty line since the BPS uses it to identify poor individuals rather than poor households. In so doing, monthly per capita expenditure of each household is estimated, and then the result is compared with the individual poverty line. When the monthly per capita expenditure of one particular household is below the poverty line of its corresponding district or city, thus the household is categorized as poor.

The identification of poor households using the method above is expected to be more accurate and representative than using the World Bank poverty standard, the BPS national or provincial poverty line (instead of district/city), or the simple family decile method (by monthly average expenditure) which sets the first two or three quantiles as poor households. The main advantage of using the district/city poverty line is its ability to capture more variety of standards of living in each district/city in Indonesia.

Total 293,715 samples of households in Susenas 2010 represent around 61.8 million households that spread over 33 provinces in Indonesia. From the poor identification of household conducted in this study, there are more than

five million poor households or 23.2 million poor individuals represented by Susenas sample. With estimated number of poor people in Indonesia in 2010, according to BPS, was 31.9 million or 13.3 percent of total Indonesia population, the poor individual samples in Susenas represent more than 70 percent of poor people or almost 10 percent of total population in Indonesia.

After obtaining poor household samples, the next step is to separate households with and without smoker. It can be identified from monthly expenditure of cigarette data in the Susenas. When the figure is non-zero (zero), the respective household has (has no) smoker. From this classification, poor household samples are now distributed, though not equally, with around 56 per cent (or representing 2.8 million poor households) classified as poor households with smoker and the remaining 44 per cent (or representing 2.2 million poor households) as poor households with no smoker.

Finally, to perform both descriptive and t-test analysis on poor households spending behavior, monthly spending of such poor households with and with no smoker on education, health, and other expenditures in Susenas are utilized. From total 32 groups of monthly expenditure of households in Susenas, this study has regrouped the expenditure into 11 groups only to simplify the analysis. The description of the eleven expenditure categories can be observed in Appendix 1.

3.1.2. The Determinants of Indviduals Smoking Decision

The subsequent analysis is to ask, if it is significance of the difference, should poor household with smoker tend to have new family member to become a smoker too. To answer this question we regress a *discrete choice model* of:

$$\begin{aligned} P(S)_j &= \alpha + \theta_1 educind_j + \theta_2 age_j \\ &\quad + \theta_3 sex_j + \theta_4 marstat_j \\ &\quad + \theta_5 work_j + \theta_6 loc + \theta_7 earn \end{aligned} \quad (3)$$

$P(S)_j$ is the decision being smoker (S=1) or is not as smoker (S=0) and each of respective independence variable represent the socio-socio-economic profile of the individual. For this regression we will employ IFLS data.

3.2. Regressivity Analysis

3.2.1. Measuring Tax Burden Over Income Groups

There are three definitions of tax burden in the literature: accounting, welfare-based willingness to pay and welfare-based time inconsistent. This study uses the the accounting definition of the tax burden and implements the formula to Indonesian Family Life Survey (IFLS) 2007 data. The IFLS data provides data set that supports for calculating the excise tax paid by individuals. It asks and records individual's quantity, total expenditure and type of cigarette consumed. For i^{th}-quantile of income group and n individuals in each quintile, we define average tax rate (ATR) or the tax burden for each quintile as:

$$ATR_i = \frac{\sum_{j=1}^{n} \frac{T_j}{Y_j}}{n} \quad (4)$$

T_j is the amount of the excise tax paid by individual j and Y_j is her income. In IFLS data we use individual earnings as proxy if income. T_j is composite tax and consists of unit tax and ad-valorem tax. Assuming that individual consumes only single cigarette type, we therefore define T_j as:

$$T_j = sQ_j + aE_j \quad (5)$$

s is the specific tax rate of cigarette per stick, a is the ad-valorem tax rate of cigarette and Q_j and E_j are sticks consumed and total expenditure of cigarette of individual j respectively.

3.2.2. Change in Regressivity from Tax Inrease

More importantly, the analysis of regressivity should be followed by observing tax increase and its impact on the structure of the tax burden among income groups. In order to perform the analysis we need to estimate the consumption response from price change and real income change due to increase of tax. The estimation of own-price and income elasticities will be performed using single equation model used by Lee et al. (2004) on the cigarette consumption in Taiwan:

$$lnq_{it} = \alpha_0 + \beta_1 lnp_{it} + \beta_2 lninc_{it} + u_{it} \quad (6)$$

Where q is weekly average number of stick consumed, p is real[1] imputed price (total expenditure/sticks consumed) in a week and inc is average weekly income. Subscript $i = 1, .., 1855$ and $t = 1997, 2000, 2007$ are indexes for individual respondents and wave(year) of the IFLS respectively. We implement the estimation to IFLS2(1997), IFLS3(2000) and IFLS4(2007) data. Thus, we expect the that $\beta_1 < 0$ and $\beta_2 > 0$ assuming that cigarette is a normal good.

3.3. Economic Wide Impact Analysis of Simplification of Cigarette Taxation

Computable General Equilibrium (CGE) model is employed to analyze the wide-impact of simplification of cigarette taxation on government revenue, employment and tobacco sector. A CGE model is a system of non-linear simultaneous equations that represents the behavior of all economic agents and market clearing condition of goods and services in the economy. Those equations can be grouped into five main blocks, hence:

1. Production block: Equations in this block represent the behavior of producers and the structure of production activities.
2. Consumption block: Equations in this block represent the consumption behavior of households and other institutions.
3. Export-import block: Equations in this block represent the decision to export or import goods and services.
4. Investment block: Equations in this block represent the decision to conduct investment and the demand of goods and services that will be utilized in the formation of new capital.
5. Market-clearing block: Equations in this block represent market-clearing condition in the labor market, commodity market and balance of payment.

We used Indonesian Social Accounting Matrix (SAM) as the main database for our CGE model. SAM is a double entry of traditional economic accounting, shaped partition matrix[2] that records all economic transactions between agents, particularly among the sectors in the production block, institutions blocks (including households, firms and government), and in the sectors of production factors (Pyatt and Round, 1979; Sadoulet and de Janvry, 1995; Hartono and Resosudarmo, 1998). SAM is a good database for CGE model because of two reasons. First, SAM summarizes all economic transactions in the economy for a single period of time. Thus, SAM provides a comprehensive overview of countrys or regions economy. Second, SAM records the socio-economic structures of an economy. Therefore, SAM is also able to picture income distribution and poverty.

In this study, we modified Indonesian SAM that is published by Central Bureau Statistics of Indonesia in 2008. There are two main differences between published Indonesian SAM and our modified Indonesian SAM. First, we disaggregated classification of sectors by introducing four tobacco sub-sectors, namely machine

[1] We use corresponding Consumer Price Indices (CPI) to deflate the imputed price for each year.

