

Determinant of Fuel Consumption in Indonesia

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Abstract

Fuel consumption in Indonesia is increasing due to rising incomes, the number of motor vehicles in Indonesia. The purpose of this study was to determine the effect of fuel price policy, motor vehicles (motorcycles), per capita income on the consumption of fuel (Premium). The object of this study is the fuel consumption in the Republic of Indonesia period 1985-2014. The design of this research study with a quantitative approach. Analyzed using Multiple Linear Regression Ordinary Least Square method (OLS). Based on the results of this study concluded that the pricing policies have a significant effect on the consumption of premium, per capita income has positive influence on consumption of premium, the number of motorcycles positive effect on premium consumption, as well as fuel prices, per capita income, and the number of motorcycles simultaneously positive effect on consumption of premium.

INTRODUCTION

Fluctuations in world oil prices impacting the oil prices and oil consumption in Indonesia. Indonesian government has made various policies on the price of fuel in Indonesia. Any policy aimed to stabilize the fuel price due to rising fuel prices. The increasing of fuel price will affect the prices of other goods. The price of fuel in Indonesia is strongly influenced by world oil prices because Indonesia need an oil import to meet domestic demand. The policy to adjust the fuel price especially premium fuel type has occurred several times since 1980. Start from President Soeharto until 2015 at the current government of President Joko Widodo. It can be seen that during the last 22 years the Indonesian government has implemented a policy of changes in fuel prices in both the increasing and decreasing price policy during different presidential era.

The government now make a new policy in fuel prices. The price now tend to be volatile because follows the world oil price. It contained in the Regulation of the Minister of Energy and Mineral Resources of the Republic of Indonesia No. 04 of 2015 on "Amendment to Regulation of the Minister of Energy and Mineral Resources No. 39 of 2014 on the Calculation of Retail Price of Retail Fuel" decides the calculation of the retail price of the type of fuel in the form of Solar and Premium oils, the base price uses the average market price index (world oil) and the rupiah exchange rate against the US dollar with the buying rate of Bank Indonesia every 25 months prior to the 24th of the current month for the calculation of retail price next month minus subsidy at most Rp.1000, -. So, the price of fuel at any time may change depending on world oil prices, US dollar exchange rate for fixed subsidies.

Consumption of subsidized fuel increased annually. Despite, the price also increase slightly. During the administration of President SBY for 10 years, the fuel price change 7 times. This is inversely happen in the recent government the change in the premium pricing policy has changed five times over the past 7 months and the policy has been made within a relatively short

span of time (Ministry of Energy and Mineral Resources 2014).

Kurtubi (1998: 385) states that an increase in fuel prices (eg policies to reduce fuel subsidies or policies with a motive to obtain government revenue from fuel tax or oil net income) will lead to a decrease in fuel consumption level even if the decline is relatively small ie less the price increase itself. In contrast, Darmaputera and Kurnaedy (1999: 15) states that the price policy (either increase or lower it) will not affect much on premium consumption. The study was conducted in 1999 when the fuel price policy tend to fixed at that time. Changes in fuel price policy, especially the premium price in the current government will have implications for the consumption of premium in Indonesia and the price set for the current premium is not much different from the price set for Pertamina.

According to (Padilla & Aracil, 2013) Increased fuel prices lead to a decrease in the rate of construction of single-family homes. The level of premium fuel consumption is not only influenced by changes in the fuel price policy but also by per capita income. Darmaputera and Kurnaedy (1999: 15) mentioned that premium is a relatively inelastic basic necessity for the rise and fall of income. Thus the premium is not only consumed by those with relatively high incomes, but also those with relatively low incomes. It show that premium does not have many alternatives to substitutes. If the premium price is raised too far, the impact will be felt on all sections and classes of society. According to population data and income per capita in Indonesia from 1990-2014. Income per capita increases every year. With these conditions it will affect the consumption of fuel oil.

An increase in fuel prices will have a negative impact on the transportation sector (Setyawan, 2014). Similarly, Yang and Timmermans, (2013) states that Fuel prices are negatively correlated with spending time traveling by car. The number of motor vehicles also has an effect on premium consumption in Indonesia. The growth of motor vehicles in Indonesia has increased year on year. The number of motorcycles has increase highly. An

increase in the amount of 7 million units per year. With a significant increase in the number of two-wheeled vehicles will also have implications for premium consumption in Indonesia. Research Darmaputera and Kurnaedy (1999) found that the number of motor vehicles is one of the factors affecting fuel consumption in Indonesia in 1999.

