Analysis of the Effects of Economic Policy on Car Demand in Indonesia

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A R T I C L E I N F O	ABSTRACT
	This study is aims to analyze and to find out the impact of economy policy for demand for cars in Indonesia. The variables consist of this study such as GDP per capita, length of road, price of fuel, interest rate for credit consumption and demand for cars. This study uses the secondary data through the Central Bureau of Statistics analyzed by multiple linear regression and Eviews 8 programs. The results showed that R Square value of 0.994, which means that 99% of demand for cars is jointly influenced by variables in the model. While the remaining is influenced by other factors outside the model. The partial result shows the GDP per capita has not affect, length of road gives a positive affect and significant, BBM price gives a positive affect and significant

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1.   INTRODUCTION

Economic development is an important part of national development with the ultimate goal of improving people's welfare. So economic growth is one of the main targets that must be achieved. Economic development basically includes the efforts of the community as a whole to develop economic activities and increase the level of welfare of the community. Therefore, the notion of economic development can be defined as a process that causes the per capita income of the population of a society to increase in the long term. One of the factors that strongly support and influence the course of the wheels of development is infrastructure. Infrastructure refers to the physical system that provides transportation, irrigation, drainage,

Transportation in Indonesia has a very rapid development. It can be seen from the history of transportation in Indonesia. In ancient times people carried out activities of moving from one place to another only by relying on walking, using animals and simple vehicles to help transport goods so that the number of goods transported was very limited and it took a very long time to get to the destination. Transportation is one type of activity that plays a role in increasing human needs by

changing the geographical location of goods and people more effectively and efficiently so that it has the potential to cause transactions. The most commonly used means of transportation and the most dominant number used by the community is motorized vehicles, both two-wheeled and four-wheeled. The car is one of the means of transportation that is very popular with the upper middle class in general. This can be seen in the table below:

Table 1

Data Comparison of Number of Cars, GDP Per Capita, Length of Roads, Fuel Prices, and Consumption Loan Interest Rates

Year	Number of cars (passenger car)	GDP per capita	Road length	Fuel Price (premium)	Consumer loan interest rate
2007	6,877.229	7392111.69	421,535	4500	16.13
2008	7,489,852	7927938.47	437,759	6000	16.4
2009	7,910,407	7994083.16	476,337	4500	16.42
2010	8,891,041	8488596.72	487,314	4500	14.53
2011	9,548,866	9027335.72	492,398	4500	14.15
2012	10,432,259	9665117.07	501,969	4500	13.58
2013	11,484,514	9798899.43	508.000	6500	13.13

Today's transportation problem has become a very complex problem, mainly due to the increasing dependence of the city community on private vehicles, both cars and motorbikes. As a result, the number of existing 4 vehicles is not accommodated by the condition of the available road. This causes congestion to become higher and seems to be accepted as a norm for the community. This is also influenced by the lack of good and adequate public transportation facilities provided by the government which makes people tend to use private vehicles. To meet the high needs of the public in the transportation sector, banks make it easier for consumers by lowering loan interest rates so that consumers can take credit to meet their needs.

The high level of community needs causes the need for transportation facilities to also increase, in this case four-wheeled motorized vehicles or commonly referred to as cars. The increasing number of cars makes the reserves of fuel oil (BBM) dwindle. This causes the government to increase fuel imports and increase fuel prices through the policies it has made. This policy was implemented in order to divert people's desire to use private vehicles whose numbers continue to increase rapidly. The purpose of this study is to determine the effect of per capita income on the demand for cars in Indonesia, to determine the effect of road length on the demand for cars in Indonesia.

2.   RESEARCH METHOD

3.1   Data Types and Sources

The type of data used is secondary data, namely the type of data obtained through the results of the processing of the second party from the results of field research and through library research, namely research through the library. The data used were obtained through the Central Statistics Agency (BPS) with a period from 2000-2013 so that the results of this study are the results of using data during that time period.

3.2   Analysis Method

This study uses quantitative methods, namely analyzing data and matters relating to numbers or calculation formulas used to analyze the problem being studied. Data analysis using multiple linear regression. In regression analysis, the dependent variable is often influenced not only by quantitative variables according to the scale, but also by qualitative variables. (Sarwoko, 2005).

