
PARTIAL ADJUSTMENT MODEL ON THE ANALYSIS OF FACTORS AFFECTING INDONESIA'S TOBACCO EXPORTS TO THE UNITED STATES

Siti Hajar Rahmawati

Department of Statistic, Universitas Muhammadiyah Semarang

Email: sitihajarrahmawati@gmail.com

ABSTRACT

Indonesia is having big tobacco's production and tobacco industry also the biggest industry that hiring employee from the farmer until exporter. Researcher want to investigate the export condition next years, because the tobacco policy that imposing Indonesia lowering state farmers. This research attempt to investigate about the effect of International tobacco price on the export volume, the effect of real total GDP of the United States on the export volume, the effect of exchange rate on the export volume, and the effect of previous tobacco export. The relevance economic theory that is used is demand theory and PAM (Partial Adjustment Model) is being used as analytical method. Result show that price of tobacco and the United States real total GDP has a significant and positive effect on the volume of tobacco export. Last, tobacco export at previous year has a significant and positive effect on the volume of tobacco export. From the short-run and long-run PAM regression, conclude that Indonesia's tobacco is less important to USA because elastic in the short-run and becoming inelastic in the future. The decision of buying Indonesia's tobacco is induce by income it will make in the long-run the product become non-necessity. It can be concluded that Indonesia cannot rely on tobacco export and Indonesia should make product diversification or country diversification.

Keywords: PAM, Indonesian tobacco, export

INTRODUCTION

The economic growth of Indonesia now is better after economic crisis hits. It proved by the increasing of the investment to the industrial sector and agricultural sector. To keep it Indonesia tried to urge the export goods and services. Export itself can be explained including in international trade, which is the exchange of goods and services between countries.

As one of developing countries follows an open economy system in economical policy, Indonesia believes that international economy holds an important role. So as agricultural country which is surplus in its sector, Indonesia gets many benefits. One of them is from tobacco.

Indonesia is one of larger producer and exporter of tobacco and cigarette. It

indicated by the annual production of cigarette is 245 billion pieces and total international trade in 1997 which gained US\$ 588 million. Foreign Direct Investment (FDI) also has important role which compels Indonesia's export. The central production of cigarette is in Central and East Java. Surabaya, Bojonegoro, Kudus, Kediri, and Malang are well-known regions as centers for manufacturing and trading. 90% of cigarette produced there and 10% cigarette manufacturing is in Sumatra Island, Medan is the central one.

As for the "Size of the Firm" is varying the market of tobacco can be divided into three segments are:

1. Large Enterprises: PT. Gudang Garam, PT. Djarum Kudus, British American Tobacco (BAT), PT. Bentoel

2. Medium Size Enterprises: Rothmans, Philips Morris, PT. Sampoerna, NV. Sumatra Tobacco Trading Company
3. Small Enterprises: American Tobacco Company (Richmond), Conwood Corporation (Memphis), Culbro Tobacco (Bloomfield), Fader & Son Inc. (Baltimore), Finck Cigar Company (San Antonio), Lancaster Leaf Tobacco (Lancaster), Marine marketing of California (California), Thorpe & Ricks Inc. (Rocky Mount)

Due to the high demand and consumption of tobacco, when the production is getting low which caused by the harvesting time, the use of pesticide, unfertilized, and so Indonesia has to import it. But Indonesia keeps itself as an important market for tobacco and still becomes an exporter since 1998. United States of America as one of industrialized tobacco in the world import it from Indonesia to fulfill the needs. It is known by the data from Statistic Indonesia 1996 and 1998.

The research in this thesis will focus on what factors that affect the quantity demand of Indonesian tobacco export to the United States. The factors that will be discussed are price of good, income of the country and exchange rate between countries that having international trade as well as the volume export of the previous year. According to those, some problems are arranged to get the explanation. These are:

1. International price of tobacco
Does the International tobacco price affect the demand for Indonesian tobacco export to The United States?
2. The United States total GDP
How far will the total real GDP of

- The United States affect tobacco export to the United States?
3. Exchange rate of Rupiah to US Dollar
How far does the exchange rate Rupiah to US Dollar affect the Indonesian tobacco export to The United States?

4. Volume of tobacco export Indonesia to USA previous year
How far does the previous year tobacco export affect current tobacco export? Problem Limitation is also given to limit the research.