[2] The definition of partition matrix can be seen in Searle, S. R. 1982: Matrix Algebra Useful for Statistics. John Wiley and Sons. New York.

made cigarette (SKM), medium-large hand-rolled kreteks (SKTMB), small hand-rolled kreteks (SKTK), and other tobacco products. Second, we aggregated groups of household from 8 (eight) classifications into one classification. We did not use the original eight classifications of household since we did not have information about the expenditure of each household group on tobacco products.

We conducted 8 (eight) scenarios in order to capture policy options that can be implemented by the Government of Indonesia (GOI). In those scenarios, we assume that the Government of Indonesia implements uniform excise tax in each cigarette sub-sector[3]. Currently, the excise tax rates on cigarette product vary based on the type of product/sector, total production, and the range of retail price. Consequently, government income will increase, and the GOI has some options to use the extra income. The GOI can use the money to pay their debt or keep it as saving. Furthermore, the GOI can also increase their expenditure on infrastructure, public sector, or even increase transfer payment to the households. Other possibilities are the combination between scenarios. For instance, the GOI can spend half of their extra income on public sector and use the rest of the extra income to increase transfer payment. Table 1 shows eight scenarios that are used in this study.

4. Result and Analysis

4.1. Household Comparison Analysis

4.1.1. Descriptive Analysis & T-test Analysis

Smoking behavior is hard to cease due to the addictive substance in cigarettes. From the 2010 Demographic Institute FEUI (LD-FEUI) survey to individual smokers in Central Java and East Java, smokers buy, on average, 12 sticks of cigarette (or for most cigarette products it is equivalent to one pack of cigarette) every day. The survey also reveals that more than 60 per cent of the total samples buy 12 and even more sticks of cigarette per day. The behavior seems to be not different whether the smoker is poor. From the same survey, it shows that while the poor smokers buy 10 sticks of cigarette per day, on average, the non-poor smokers buy at least 12 sticks per day. The inelastic nature of the price elasticity of demand for cigarette (as has been summarized from many studies by Barber S., et al. in 2008) further indicates that as long as the increased price is still affordable, smokers will continue smoking. The smokers may also still substitute the cheaper cigarette product for the more expensive one, even if it results in more risk for their health. Another negative impact from smoking behavior may arise when it affects consumption pattern of a household. The smoking household may sacrifice their spending on more essential expenditures such as basic foods, education, and health to preserve their smoking behavior.

In Table 2, we can observe the consumption priority of group of households in Indonesia with and without smoker. The percentage number of each expenditure category is obtained by dividing sum of the expenditure category with sum of total expenditure from all households within each group. The table shows that although cigarette spending is relatively small, it is comparable to the amount spent for basic food and sources of protein (meat, fish, egg, and milk) and even higher than that for vegetable and fruit. The different priority between smoking and non-smoking household groups only appears in the four lowest expenditure categories. Unlike the non-smoking households, smoking households tend to prioritize clothing to health spending and basic food to sources of protein.

[3]Technically, we set the excise tax rate at the highest rate in each cigarette sub-sector. The excise tax rate for machine made cigarette (SKM), medium-large hand-rolled kreteks (SKTMB), and and small hand-rolled kreteks (SKTK) are Rp. 365 per piece, Rp. 255 per piece, and Rp. 100 per piece respectively.

Table 1: Scenarios in the CGE model

Scenarios	Definition
SIM 1	The GOI impose uniform excise tax in each cigarette sub-sector and use the extra government income to pay their debt.
SIM 2	The GOI impose uniform excise tax in each cigarette sub-sector and keep the extra government income as saving.
SIM 3	The GOI impose uniform excise tax in each cigarette sub-sector and use the extra government income to increase their expenditure on infrastructure (construction sector).
SIM 4	The GOI impose uniform excise tax in each cigarette sub-sector and use the extra government income to increase their expenditure on public sector.
SIM 5	The GOI impose uniform excise tax in each cigarette sub-sector and use the extra government income to increase transfer payment to the households.
SIM 6	The GOI impose uniform excise tax in each cigarette sub-sector and spend half of their extra income on infrastructure (construction sector) and use the rest of the extra income to increase transfer payment.
SIM 7	The GOI impose uniform excise tax in each cigarette sub-sector and spend half of their extra income on public sector and use the rest of the extra income to increase transfer payment.
SIM 8	The GOI impose uniform excise tax in each cigarette sub-sector and spend half of their extra income on public sector and spend the rest of the extra income on infrastructure (construction sector).

Table 2: Consumption Priority of Household Group with and without Smoker in Indonesia, 2010 (in percentage and value)

	Expenditure	Group of smoking households		Group of non smoking households	
		Rp	%	Rp	%
1	Housing	410,416	32,46	487,678	35,56
2	Other non food	193,479	15,3	211,343	15,37
3	Education	142,607	11,29	198,198	14,41
4	Transportation	120,532	9,53	124,403	9,03
5	Other food and drink	82664	6,53	84,669	6,15
6	Clothing	72,649	5,75	70,385	5,1
7	Health	66542	5,27	83183	6,06
8	Basic food	50,207	3,97	40,306	2,93
9	Meat, fish, egg, milk	46621	3,68	44,621	3,25
10	Cigarette	44,525	3,52	0	-
11	Vegetable and fruit	33,763	2,67	31,942	2,32
	Total food excl, cigarette	213,254	16,87	201,537	14,66
	Total non food	1,006,224	79,61	1,175,190	85,34

Source: Susenas 2010, processed

Consumption priority of poor households can be observed from Table 3. As the table reveals, poor households, either with or without smoker, put less priority on education and health spending. While they put basic food as their almost highest priority, the amount spent for education and health is just comparable to their cigarette spending. Moreover, cigarette spending in poor households is apparently higher than spending for sources of protein and vegetable and fruit. Compared to the poor household group without smoker, poor household group with smoker also spend for clothing higher than for education, and for sources of protein higher than for vegetable and fruit.

Despite the fact that consumption priority between groups of households (with and without smoker), entirely or just the poor ones, is relatively similar, smoking behavior may really sacrifice some households essential expenditures. In order to find such impact, we may again use the portion of each expenditure category to total expenditure. However, since now we are concerned on the individual behavior of households, the percentage number of each expenditure category is obtained by averaging the monthly expenditure proportion of all individual households.

From Table 4, the general pattern in Indonesia shows that smoking behavior tends to sacrifice households spending on such non-food expenditures as housing, other non food, education, and health. Portions of such expenditures in smoking households, on average, are relatively lower than those in non-smoking households.

The impact is even bigger for poor households. As can be seen in Table 5, poor smoking households in general spend less than poor non-smoking households in both food (without cigarette) and non-food expenditure categories. Spending for cigarette not only sacrifices spending on housing, other non food, and health, but also on basic food, other food and drink, and vegetable and fruit.

The finding above is further confirmed by the resulting two samples T-test. By comparing the portion mean of each expenditure category in smoking and non-smoking households, the result (presented in Table 6) shows that only portion of education spending that is statistically insignificant. Therefore, even though from the figure before the average portion of education spending by poor smoking households is bigger, statistically it has no difference.