Y   = f(X1, X2, X3, X4) .... (3.1)

Or it can be explicitly stated in the following non-linear function:

e Y   = 0 . X1 1. X2 2. X3 3. X4 4.eµ .... (3.2)

To estimate the regression coefficient, Feldstein (1999) transforms into a linear form using the natural logarithm (ln) into the model so that the following equation is obtained:

Y $= \ln 0 + 1\ln X1 + 2\ln X2 + 3\ln X3 + 4\ln X4 +$ .... (3.3)

Where:

Y	= Demand for Cars in units
X1	= GDP per capita in rupiah
X2	= Road length in kilometers
X3	= fuel price in rupiah
X4	= Consumption Loan Interest Rate in percent
0	= Constant
1, 2, 3	= Parameter to be Estimated / Coefficient
☐	= Error Term

       Equation (3.3) is calculated using the linear regression analysis method and the linear regression coefficients of each variable will be obtained using the Eviews 8 program.

2.3 Basic Statistical Test

a. Test Statistics t

       This test is used to determine whether each independent variable individually has a significant effect on the dependent variable. In other words, to find out whether each independent variable can explain the changes that occur in the dependent variable significantly. Where if tcount > ttable Hi is accepted (significant) and if tcount < ttable Ho is accepted (not significant). The t test is used to make a decision whether the hypothesis is proven or not, where the significant level used is 5%.

b. Coefficient of Determination Analysis (R2)

       The coefficient of determinant (R2) essentially measures the correctness of the regression analysis model. Where the analysis is if the value of R2 is close to 1, then the independent variable is getting closer to the relationship with the dependent variable so that it can be said that the use of the model can be justified. A good model is a model that minimizes residuals meaning that the variation of the independent variable can explain the dependent variable with a of above 0.75 (Gujarati, 2003), so that a high correlation is obtained between the dependent variable and the independent variable.

c. F Statistic Test

       This test is used to test the effect of the independent variable as a whole on the dependent variable. Where if Fcount < Ftable, then Ho is accepted or the independent variables together have no effect on the dependent variable (not significant) in other words changes that occur in the dependent variable cannot be explained by changes in the independent variable, where the significance level used is 5 %.

2.4 Operational definition

       To further direct the discussion, the authors provide variable limits which include:

a. Y (Demand for Cars) Demand for cars is the number of cars (passenger cars) circulating in Indonesia in one year. Measured in units.

b. X1 (GDP per capita) GDP per capita is a picture of the average income received by each resident as a result of the production process. Measured in rupiah.

c. X2 (Road Length) Road length is the total length of district, provincial and state roads. Measured in kilometers.

d. X3 (BBM Price) The fuel price is the price of premium type of fuel in Indonesia. Measured in rupiah.

e. X4 (Consumption Loan Interest Rate) Consumption Loan Interest Rate is the Consumption Loan Interest Rate issued by BI. Measured in percent.

3. RESULTS AND DISCUSSION

3.3 Variable Development

a. Demand for Cars in Indonesia in 2000-2013.

       Transportation is something that cannot be separated from motorized vehicles, although transportation does not only consist of these things. One of the most common means of

transportation used by the public at this time is a passenger car. It started in 2000 where the number of passenger cars was only 3,038,913 units which has doubled in 2006 where the number of passenger cars amounted to 6,035,291 units. In 2013 the number of passenger cars again almost doubled from 2006 to 11,484,514 units.

b. GDP Per Capita in Indonesia Year 2000-2013

GDP per capita is one of the tools to measure the level of welfare of a country. The higher the GDP per capita of a country, the higher the purchasing power of the people of that country. GDP per capita is obtained by dividing GDP by the total population. It is known that Indonesia's GDP per capita continues to grow from year to year except in 2001 which decreased from the previous year, namely in 2000 Indonesia's GDP per capita was Rp. 6,171,342.91 to Rp. 6,083,368.92.

c. Length of Roads in Indonesia in 2000-2013

In 2013, the total road length in Indonesia was 508000 km, consisting of 38570 km of state roads, 53642 38 km of provincial roads, and 415788 km of district roads. The length of state roads and the length of provincial roads increases but does not increase every year. For example, the length of state roads only increases every four or five years. In 2000 to 2003 the length of state roads was 26271 km, then increased again in 2004 to 34628 km, and again increased in 2009 to 38570 km until 2013.

d. Fuel Prices in Indonesia in 2000-2013

Fuel prices (premium) from 2000-2013. From this table we can see fluctuations in fuel prices from year to year. In 2005, 2008, and 2013 we can see a sharp increase in prices caused by rising world oil prices which forced the government to increase fuel prices in Indonesia.

e. Interest Rate of Consumer Loans in Indonesia in 2000-2013

Consumer credit is one of the services provided by banks in the form of credit aimed at financing customer needs, especially those related to consumption activities, such as purchasing motorcycles, cars and electronic goods for personal use. The following is the interest rate on consumer loans in Indonesia in 2000-2013.