The purpose of this study is to determine how the influence of Price, Income per capita, and the number of Motorcycles simultaneously to Premium Consumption either partially or simultaneously.

RESEARCH METHOD

This research uses quantitative approach. According to Azwar (2004: 5) describes that research with quantitative approach emphasizes its analysis on numerical data processed by statistical methods. Data used in this research is secondary data and in form of time series. According Sarwono (2006: 17) secondary research using materials that are not from the first source as a means to obtain data or information to answer the problem under study. Time series data is chronologically arranged data according to time on one particular variable. Time-frame data is used to see the effect within a certain time span (Kuncoro, 2007: 24).

Table 1. Type and Source of Data

Fuel consumption	Energy and Mineral Resources Ministry
Fuel price	Energy and Mineral Resources Ministry
Income per capita	World Bank
Number of motorcycle	Central Statistic Bureau

Source: Secondary data, processed: 2015

Data collection method in this research is document study method. Sarwono (2006: 225), states that document review method is an collecting data or information by reading letters, announcements, summaries of meetings,

statements written certain policies and other writing materials. This study use multiple linear regression using EVIEWS 6.0 program, while analysis in this research is descriptive and quantitative analysis. Quantative analysis using OLS regression method that aims to determine the effect of some independent variables to the dependent variable. This method is used to find out whether Fuel Price, Per Capita Income, and a number of Motorcycle have significant influence to Premium Consumption. Further form the function can be formulated in simple as follows:

$$Y = \alpha + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \mu \dots \dots \dots (1)$$

Whereas :

Y	: fuel consumption / (Kilo Liter)
X ₁	: fuel price / (Rupiah)
X ₂	: income per capita / (Rupiah)
X ₃	: number of vehicle / (Unit)
β ₁	: fuel coefficient
β ₂	: vehicle coefficient
β ₃	: income per capita coefficient
α	: constant
μ	: error

This research conduct regression model test before hypotesis test. The test in this research is classical assumption test consisting of normality, heteroscedasticity, multicollinearity, and autocorrelation. Hypothesis test in this research use Determination Coefficient Test (R²), Individual Parameter Significance Test (t-Statistic Test), and Analysis of Variance / F-Statistic Test.

RESULTS AND DISCUSSION

Multiple linear regrei model can be called a good model if the model meets the assumptions of data normality and is free of classical statistical assumptions, whether it is heteroscedicity, autocorrelation, multicolorality or able to be called BLUE (Best Linear Unbiased Estimator) (Gujarati 2012).

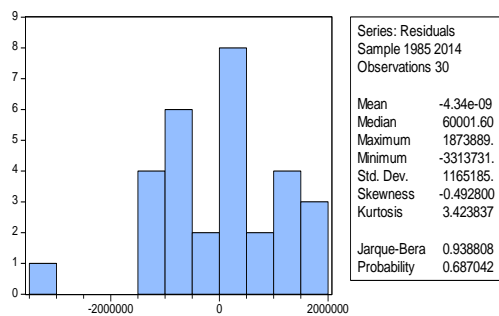


Figure 1. Normalitas Test

Based on normality test results. Jarque-Bera value and probability value is 0.938808 and 0.687042. from these results it can be concluded that the residuals in the data are normally distributed because the value of probability is close to zero or far from one.

Collinearity test is needed to determine whether there are independent variables that have similarities with other independent variables in one model. As for the detection by using comparing R-Square Compound with R-Square Partial, if R-Square Compound > R-Square Partial it means that model are not contains collinearity. (Gujarati, 2012).

Table 2. Collinearity test

Variable	R-Partial	R-Compound
X ₁ , X ₂	0.443673	0.974979
X ₁ , X ₃	0.935643	0.974979
X ₂ , X ₃	0.456531	0.974979

Source: Data processed

In Table 2 it can be seen that one variable is exposed to multicollinearity. According to the test, all R-Partial variables are smaller than

R-Compound. It means this model are fit.

Heteroscedasticity test using White test by comparing Prob-Chi Square with α 5%. If the value of Prob-Chi Square > α 5% means the model passes from heteroscedasticity.

Tabel 3. Heteroskedasticity Test: White

F-statistic	3.838647	Prob. F(9,20)	0.2059
Obs*R-squared	19.00048	Prob. Chi-Square(9)	0.3252
Scaled explained SS	17.29586	Prob. Chi-Square(9)	0.7443

Sumber : Hasil olah data Eviews 6.0

Based on the data, the Prob-Chi Square is 0.7443 which means greater than α 5%. It can concluded that this model is free from heteroscedasticity problem.