4.1.2. The Determinants of Individuals Smoking Decision

Although smoking behavior statistically has no significant impact on education spending for poor households, attention still needs to be paid. As has been shown in Table 3, poor households allocation for education is relatively low and even comparable with the amount spent for buying cigarette. With small allocation for education, children in poor households with smoker are more likely to attain lower education level. The condition may result in an increased probability of them smoking when they grow up.

The negative correlation between education level attainment and smoking probability of individual has been tested by Ahsan and Tobing (2008) and Terblance (2012). Using logistic regression method, this study also tries to find the correlation. The IEFLS data 2007 has been used in the regression. As dependent variable we used smoke variable, the dummy showing the individuals decision to smoke or not, with 1 and 0 indicate decision to smoke and not smoke respectively. As the independent variables, we chose education level attainment (educind2007), age (age2007), gender (sex2007), marriage status (marstat2007), working status (work2007), resident location (loc2007), and individual earning per month (earn2007).

From the logistic test, as can be seen in Figure 1, education level attainment, age, gender, and marriage status are statistically significant

Table 3: Consumption Priority of Poor Household Group with and without Smoker in Indonesia, 2010 (in percentage and value)

	Expenditure	Group of smoking households		Group of non smoking households	
		Rp	%	Rp	%
1	Housing	155,860	32.78	143,126	36.54
2	Basic food	51,251	10.8	43,075	11
3	Other non food	48,843	10.28	40,111	10.24
4	Other food and drink	37,589	7.9	34,302	8.75
5	Transportation	34,053	7.15	26,718	6.82
6	Clothing	29,009	6.09	23,659	6.04
7	Education	28,077	5.9	23,959	6.12
8	Health	26,518	5.57	21,584	5.51
9	Cigarette	23,479	4.93	-	-
10	Meat, fish, egg, milk	20,982	4.41	16,085	4.1
11	Vegetable and fruit	20,326	4.27	19,086	4.87
	Total food excl. cigarette	130,148	27.34	112,549	28.75
	Total non food	322,359	67.72	279,156	71.25

Source: Susenas 2010, processed

Table 4: Impacts of Cigarette Spending on Households Spending Pattern in Indonesia, 2010 (in Percentage and Point Percentage)

	Expenditure	Smoking Household	Non Smoking Household	Difference
1	Housing	34.3	38.71	-4.41
2	Other non food	10.48	10.81	-0.33
3	Education	7.38	8.06	-0.68
4	Transportation	9.39	8.54	0.85
5	Other food and drink	8.81	9.72	-0.91
6	Clothing	5.3	4.81	0.49
7	Health	4.1	4.69	-0.59
8	Basic Food	6.66	6.21	0.45
9	Meat, fish and egg	4.56	4.32	0.24
10	Cigarette	5.12	0	5.12
11	Vegetable and fruit	3.9	4.12	-0.22
	Total food excl. cigarette	23.93	24.37	-0.44
	Total non food	70.94	75.63	-4.69

Source: Susenas 2010, processed

Table 5: Impacts of Cigarette Spending on Poor Households Spending Pattern in Indonesia, 2010 (in Percentage and Point Percentage)

	Expenditure	Smoking Household (%)	Non Smoking Household (%)	Difference
1	Housing	33.79	38.11	-4.32
2	Basic food	12.21	12.61	-0.40
3	Other non food	9.81	10.01	-0.20
4	Other food and drink	8.77	10.09	-1.32
5	Transportation	6.16	5.44	0.72
6	Cigarette	5.43	0	5.43
7	Education	5.04	4.88	0.16
8	Clothing	4.87	4.28	0.59
9	Vegetable and fruit	4.8	5.64	-0.84
10	Health	4.61	4.78	-0.17
11	Meat, fish and egg	4.52	4.18	0.34
	Total food excl. cigarette	30.29	32.52	-2.23
	Total non food	64.28	67.48	-3.20

Source: Susenas 2010, processed

in affecting individuals decision to smoke or not. With the signs of coefficient found, we can interpret that probability of individual for smoking is higher with lower education attainment and lower age and if the individual is male and has or had married. The other variables in the model, which are working status (working or not working), resident location (rural or urban), and individual earning, statistically have no significant effect on individuals smoking decision. The odd ratio number of 0.89 (certainly less than 1) found for education variable in the same table, further indicates that individual who attains a certain level of education will have less probability to smoke, that is 0.89 times, than individual whose education attainment is one level lower.

Therefore, the logistic regression test conducted in this study also confirms the negative correlation between education level attainment and individuals decision to smoke as has been found by Ahsan and Tobing (2008) and Terblance (2012). As a result, a vicious cycle from the smoking behavior in poor households is most likely to continue unless certain action is made to encourage the current smokers in those poor households to quit smoking.

4.2. Regressivity Analysis

This section attempts to answer the first question of this study, whether the current excise tax on cigarette regresive or not. The first part of this section will describe the distribution of cigarette taxation with respect to brand, class of excise tax and income group. Then it followed by analysis of the result computing the regressivity of tax burden over income group using IFLS data.

4.2.1. IFLS Data

The Indonesia Family Life Survey is a continuing longitudinal socioeconomic and health survey. It is based on a sample of households representing about 83% of the Indonesian population living in 13 of the nation's 26 provinces in 1993. The survey collects data on individual respondents, their families, their households, the communities in which they live, and the health and education facilities they use. In this study, we use IFLS4 or the wave of the year 2007 because of the avaibility of key variables for computing tax burden.[4] In particular,

[4]IFLS4 was a collaborative effort of RAND, the Center for Population and Policy Studies (CPPS) of the

Table 6: Mean Comparison of Portion of Expenditures between Poor Households with and without Smoker Using T-Test

	Expenditure	T-test	Sign
1	Basic food	significant	-
2	Meat, fish and egg	significant	+
3	Vegetable and fruit	significant	-
4	Other food and drink	significant	-
5	Housing	significant	-
6	Health	significant	-
7	Education	not significant	0
8	Transportation	significant	+
9	Clothing	significant	+
10	Other non food	significant	-
	Total food excl. cigarette	significant	-
	Total nn food	significant	-

Source: Susenas 2010, processed. (+) means smoking HHs allocate spending more than non-smoking HHs. (-) means smoking HHs allocate spending less than non-smoking HHs.