3.4 The Result of Estimating the Effect of Economic Policy on the Demand for Cars in Indonesia in 2000-2013

The results of the regression of the effect of economic policy on the demand for cars in Indonesia in 2000-2013 using the Eviews 8 program obtained the following regression results:

Table 2
Estimation Results Through Least Square Model

Independent Variable	Coefficient	T-Stats	Probability
GDP Per Capita (X1)	0.607330	1.505.109	0.1666
Road Length (X2)	1,405,037	3,292,669	0.0093
Fuel Price (X3)	0.204818	5,585,681	0.0003
Consumption Loan Interest Rate (X4)	-0.023264	-1,483,571	0.1721
Constanta	-1,346.452	-3,766.337	0.0044

5% ; R-squared = 0.994856 ; Adjusted R-squared = 0.992570 F-statistic = 435.1781 ; Prob(F-statistic) = 0.000000

The regression results are in Table 3.1 regarding the effect of economic policy on demand for cars in Indonesia in 2000-2013 where GDP per capita (x1), road length (x2), fuel prices (x3), consumer credit interest rates (x4), and demand for cars (x4) y) are:

Y = -13.46452+ 0.607330 ln X1 + 1.405037 ln X2 + 0.204818 ln X3

3.5 Interpretation of the Estimated Effect of Economic Policy on the Demand for Cars in Indonesia in 2000-2013

a. The Effect of Per Capita GDP on Car Demand in Indonesia in 2000-2013

Based on Table 3.1 by looking at each regression coefficient, it is known that GDP per capita has a coefficient value of 0.607330 and besides that, it can also be seen that the probability value is more than 5% (0.05) which is 0.1666. So it can be concluded that GDP per capita has no effect on the demand for cars in Indonesia in 2000-2013.

b. The Effect of Road Length on Car Demand in Indonesia in 2000-2013

Based on Table 3.1 by looking at each regression coefficient, it is known that the length of the road has a coefficient value of 1.405037 which means that every 1% increase in the X2 variable (road length) will have a positive effect of 1.405037 on the increase in the Y variable (car demand). In addition, it can also be seen that the probability is less than 5% (0.05) which is 0.0093. So it can be concluded that the length of the road has a positive and significant effect on the demand for cars in Indonesia in 2000-2013.

c.   The Effect of Fuel Prices on Car Demand in Indonesia in 2000-2013

Based on Table 3.1 by looking at each regression coefficient, it is known that the fuel price has a coefficient value of 0.204818 which means that every 1% increase in the X3 variable (fuel price) will have a positive effect of 0.204818 on the increase in the Y variable (car demand). In addition, it can also be seen that the probability is less than 5% (0.05) which is 0.0003. So it can be concluded that the price of fuel has a positive and significant effect on the demand for cars in Indonesia in 2000-2013.

d.   The Effect of Consumption Loan Interest Rate on Car Demand in Indonesia in 2000-2013

Based on Table 4.6 by looking at each of the regression coefficients, it is known that the interest rate on consumer loans has a coefficient value of -0.023264 and in addition it is known that the probability value is more than 5% (0.05) which is 0.1721. in 2000-2013.