1. The export volume of tobacco to the United States in 1981 – 2001.
2. The international tobacco price in 1981 – 2001.
3. The United States real total GDP in 1981 – 2001.
4. The exchange rate of Rupiah toward US Dollar in 1981 – 2001.
5. The volume of tobacco export Indonesia to USA at previous year.

Research objectives

1. To analyze the effect of international price of Indonesia tobacco toward export demand of Indonesia tobacco by the United States.
2. To analyze the effect of the United States total real GDP toward export demand of Indonesia tobacco by the United states.
3. To analyze the effect of exchange rate of Rupiah to US Dollar toward export demand of Indonesia tobacco by the United States.
4. To analyze the effect of volume of tobacco export Indonesia to USA at previous year toward current demand of Indonesian tobacco by the United States.

RESEARCH METHOD

The theory based on data analysis (quantitative) is a demand theory as a general, which is demand of Indonesian tobacco export by the United States. The formula:

$$Y = F(X1.X2.X3.Yt-1)$$

Y = Volume Export (ton)
 X1 = Price of International Tobacco (US\$/ Pound)
 X2 = Total Real GDP of The United States (Bill of US\$) with 1990 as the based year
 X3 = Exchange Rate (Rp/ US\$)
 Yt-1 = Volume Export at Previous Year (lagged 1 year)

The research was concentrated on the United States demand of tobacco exported from Indonesia. The research sought what variable that had impacts on the United States tobacco demand.

This section analyzes why The United States import tobacco from Indonesia. Some reason is tobacco from Indonesia has good quality especially the flue cured Virginian type, even though the quality is still less than Pakistan. Then tobacco is the basic material for cigarette and the demand for cigar in the United States places good position in trade. Most of Indonesian tobaccos used by big cigarette factory like American Tobacco Company in Richmond City. Trading between Indonesia and the United States will create advantageous in both country.

Data Sources

- International Financial Statistic (IFS), various editions.
- Statistical Year Book of Indonesia (Statistik Indonesia), various editions.
- Indonesia Foreign Trade Statistic (Biro Pusat Statistik), various editions.

Dependent Variable is the volume of Indonesian tobacco export to the United States (Q). Independent Variable is price of tobacco (P), The United States real GDP (GDP), Exchange rate Rupiah/ US\$

(Exc). Research uses PAM, so volume export at previous year will be used as independent variable. The regression that might be used in the research is log-linear.

Log linier (double log):

$$\ln Y = \ln o + 1 \ln X1 + 2 \ln X2 + 3 \ln X3 + 4 \ln Yt-1$$

Where:

$\ln o$ = autonomous $\ln Y$
 i = elasticity of each independent variable

In order to interpret the regression that consists of regression coefficient number. A model becomes valid if it is free from the presence of multicollinearity, autocorrelation and heterocedasticity. H.

A time series is a set of observations on the values that are taken variable at different times such data may be collected at regular time intervals, such as daily, weekly, monthly, quarterly, and annually. I. Test of significant approach (T-test) is a test of significance of the procedure by which sample results are used to verify the truth or falsity of a null hypothesis to know the relationship between independent variable and dependent variable individually. J. F-Statistic Testing the overall significance of the sample regression (F-test) is a test of the overall significance of the observed or estimated regression line, that is whether Y as dependent variable is linearly related to independent variable X1, X2, X3, Yt-1. K.

PAM (Partial Adjusted Model) One way to maintain the stationary is using PAM. In PAM the model is in the condition of short-run model (because there is lag in the model), since in the short-run the dependent variable may not necessary be equal to its long-run model L. The Multiple Regression Coefficient of Determination is the quantity that gives information to know the proportion of the variation in Y explained by the variables X1, X2, X3 and Yt-1. Multiple coefficient determination is an abstraction that

describes the condition of sample regression line showing all data. That R^2 lies between 0 - 1.

REGRESSION RESULT

The model used in this research is proper, shown by the size of $R^2=0,94$, it means that 94% of the variability of the independent variable is explained by the independent variable. Only 6% is explained by independent variables from outside the model. $F=63.89970$ is greater than F -table 2.85 at $\alpha = 5\%$, all independent variables have joined impact on the dependent variable. Testing in one tail test (strong theoretical expectation) with negative one-tail test showing t -value= 3.806635. Testing on real GDP (LnGDP) uses two-tail test is showing t -value= 1.742539. Exchange rate (Lnexc) testing uses positive one-tail test is showing t -value= -1.899922. Then testing on volume export tobacco at previous year (Lnvolume (-1)) is showing t -value=5.679483. Coefficient of PAM can be seen in this following data:

$$\text{LnY} = -1.214545 + 2.726410 \text{LnX1} + 0.543760 \text{LnX2} - 0.248775 \text{LnX3} + 0.664566 \text{LnYt-1}$$

$$\text{Se} = (0.732832)(0.716226)(0.312051)(0.130939)(0.117012)$$

$$\text{T-Stat} = (-1.657331)(3.806635)(1.742539)(-1.899922)(5.679483)$$

$$R^2 = 0.944567 \quad \text{Adj } R^2 = 0.929785 \quad \text{DW} = 1.878440$$

$$\text{Prob F-Stat} = 0.00000$$

RESEARCH FINDING AND DISCUSSION

1. Hypothesis is not proven. The price of tobacco (X1) has significant and positive influence on the export volume of Indonesia to the United States (at $\alpha = 5\%$).
2. Hypothesis is proven. The United States real total GDP (X2) has

significant and positive effect on the tobacco export volume of Indonesia. It means Indonesian tobacco has already been superior goods to the United States importer.

3. Hypothesis is not proven. The exchange rate (X2) has significant and negative effect on the tobacco export volume of Indonesia because the exchange rate is negative.
4. Hypothesis is proven. The previous year tobacco export (Yt-1) has a positive and significant effect on the tobacco volume export of Indonesia (at $\alpha = 20\%$).
5. All independent variables on the model have joined impact on dependent variable.

CONCLUSION AND IMPLICATION

Conclusion

- a) From the regression of time series data from 1981 - 2001 with volume of Indonesian tobacco export to the United States as the dependent variable (Ln Y) and price of tobacco (Ln X1), the United States real total GDP (Ln X2), Foreign Exchange (Ln X3) and volume of Indonesian tobacco export at previous year (Ln Yt-1) as independent variable, the R^2 value is 0.944567 (94%). It means 94% of the variability of the dependent variable is explained by independent variable chosen in this research. Only 6% is explained by variables from outside of model.
- b) From classical assumption, there are not multicollinearity, heteroscedasticity, and autocorrelation.
- c) From F-test we can conclude that all of independent variables have joint impact on the volume of Indonesian tobacco export to the United States.
- d) Price of tobacco (X1) has a significant and positive effect on the volume of tobacco export; both in short-run and long-run, price elasticity

- are elastic.
- e) The United States real total GDP (X2) has a significant and positive effect on the volume of tobacco export.
 - f) Foreign exchange rate has a significant and negative effect on the volume of tobacco export.
 - g) Tobacco export at previous year (Y_{t-1}) has a positive and significant effect on the volume of tobacco export.
 - h) The use PAM in this research is valid to explain Indonesian tobacco export to the United States.

Implication

- a) The finding X1 has influence on the volume of Indonesian tobacco export to USA. The result shows that the demand of Indonesian tobacco is elastic and is becoming inelastic in the future. It means Indonesian tobacco is less important to USA and has more substitute from other tobacco producer countries. In the future, Indonesia cannot rely on their income from tobacco export to the United States.
- b) The decision of buying Indonesian tobacco is induced by income decision. In the short-run tobacco export is showing superior but in the long-run tobacco export is showing inferior.
- c) The finding X3 has significant and negative influence. This fact shows that the fluctuation of Rupiah exchange rate does not influence the volume of tobacco export.
- d) The fact that previous tobacco export influences current tobacco export, combine with elastic price elasticity and positive income elasticity, shows that the prospect of tobacco export is a promising one.
- e) Overall, tobacco is not affected by price or by exchange rate, which can be concluded that Indonesian tobacco exports to the United States only influenced by income of the US.
- f) Indonesia has to face the fact that Indonesia cannot rely on the tobacco exports to the United States. Indonesia should make product diversification or cities diversification on the exports of tobacco.
- g) So hopefully next researchers are expected to research the volume of Indonesian tobacco exports to other country or specifically research on the several type of tobacco Indonesia.
- h) The writer suggests for the next researchers to use the ECM (Error Correction Model) to regress the data.

REFERENCES

- Edition. *Indonesia Statistic Year Book* IFS (Various Edition). *International Financial Statement*.
- Gujarati, D. 1999. *Essentials of Econometrics. 2nd Edition*. Irwin McGraw-Hill: Singapore.
- Hyman, D. 1995. *Microeconomics. 4 Edition*. McGraw-Hill: North Caroline BPS Various.