Figure 1: Logistic Regression on Determinants of Individuals Decision to Smoke

```
Logistic regression                               Number of obs   =      22446
                                                  LR chi2(7)      =   11127.67
                                                  Prob > chi2     =     0.0000
Log likelihood = -9961.1596                       Pseudo R2       =     0.3584

------------------------------------------------------------------------------
       smoke |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  educind2007 |  -.1134322   .0127767    -8.88   0.000    -.1384742   -.0883902
     age2007 |  -.0180212   .0015125   -11.91   0.000    -.0209856   -.0150567
     sex2007 |   4.555676   .0765704    59.50   0.000     4.405601    4.705752
 marstat2007 |   .2148413   .0329136     6.53   0.000     .1503319    .2793507
    work2007 |  -.0598071   .0378953    -1.58   0.115    -.1340806    .0144664
     loc2007 |  -.0344201   .0370184    -0.93   0.352    -.1069748    .0381346
    earn2007 |   3.46e-09   2.43e-09     1.43   0.154    -1.30e-09    8.22e-09
       _cons |  -3.183906    .116221   -27.40   0.000    -3.411695   -2.956117
------------------------------------------------------------------------------
```

the section "3B-Smoking" of the data publication has questions on smoking behaviour that includes amount spent, number of stick, and type of cigarette smoked. This is only found in wave 2007 and not in earlier wave, so that it provides possibility to extract the Indonesia's cigarette tax burden and furthermore to analyze its regressivity in IFLS4.

The sample size extracted for the analysis consists of 4095 individuals that have non-zero spending on tobacco product. The ages are varying between 15-83 years old. Among these individuals, 74% are the head of the household and the remaining are family members.

To compute the tax burden in the IFLS, we pair the cigarette's excise tax and the type of cigarette consumed by individual sample along with the complexity of the tariff structure. The complexity of Indonesias excise tax is reflected by not only the two types of the specific and ad-valorem tax within the tax paid, but also the rates are further classified by types of tobacco product and the scale of producers. In 2007, refers to Ministry of Finance 's Ministerial Decree Number 118/PMK.04/2006, the ad-valorem tax has eight class of tariff ranging from 4% to 40% based on combination of types of tobacco product and producers scale. As for the specific tax, it has three rates: Rp3, Rp5 and Rp7 per stick, again based on combination of type of tobacco product and producers scale. The sample that we are using consists of

University of Gadjah Mada and Survey METRE.

Figure 2: Odds Ratio of Logistic Regression on Determinants of Individuals Decision to Smoke

Logistic regression — Number of obs = 22446; LR chi2(7) = 11127.67; Prob > chi2 = 0.0000; Log likelihood = -9961.1596; Pseudo R2 = 0.3584

smoke	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
educind2007	.8927647	.0114066	-8.88	0.000	.8706858	.9154036
age2007	.9821402	.0014855	-11.91	0.000	.979233	.9850561
sex2007	95.1711	7.287288	59.50	0.000	81.90837	110.5814
marstat2007	1.239665	.0408018	6.53	0.000	1.16222	1.322271
work2007	.9419462	.0356954	-1.58	0.115	.8745196	1.014572
loc2007	.9661655	.0357659	-0.93	0.352	.8985483	1.038871
earn2007	1	2.43e-09	1.43	0.154	1	1

10 brands and then distributed into 4 class of excise tax: SKM I, SKM II, SPM I and SKT I[5]. Table 7 describes the pair and its shares based on number of respondents for each class of tax tariff. It is clear that SKM1 and SKT1 have more various brand than the two other classes. Gudang Garam Surya and Djarum 76 Kretek are the brands with highest proportion of consumers in SKM1 and in SKT1 respectively.

In general, consumption tax that is measured by ATR concept, is regressive as the consumption is also regressive. This is because the rich tend to save and invest more of their income than the poor or the poor spend more of their income on consumption. This presumption is confirmed using IFLS4 on the share of consumption among deciles. Table 8 shows that the poorest idividuals in the first decile consume thirty times than individuals in the tenth decile.

4.2.2. Average Tax Burden of Cigarette Excise Tax over Income Group

To compute the tax burden for each individual in the sample, we implement equation 1 to IFLS4 data. First we compute the imputed price (expenditure/sticks) of cigarette consumed by each decile to show wheter the price effect makes the regressivity pattern. The second column of Table 5 shows the result. It is shown that indeed the second decile has the lowest price rather than the first decile as expected. However, there is no clear pattern of increasing of imputed price over deciles as in general case. On the other hand, the sticks clearly justifies the increasing pattern over deciles, where the first decile consumes only half than the tenth decile in average.

In 2007 there are two types of tax levied to cigarette, the specific tax and the ad-valorem tax. We compute the specific tax as the rate times the number stick consumed and the ad-valorem tax as the rate times the total expenditure in a month. The estimated value are presented in sixth and seventh column of Table 9. It is increasing over deciles and arguably it is caused by increasing pattern of consumption level (sticks) rather than price. This can be shown as the comparisons between the first and tenth decile in terms of specific, ad-valorem and total tax expenditure show exactly the same figure as the sticks, the first decile consumes only half than the tenth decile in average. *The Tax Burden*

This study has two queries regarding the regressivity of cigarette tax in Indonesia: the static figure of the tax regressivity and the resulted figure of the tax regressivity if there would be a tax increase. The 9^{th} column of Ta-

[5]SKM stands for *Sigaret Kretek Mesin*, it is machine produced non-filter cigarette. SPM stands for *Sigaret Putih Mesin*, it is machine produced with filter cigarette. SKT stands for *Sigaret Kretek Tangan*, it is hand made and non-filter cigarette. The producers scale are classified into groups, where I refers to production more than 2 billion sticks per year, II refers to production more than 500 million sticks and less than or equal to 2 billion sticks per year, III refers to production less than 500 million sticks per year.

Table 7: The Distribution of Sample over Brand in Each Taxation Class(%)

No	Brand	SKM1	SKM2	SPM1	SKT1
1	Gudang Garam Merah	-	-	-	17
2	Gudang Garam Surya	38	-	-	-
3	Gudang Garam Internas	15	-	-	-
4	Sampoerna A Mild	24	-	-	-
5	Sampoerna Hijau	-	-	-	24
6	Djarum Super	24	-	-	-
7	Djarum 76 Kretek	-	-	-	32
8	Bentoel Filter	-	100	-	-
9	Marlboro	-	-	100	-
10	Dji Sam Soe	-	-	-	28
	Total	100	100	100	100

Note: The % is computed by share of individual to total number of respondents (4,095 individuals).

Table 8: Cigarette Expenditure as Proportion of Earning per Month by Decile

Decile	Average	Min.	Max.
1	0.31	0.012	6.40
2	0.08	0.006	0.30
3	0.05	0.002	0.45
4	0.04	0.003	0.12
5	0.03	0.002	0.10
6	0.03	0.002	0.10
7	0.02	0.002	0.43
8	0.02	0.001	0.22
9	0.02	0.000	0.98
10	0.01	0.000	0.28

ble 9 shows the static figure of computation of ATR based on equation (1). It is conclusive to record that the tax stucture is regressive. The ATR for lowest income group is 25 times higher than the highest income group and the pattern are precisely declining from the lowest to highest income groups. The static figure tells us that the existing (2007) cigarette tax burden puts more burden for lowest income than higher incomes.