3.6   Basic Statistical Test Result of Estimated Effect of Economic Policy on Car Demand in Indonesia in 2000-2013

a.   Test Statistics t

Analysis of the effect of economic policy on demand for cars in Indonesia in 2000-2013 using the 95% confidence level ($\alpha=0.005$) and the degree of freedom (df=nk=14-5=9) obtained a t-table of 1.833. From Table 3.1, it can be seen that the length of the road (X2) and fuel prices (X3) significantly affect the demand for cars (Y) where the t-statistic is greater than ttable while GDP per capita (X1) and the consumption credit interest rate (X4) are not significant. affect economic growth (Y) because the t-statistic is less than t-table.

b.   Coefficient of Determination Analysis (R2)

From the regression results in Table 4.6 regarding the effect of economic policy on demand for cars in Indonesia in 2000-2013, R2 is obtained with a value of 0.994. This means that the independent variables, namely, GDP per capita (X1), road length (X2), fuel prices (X3), and consumer credit interest rates (X4) explain the large proportion of the contribution to the demand for cars (Y) in Indonesia is 99.4 %. The remaining influence of other variables is explained outside the model by 0.6%.

c.   F Statistic Test

Testing the effect of all independent variables in the model can be done by using the F test. The effect of GDP per capita (X1), road length (X2), fuel prices (X3), and consumer credit interest rates (X4) on car demand (Y) in Indonesia with using a 95% confidence level ($\alpha=0.05$) the F-table (df1=k-1=5-1 and df2=nk=14-5=9) obtained a value of 3.63 while the regression table 3.1 obtained an F-statistic of 435,1781 so it can be seen that the estimation results in Table 3.1 are greater than F-table so that it can be concluded that together the variables of GDP per capita, road length, fuel prices, and interest rates on consumption loans have a significant effect on 46 demand for cars or in other words this equation is overall fit.

3.7   Analysis of the Effects of Economic Policy on Car Demand in Indonesia in 2000-2013

a.   **The Effect of GDP Per Capita on Car Demand in Indonesia in 2000-2013**

Based on the estimation results in equation (3.3) GDP per capita has an effect on car demand with a regression coefficient of 0.1666. And through the previous t-statistic test, it was also known that with a 95% confidence level ($\alpha=0.05$) t-table 1.833 and t-statistic 1.505109, GDP per capita has no effect on car demand. Per capita income is obtained by dividing the total GDP in a given year by the total population in that year. Thus the hypothesis which states that GDP per capita has a positive and significant effect on the demand for cars in Indonesia in 2000-2013 is not proven in accordance with the results of the study through the regression results in Table 3.1.

b.   The Effect of Road Length on Car Demand in Indonesia in 2000-2013

Based on the estimation results in equation (3.3) the length of the road affects the demand for cars with a regression coefficient of 0.0093. And through the previous t-statistic test, it was also

known that with a 95% confidence level (α=0.05) t-table 1.833 and t-statistic 3.292669, the length of the road has a significant effect on car demand.

c.   The Effect of Fuel Prices on Car Demand in Indonesia in 2000-2013

Based on the estimation results in equation (3.3) the fuel price has an effect on the demand for cars with a regression coefficient of 0.0003. And through the t-statistic test, it was previously known with a confidence level of 95% (α=0.05) t-table 1.833 and t-statistic 5.585681 then the fuel price has an effect significant to the demand for cars.

d.   The Effect of Consumption Loan Interest Rate on Car Demand in Indonesia in 2000-2013

Based on the estimation results in equation (3.3) the interest rate on consumer credit has an effect on economic growth with a regression coefficient of 0.1721. And through the t-statistic test, it was previously known that the pkula with 95% confidence level (α=0.05) t-table 1.833 and t-statistic -1.483571, the interest rate on consumer credit has no effect on the demand for cars.

4.   CONCLUSION

The demand for cars in Indonesia is influenced by GDP per capita, length of roads, fuel prices, and interest rates on consumer loans where the magnitude of these factors is 99% and the rest is influenced by other factors not included in the regression model. All independent variables together affect the demand for cars in Indonesia. The variable GDP per capita (X1) and the interest rate on consumer loans (X4) have no effect on the demand for cars in Indonesia in 2000-2013. These results are based on the coefficient value of GDP per capita which is 0.60 and the interest rate on consumer loans is -0.02. This is because the high GDP per capita has not been able to reflect the level of public welfare in general and if the income level of the community is high, the tendency of people to ask for credit will decrease. The variable length of road (X2) and fuel price (X3) have a positive and significant effect on the demand for cars in Indonesia in 2000-2013. These results are based on the coefficient value of the length of the road which is worth 1.40 and the price of fuel which is worth 0.2. This is because the growth of motorized vehicles, in this case passenger cars, must be accompanied by the growth of adequate road infrastructure so that there is no vehicle density, while the increase in fuel prices will only have an impact on the short term.

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