Autocorrelation problem could be checked from comparing the Durbin Watson (DW) value with the Durbin Watson Test Bound table. (Gujarati 2012). It can be detected by comparing the DW statistics with DW tables. The values of dl and du with the number of independent variables 3 and N of 30 are respectively 0.941 and 1.510. therefore, the decision is the model is free from autocorrelation when $du < dw < dl$ (1,510 < 1,520 < 2.49) is acceptable . The conclusion that can be drawn is this model are free from Autocorrelation.

As described in the previous chapter, this study aims to analyze the effect of fuel price policy, a number of Motorcycle and per capita income towards fuel Consumption. This study using Liniear Multiple Regression model with ordinary least squares method (OLS) using EVIEWS 6.0, Regression results as follows:

Table 4. Multiple regression result

Variable	Coefficien	t-Statistic	Probabilitas
@LOG(HARGA)	3160169	4.150948	0.0003
PENDAPATAN	0.092749	2.635355	0.0000
SEPEDA_MOTOR	0.142935	6.477767	0.0000
C	-17194450	-4.365578	0.0002

Source: Data processed

* α = 5%

Here is the equation related to the regression output.

$$Y = -17194450 + 3160169X_1 + 0.092749X_2 + 0.142935X_3 + \mu \dots \dots \dots (2)$$

The results of the analysis in Table 4 can be estimated that the value of Adjusted R² = 0.977568 indicates that the variation of the fuel consumption change (Y) is able to be explained simultaneously by the variables of Fuel Price (X₁), Income per capita (X₂), and Number of Motorcycles (X₃) equal to 97.7%, while the rest of 2.3% is explained by other factors exclude the model.

The t-statistic test is done by comparing t-tables with t-Statistics. Regression analysis results found that Fuel Price does not significantly influence fuel consumption. While the income partially influence the fuel consumption.

F test conducted in this study is to look at the probability of F-statistics on the regression output. This research result indicates that simultaneously all independent variables ie Fuel Price, income per capita and Number of Motorcycles have a significant effect on fuel Consumption.

Price is the unit of value assigned to a commodity as counterpart information from the producer of the commodity owner. In economic theory, the price of a goods or services in the competitive market is determined by the demand and supply interaction in the market. Fuel price has positive coefficient of 3160169. There is an increase in fuel price of Rp. 1000, - it will increase a fuel Consumption to 3.1 million kiloliters. this is in accordance with the research hypothesis that Fuel Price has a positive and significant influence on fuel Consumption.

Price policy (either up or down) will not have much effect on fuel consumption. Fuel has become the basic necessities, which are relatively inelastic with the ups and downs of prices. Thus the fuel is not only consumed by those who can afford but all of society can consume. Despite, the government intended to reduce exhaust emissions and the use of private motor vehicles. The policy of raising prices will not have a major

impact on the decline in fuel consumption. (Darmaputera and kurnaedy, 1999)

According to the research result, it is known that the number of Motorcycles has a positive coefficient 0.142935. This means that if there is an increase of Motorcycles to 1 unit, it will result in an increase to fuel Consumption of 14.3 kiloliters This is in accordance with the hypothesis of research that explains that the number of Motorcycles has a positive and significant effect on fuel Consumption and in accordance with previous research conducted by Darmaputra and Kurnaedy (1999) which shows a positive relationship between the number of Motorcycles with fuel Consumption.

The ultimate goal of development and policy is the improvement of people's welfare. In simple terms, the policy aims to increase people's income, in terms of economics is referred to as national income. The welfare of society can also be measured by dividing the national income by the number of peoples. The result for this is called the per capita income.

Income percapita has a positive coefficient of 0.092749. it means, if there is an increase in income per capita of Rp.1000, - it will result in an increase to fuel Consumption of 9.275 kiloliters. This is consistent with the research hypothesis which explains that the income Per Capita has a positive and significant influence on fuel Consumption as well as previous research conducted by Darmaputra and Kurnaedy (1999), fuel is the basic requirement, which is relatively inelastic with the rise of revenue. It shows a positive relationship between income per capita with consumption.

CONCLUSION

Based on the results and discussion, it can be concluded that the price policy, income per capita, and the number of Motorcycles simultaneously have a positive effect on fuel Consumption. Price policy partially has positive effect on fuel Consumption. In accordance with the hypothesis that fuel price has a positive and significant influence on fuel Consumption. Income per capita has a positive effect on fuel consumption. The number of Motorcycles

partially has a positive effect on fuel consumption. This is in accordance with the research hypothesis which explains that variable Number of Motorcycles has a positive and significant influence on fuel Consumption.

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