The previous analysis tells us that at level, the tax burden is increasing over income group. However, if we measure it using ATR concept, in which we put the weight of relative income, the tendency of increasing pattern is no longer maintained, indeed the tax burden is regressive. This situation can be interpreted as follows, the richer have higher level of cigarette consumptions. However, the proportion of the total expenditure of cigarette consumption relative to their income is smaller than the poorer income group.

Secondly, the research question being addressed in this paper is the dynamic effect of any tax increase based on equation (3). Specifically we want to know the values of β_1 for each income group. To obtain the result we estimate equation 3 using PLS based on Chow-test. The last two column of Table 9 shows the econometric result. It explains the effect of any future increase of tax to the regressivity. Borren and Sutton (1992) and Towsend (1987) suggest that if we do not find decreasing price elasticity (from lower to higher income group), any further increase of tax is a regressive policy. The 11^{th} column of Table 9 shows no tendency of decreasing price elasticy, thus we might draw the same conclusion, any tax cigarette tax increase in Indonesia is a regressive policy.

In addition, if we look at the price and income elasticities obtained from the estimation of equation (3), both shows inelastic demand of price and income. The most sensitive group with respect to change in consumption is the middle income groups (i.e. 5^{th}, 6^{th}, and 9^{th} deciles). Whereas, the poorest (1^{st} decile) and the richest (10^{th} decile) only have sensitivity about a third smaller than these group. This implies that for any positive income shock will

Table 9: Summary of Excise Tax Regressivity Using IFLS (Average Measures)

Deciles	Price (Rp)	Sticks	Expenditure of cigarette (Rp/month)	Monthly income (Rp)	Specific tax (Rp)	Ad-valorem tax (Rp)	Tax Expenditure (Rp)	Tax Burden (% of income)	Price elasticity	Income elasticity
1	616	9	19,085	102,345	247	6,031	6,278	10.63	-0.15	0.08
2	553	10	21,501	257,015	290	7,241	7,531	3.00	-0.16	0.17
3	571	10	20,183	385,764	271	6,843	7,114	1.86	-0.24	0.25
4	638	11	24,227	515,223	307	8,421	8,728	1.70	-0.20	0.20
5	595	10	22,850	626,085	290	7,831	8,120	1.30	-0.24	0.29
6	612	12	25,994	787,276	330	9,020	9,349	1.19	-0.28	0.32
7	648	14	28,437	962,928	383	9,455	9,839	1.02	-0.26	0.29
8	629	13	27,530	1,218,610	361	9,632	9,993	0.83	-0.28	0.27
9	672	17	36,972	1,683,211	460	12,727	13,187	0.80	-0.21	0.29
10	670	18	38,748	4,240,529	495	13,641	14,136	0.42	-0.13	0.10

be responded heavily by the middle income groups.

4.3. Economic Impact of Simplification of Cigarette Taxation

As we previously mentioned in the introduction, the main objective of the study is to evaluate certain aspects of cigarette taxation in Indonesia. The first aspect that we observed is the cigarette tax regressivity. We already showed that the cigarette excise tax in Indonesia is regressive in Section 4.1. It means that the policy to increase the cigarette tax may result higher cost on poor households relative to rich households. Moreover, the addictiveness of nicotine may force poor households to reduce their spending on non-cigarette products. Thus, the policy to increase the cigarette tax can harm the poor instead of helping them. However, in macro and economy wide impact perspective, we might collect some opposite impacts (gain) of tax increase policy.

In this section we present a CGE model's calculation to capture the economy-wide impacts of a tax increase (a simplification) to take into account overal impacts in addition to distributive consideration in the regressivity analysis and poor household spending comparison analysis.

As we mentioned in the previous s, we employ CGE model in order to estimate the impact of the simplification of cigarette taxation. Our CGE model is based on Indonesian SAM which provides a comprehensive overview of Indonesian economy and records Indonesian socio-economic structures. Thus, the linkages across economic agent, production factors and sectors have been taken into account in the calculation. In this study, we emphasize our analysis on three macroeconomic indicators, sectoral output and sectoral employment. All scenarios represent the policy option that can be implemented by the government in order to utilize extra income from simplification of cigarette taxation. Therefore, all scenarios are comparable one to another.

In general, simplification of cigarette taxation has a negative impact on national output. However, the impact is relatively small in magnitude. Simplification of cigarette taxation (which is followed by eight alternatives in order to utilize the extra income) is expected to lower national output by minus 0.034 percent to minus 0.045 percent. SIM 1 has the largest negative impact on national output as much as minus 0.045 percent. If the GOI use the extra income to pay their debt to other country, the government will lose an opportunity to optimize the utilization of the extra income in the domestic economy. However, we did not take into account the impact of debt payment on temporal structure of Indonesian national budget. Indeed, debt payment in period t will reduce the burden of Indonesian national budget in period t+1. In this case, the GOI will have more flexibility to restructure their national budget in period t+1. In the first scenario (SIM 1), we only assumed that the GOI receive higher government income. Then, the GOI transfer the extra income abroad as debt payment. Therefore, SIM 1 is similar with the idea of "doing nothing" policy. The GOI can also keep the extra income as saving (SIM 2). This scenario will result negative impact on national output approximately minus 0.038 percent.

Alternatively, the GOI can use the extra income to finance higher government expenditure. In the scenarios, we introduce three possibilities that are quite common, namely higher expenditure on infrastructure, public sector and transfer payment. Among those three options, higher expenditure on infrastructure (SIM 3) has a relatively better impact. National output is expected to drop by minus 0.034 percent. The negative impact is even the smallest relative to other seven scenarios. The last three scenarios (SIM 6, SIM 7 and SIM 8) represent mixed policies. Table 10 shows that no mixed policies can surpass the impact of SIM 3. Furthermore, spending half of the ex-

tra income on infrastructure and use the rest of the extra income to increase transfer payment (SIM 6) is relatively better than other two mixed scenarios.

Even though the simplification of cigarette taxation has a negative impact on national output, government consumption is expected to increase as the government receives more income. SIM 3 results the largest positive impact on government consumption, whereas SIM 1 has the smallest positive impact. Government consumption is expected to increase by 4.2 percent if the GOI implement uniform excise tax in each cigarette sub-sector and spend the extra income on infrastructure. SIM 4 also has a relatively large positive impact on government consumption as much as 4.0 percent. Increasing the transfer payment (SIM 5) is estimated to lower positive impact on government consumption relative to SIM 3 and SIM 4. However, the magnitude is still substantially larger than the policy option to keep the extra income as saving or to send it abroad. Among the mixed scenarios, SIM 8 has relatively larger positive impact on government consumption. The impact is even the second largest impact on government consumption after SIM 3.

Table 10 also suggests that simplification of cigarette taxation is expected to drop household income. Without transfer payment policy, the negative impact on household income is larger than -0.13 percent. For instance, SIM 3 (which is preferable in the previous analysis) results 0.14 percent drop in household income. Furthermore, if the GOI implement uniform cigarette excise tax and transfer the extra income abroad as debt payment, household income decrease up to 0.2 percent lower than the baseline. It is the largest negative impact relative to other seven scenarios. In contrast, SIM 5 almost has no impact on household income. The impact of SIM 5 is extremely small in magnitude as much as -0.006 percent.

To sum up, all scenarios have negative impacts both on national output and household income. Meanwhile, government consumption is expected to increase in all scenarios. SIM 1 is less preferable than other seven scenarios because it has the largest negative impact on both national output and household income. The first scenario also has the smallest positive impact on government consumption. SIM 3 seems to be superior in terms of its impact on national output and government consumption. However, SIM 3 has a relatively large negative impact on household income. In order to lower the impact on household income, the GOI can implement mixed policy between infrastructure spending and transfer payment through SIM 6. SIM 6 has 0.0006 percent larger negative impact on national output, 0.89 percent smaller positive impact on government consumption, and 0.063 percent smaller negative impact on household income relative to SIM 3. Moreover, if the GOI focus more on the impact on household income, SIM 5 can be chosen. It has the smallest negative (even almost zero) impact on household income, and its negative impact on national output is 0.0012 percent larger than relative to SIM 3.

The combination between lower household income and the higher price of cigarette products due to the simplification of cigarette taxation may hurt the poor households. Unfortunately, the model is not able to show the impact on household income across group of households due to data limitation. Nevertheless, the CGE results show that the impact of the simplification of cigarette taxation on household income is small in magnitude. Furthermore, the negative impacts is expected to be much lower if the GOI use the extra income to finance higher government expenditure (even though the positive impact of higher government expenditure will not fully compensate the negative impact). Thus, we can argue that the impact of the simplification of cigarette taxation on poor households is indeed negative but not severe.

Another important result that we obtained

Table 10: The Impact of Each Scenario on Macro Indicators (%)

Scenario	National Output	Government Consumption	Household Income
SIM 1	-0.04	0.66	-0.20
SIM 2	-0.04	0.71	-0.18
SIM 3	-0.03	4.21	-0.14
SIM 4	-0.04	4.03	-0.12
SIM 5	-0.04	2.41	-0.01
SIM 6	-0.04	3.31	-0.07
SIM 7	-0.04	3.22	-0.06
SIM 8	-0.04	4.12	-0.13

Table 11: The Impact of Each Scenario on Sectoral Output(%)

Sector	SIM 1	SIM 2	SIM 3	SIM 4	SIM 5	SIM 6	SIM 7	SIM 8
Crops	0.03	0.03	0.04	0.06	0.05	0.05	0.05	0.05
Other Agriculture	-0.14	-0.18	-0.27	-0.30	-0.30	-0.28	-0.30	-0.28
Livestock	0.02	0.02	0.07	0.10	0.14	0.11	0.12	0.08
Forestry and Hunting	0.10	0.27	0.29	0.07	0.12	0.20	0.10	0.18
Fishery	0.04	0.03	0.07	0.10	0.16	0.11	0.13	0.09
Coal, Metal, Petroleum Mining	0.06	-0.10	-0.31	-0.27	-0.24	-0.28	-0.26	-0.29
Mining and Quarry	0.12	0.38	0.48	0.13	0.17	0.32	0.15	0.30
Food Products and Beverages	0.03	-0.01	-0.04	-0.03	0.00	-0.02	-0.02	-0.03
Machine Made Cigarette	-6.00	-5.99	-5.94	-5.90	-5.79	-5.87	-5.84	-5.92
Medium-Large Hand-Rolled Kreteks	-6.76	-6.75	-6.72	-6.67	-6.56	-6.64	-6.62	-6.69
Small Hand-Rolled Kreteks	-3.44	-3.43	-3.39	-3.35	-3.24	-3.32	-3.30	-3.37
Other Tobacco Products	0.04	0.04	0.07	0.12	0.23	0.15	0.18	0.10
Weave, Textile, Garment and Leather	0.05	-0.05	-0.16	-0.13	-0.08	-0.12	-0.10	-0.15
Wood	0.08	0.16	0.12	-0.02	0.04	0.08	0.01	0.05
Paper, Print, Transp, Metal Product	0.06	0.09	-0.03	-0.08	-0.01	-0.02	-0.04	-0.05
Chemical, Fertilizer, Clay and Cement	0.03	-0.05	-0.13	-0.15	-0.10	-0.11	-0.13	-0.14
Electricity, Gas and Water	0.02	0.01	0.05	0.06	0.13	0.09	0.10	0.06
Construction	0.13	0.46	0.60	0.18	0.22	0.41	0.20	0.39
Trade Services	-0.07	-0.11	-0.20	-0.24	-0.18	-0.90	-0.21	-0.22
Restaurant and Hotel	-0.06	-0.05	-0.01	-0.05	0.05	0.02	0.00	-0.03
Land Transportation Services	-0.02	-0.03	-0.03	-0.04	0.03	0.00	-0.01	-0.04
Air, Water Transportation and Communication	0.01	-0.04	-0.04	-0.04	0.04	0.00	0.00	-0.04
Transportation Supporting Services	-0.02	-0.09	-0.15	-0.19	-0.09	-0.12	-0.14	-0.17
Bank, Insurance and Financial Services	-0.04	-0.05	-0.03	-0.06	0.01	-0.01	-0.02	-0.04
Real Estate and Business Services	-0.01	-0.01	-0.02	-0.05	0.02	0.00	-0.02	-0.03
Government, Defense, Education and Other Social Services	0.21	0.22	0.70	1.50	0.77	0.74	1.14	1.10
Other Individual Services	0.04	0.06	0.14	0.13	0.22	0.18	0.18	0.14

from CGE model is the impact on sectoral output. It is one of the advantages of CGE model in which we can show the economic wide impact. The results show not only the impact on tobacco sector but also other sectors by considering the linkages between sectors. Generally, Medium-Large Hand-Rolled Kreteks sector experiences the largest negative impact in all scenarios relative to other cigarette sub-sectors. It is also the largest negative impact among all sectors that are observed. Output of Medium-Large Hand-Rolled Kreteks sector is expected to decrease in the range of -6.56 percent to -6.76 percent. The second largest negative impact is experienced by Machine Made Cigarette sector. This sector output decrease in all scenarios by between -5.79 percent and -6.0 percent. Small Hand-Rolled Kreteks sector experiences the smallest negative impact among the three cigarette sub-sectors. However, it is substantially large in magnitude if we compare with other non-cigarette sectors. The simplification of cigarette tax is expected to decrease the output of Small Hand-Rolled Kreteks sector by between -3.24 percent and -3.44 percent.

Mining and quarry sector, most agriculture sectors (except "other agriculture" sector), construction sector, public services sector, and other individual services sector are expected to receive positive impact in all scenarios. Similarly, other tobacco product sector is expected to experience positive impact in almost all scenarios with the percentage change between 0.04-0.23 percent. In contrast, six other sectors (other agriculture sector, electricity, gas and water sector, trade services sector, bank, insurance and financial services sector, real estate and business services sector, and transportation supporting sector) experience negative impact in all scenarios. Three manufacturing sectors (food products and beverages sector; weave, textile, garment and leather sector; and chemical, fertilizer, clay and cement sector) and coal, metal, petroleum mining sector are expected to receive negative impact in almost all scenarios other than SIM 1.

Table 11 shows the detailed estimated impact of simplification of cigarette tax on sectoral output. SIM 1 is expected to increase all agriculture sectors (except other agriculture sector) and mining sectors. Manufacturing sectors (other than cigarette sub-sectors) will also benefit from the policy under the first scenario. Services sectors are mostly experiencing disadvantage due to the SIM 1 implementation. If the GOI choose to keep the extra income as saving (SIM 2), all sectors that are previously experiencing negative impacts (under SIM 1) are expected to experience even worse negative impact. Five sectors (coal, metal and petroleum mining sector; food products and beverages sector; weave, textile, garment and leather sector; chemical, fertilizer, clay and cement sector; air, water transportation and communication sector) are expected to experience negative impacts. Those five sectors previously gain positive impacts under SIM 1. Interestingly, other sectors that are not mentioned above experience positive impacts even larger than under SIM 1.

The comparison between SIM 1 and SIM 2 can also be applied for SIM 2 and SIM 3. If the GOI implements SIM 3, some sectors that are previously experiencing negative impacts under SIM 2 are expected to experience even worse negative impact. Two sectors (other tobacco products sector and paper, print, transp, metal products sector) that are previously experiencing positive impacts under SIM 2 are expected to experience negative impacts. Furthermore, sectors other than mentioned above gain larger positive impact under SIM 3 relative to SIM 2. The question that may arise: Why some sectors can benefit and some other not? The first argument is the composition of labor across sectors. If the GOI spends more money on a particular sector, the sector will demand more labor. These will change the equilibrium wage in the labor market. More labor will move to other sectors that are relatively

more attractive (in terms of wage). Since we assume that the total number of labor in the economy is fixed, some less attractive sectors will have fewer labors. Consequently, those less attractive sectors will experience negative growth on their output. The second argument is the linkage between a sector and cigarette sub-sectors. Other agriculture sector experiences a negative impact in all scenarios because this sector has a strong linkage (especially forward linkage) with cigarette sub-sector. The most important inputs for cigarette sub-sector are tobacco and clove. Both products are produced by other agriculture sector.

SIM 4 has relatively similar results to SIM 3. The impacts of both scenarios across sector have a completely identical pattern. Indeed, government, defense, education, and other social services sector receive the highest positive impact as much as 1.50 percent. SIM 5 also has an almost similar impact to SIM 4 except for wood products sector, restaurant and hotel sector, and land transportation services sector. In terms of the percentage change, the impacts are quite moderate across sectors. However, three cigarette sub-sectors experience the smallest negative impact under SIM 5 relative to other scenarios. Moreover, other tobacco sector also experiences the largest positive impact. SIM 6 has an almost similar impact with SIM 3. The main differences are only on land transportation services sector, real estate and business services sector, and restaurant and hotel sector. Those three sectors are almost unaffected under SIM 6 since the impacts are really small in magnitude. The last two scenarios (SIM 7 and SIM 8) have a completely similar impact in terms of its pattern across sectors and also the percentage changes.

Table 12 shows the estimated impact of simplification of cigarette tax on sectoral employment. In general, the impacts of simplification of cigarette tax on sectoral employment are almost similar both in pattern and magnitude with the impacts on sectoral output. We identify that only one sector (electricity, gas and water sector) that experience a completely different impact and five sectors that experience minor differences. The simplification of cigarette tax is expected to increase the total output of electricity, gas and water sector and decrease its employment. Why the outputs of the sector still increase even though its employment decrease? In order to find the answer, we should consider the character of the sector and the magnitude of the impacts. Electricity, gas and water sector is one of the capital intensive sectors in the economy. The proportion of sectors expenditure on capital to total primary input is 87 percent. Moreover, the impact of the scenario on the sectors employment is only less than 0.27 percent. Thus, electricity, gas and water sector still experience an increase in output. The same argument can also be applied to explain why other tobacco products sector experiences negative impact on its employment but positive impact on its output under SIM 3. Four other sectors that experience the same pattern are air, water transportation and communication sector (under SIM 5, SIM 6, and SIM 7); bank, insurance and financial services sector (under SIM 5); real estate and business services sector (under SIM 5 and SIM 6); and other individual sector (under SIM 4).

In the downstream sector of the tobacco sectors, two sectors will experience negative impact, namely other agriculture sector and electricity, gas and water sector. Employment in agriculture sector is expected to drop by -0.14 percent under the first scenario. It is understandable since two main intermediate input for tobacco sector, tobacco and clove, are included in other agriculture sector. The negative impact is even much larger in other seven scenarios. The main argument behind this is the interaction across sector in the economy due to higher government saving and higher government spending. However, the impact is really small in magnitude ranging from -0.14 to -0.29 percent. The similar pattern is also

Table 12: The Impact of Each Scenario on Sectoral Employment(%)

Sector	SIM 1	SIM 2	SIM 3	SIM 4	SIM 5	SIM 6	SIM 7	SIM 8
Crops	0.03	0.03	0.04	0.06	0.04	0.04	0.05	0.05
Other Agriculture	-0.14	-0.18	-0.27	-0.31	-0.31	-0.29	-0.31	-0.29
Livestock	0.02	0.03	0.07	0.08	0.12	0.09	0.10	0.08
Forestry and Hunting	0.10	0.27	0.28	0.05	0.09	0.18	0.07	0.16
Fishery	0.03	0.03	0.06	0.08	0.12	0.09	0.10	0.07
Coal, Metal, Petroleum Mining	0.05	-0.11	-0.34	-0.33	-0.27	-0.31	-0.30	-0.34
Mining and Quarry	0.12	0.37	0.47	0.13	0.17	0.32	0.15	0.30
Food Products and Beverages	0.03	-0.04	-0.11	-0.11	-0.05	-0.08	-0.08	-0.11
Machine Made Cigarette	-6.00	-6.03	-6.04	-6.00	-5.85	-5.94	-5.92	-6.02
Medium-Large Hand-Rolled Kreteks	-6.76	-6.78	-6.76	-6.73	-6.60	-6.68	-6.66	-6.75
Small Hand-Rolled Kreteks	-3.45	-3.46	-3.44	-3.41	-3.27	-3.36	-3.34	-3.43
Other Tobacco Products	0.04	0.00	-0.01	0.03	0.18	0.08	0.10	0.01
Weave, Textile, Garment and Leather	0.04	-0.09	-0.24	-0.22	-0.13	-0.19	-0.17	-0.23
Wood	0.08	0.12	0.05	-0.07	0.00	0.03	-0.03	-0.01
Paper, Print, Transp, Metal Product	0.06	0.05	-0.12	-0.19	-0.08	-0.10	-0.14	-0.15
Chemical, Fertilizer, Clay and Cement	0.02	-0.10	-0.25	-0.31	-0.20	-0.22	-0.26	-0.28
Electricity, Gas and Water	-0.02	-0.06	-0.18	-0.36	-0.10	-0.14	-0.23	-0.27
Construction	0.12	0.41	0.49	0.08	0.16	0.33	0.12	0.29
Trade Services	-0.07	-0.10	-0.20	-0.27	-0.19	-0.20	-0.23	-0.23
Restaurant and Hotel	-0.05	-0.05	-0.02	-0.11	0.02	0.00	-0.05	-0.07
Land Transportation Services	-0.02	-0.05	-0.06	-0.07	0.01	-0.03	-0.03	-0.07
Air, Water Transportation and Communication	0.00	-0.07	-0.18	-0.31	-0.10	-0.14	-0.21	-0.24
Transportation Supporting Services	-0.02	-0.10	-0.19	-0.27	-0.14	-0.16	-0.20	-0.23
Bank, Insurance and Financial Services	-0.07	-0.07	-0.18	-0.40	-0.17	-0.17	-0.28	-0.29
Real Estate and Business Services	-0.04	-0.04	-0.17	-0.39	-0.16	-0.16	-0.27	-0.28
Government, Defense, Education and Other Social Services	0.19	0.20	0.64	1.36	0.70	0.67	1.03	1.00
Other Individual Services	0.03	0.04	0.07	-0.01	0.14	0.10	0.06	0.03

applicable for electricity, gas and water sector. In the upstream sector of the tobacco sectors, employment in restaurant and hotel sector is expected to decrease by between -0.02 to -0.36 percent.

5. Concluding Remarks

This paper has three main objectives related to cigarette excise taxation in Indonesia. The first is to test the difference of poor household's spending with and without smoker. The second objective is to test the validity of regressive tax burden of cigarette excise taxation. The first objective is related to second objective in terms of consequences of increasing cigarette tax to poor households in terms of essential spendings. If the tax burden is regressive, it means that any tax increase will put more burden to the poorer and considering the nature of addictive substance of cigarette, the poorer will tend to sacrifies essential spendings such as health and education. However, tobacco product is more likely depend on many sectors as well as other sectors depend on cigarette sector. Therefore, the third objective is to capture all macro effect of an increase of cigarette excise tax and it include total output, employment, government consumption and sectoral impacts. We complete the analysis using a CGE model based on decomposed Indonesian's SAM sectors using cigarette sectors.

Regarding the first queries, this paper finds the statistically significant of the difference (lower) between household with and without smokers on their essential spending including basic food and health, but not education. This finding magnifies the negative impacts of cigarette tax increase policy. Tax increase is not only puts more burden to them, but also harms their essential spendings. The second queries find that the current Indonesian cigarette excise tax is regressive and any increase of cigarette tax is a regressive policy. The welfare consequences for poor smokers is clear, any increase in taxation will put more burden on poorer people rather than the richer. Lastly, the computable general equilibrium models the scenarios of cigarette excise tax increase shows a not severe decrease of national output, sectoral output and household income and employment. In addition, it gives government higher consumption depending the way additional revenue from tax increase is allocated. The alloacation of infrastructure sector has the highest impacts on government spending.

To sump up, the findings of this paper suggest two important policy recommendations. In order to implement excise tax increase policy, the government needs to address seriously the distibutive policy such that the poorer income group obtain enough compensation to maintain their essential spending that harmed by the policy. This action, also in same result can be obatined by making a specific and targetted (i.e. incentives policy) to make the poorer with smokers to quit. Secondly, on the macro ground, measured by government consumption and household income, it is better for the government to spend additional revenue from cigarette tax increase on infrastucture (construction sector).

6. References

[1] Ahsan, A., Wiyono, N., and Setyonaluri, D. Illicit Cigarettes in Indonesia. Demographic Institute FEUI & Duke-SEATCA; 2010

[2] Ahsan, A. and Tobing, M.H.L. Study of the Impact of Tobacco Consumption Among the Poor in Indonesia. Demographic Institute FEUI; 2008

[3] Ahsan , A. and Wiyono, N. An Analysis of the Impact of Higher Cigarette Prices on Employment in Indonesia. SEATCA; December 2007

[4] Barbara S. et al. Tobacco Economics in Indonesia. Paris: International Union Against Tubercolosis and Lung Decease; 2008

[5] Borren, P. and Sutton, M. Are Increases in Cigarette Taxation Pregressive? Health Economics, Vol. 1; 1992, pp. 245-253

[6] Chernick, H. and Reschovsky, A. Yes! Consumption Taxes Are Regressive. Challenge, Vol. 43, No.5; September/October 2000, pp. 60-91

[7] Djutaharta, T. et al. Aggregate Analysis of the Impact of Cigarette Tax Rate Increase on Tobacco

Consumption and Government Revenue: the Case of Indonesia. Health, Nutrition and Population (HNP): Economics of Tobacco Control Paper, No. 25; January 2005

[8] Hartono, D., Resosudarmo, B.P., Eksistensi matriks pengganda dan dekomposisi matriks pengganda Pyatt dan Round dari sistem neraca sosial ekonomi. Ekonomi dan Keuangan Indonesia 46 (4), 473496, 1998

[9] Lee, Jie-Min, et al. The effect of cigarette price increase on the cigarette consumption in Taiwan: evidence from the National Health Interview Surveys on cigarette consumption, BMC Public Health, 4(61); 2004

[10] Pyatt, G. and Round, J., Accounting and fixed price multipliers in a social accounting matrix framework. Economic Journal 89: 850873, 1979

[11] Remler, D.K. Poor Smokers, Poor Quitters, and Cigarette Tax Regressivity. American Journal of Public Health, Vol.94, No.2; February 2004, pp. 225-229

[12] Sadoulet, E., de Janvry, A., Quantitative Development Policy Analysis. Johns Hopkins University Press, Baltimore, 1995

[13] Stiglitz, J. Economics of the Public Sector. 3rd ed. New York, NY: W.W. Norton & Co; 2000

[14] Tamaoka, M. The Regressivity of a Value Added Tax: Tax Credit Method and Subtraction Method a Japanese Case. Fiscal Studies, Vol. 15, No.2; May 1994

[15] Terblanche, T. The Opportunity Cost of Tobacco in South Africa. University of Cape Town: Unpublished; 2012

[16] Townsend, J. Cigarette Tax, Economic Welfare and Social Class Patterns of Smoking. Applied Economics, Vol. 19; pp. 355-365, 1987