Can The Prices Of The World Crude Oil As A Proxy Cost Transportation In Trade In Asean-3?

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Abstract

The purpose of this paper is to examine the effect of crude oil prices, GDPimporter, and GDPexporter on trade in three ASEAN includes: Indonesia, Malaysia, and Thailand. In this context, the three ASEAN countries are assumed to be trading partner for two advanced countries, namely USA and Japan.To reach research purposes, this paper uses quantitative research method. As analysis technique, econometrics is being applied which consists of two ways: Ordinary Least Squares (OLS) and Panel Data. The results show that GDP exporter countries, GDP importer countries and crude oil price have significant and positive impact to trade value

Keywords: crude oil price, GDPexporters, GDPimporters, trade

JEL Classification: F10, F14

1. INTRODUCTION

Trade has long been committed by citizens of a country with citizens of other countries. The purpose of trade is to equally benefit from such acti-vities. Countries that have more exports than imports means the country receives income (surplus), but a country whose exports less imports will lose foreign exchange (deficit).

Many factors could affect trade (exports plus imports) of a country. The GDPexporter and GDPimporter referred to as the main factors that affect the trade from one country to another countries. In addition, the distance between the two countries said to be a major factor in the trade. The relationship distance with trade is a ne-gative correlation: when distance is long distance that will trade a little, when the distance is closer then the trade will increase.

Newton's gravitational theory is used in economics seek to answer about the role of size of economy (income countries, GDP) and distance in explaining the phenomenon of tra-ding. In this paper, researcher did not include distance as a proxy for transportation costs but researcher replace it with the prices of crude oil which researcher believe is a proxy that is more appropriate to describe the magnitude of transportation costs for transport always wear an oil component in a range of derivatives in addition to taking into account the distance.

The prices of crude oil fluc-tuates from time to time, there are times when riding high once but once prices fall dramatically due to various events that preceded it, generally the state of the world economy and poli-tical factors.

The prices of the world crude o-il per barell can be look at this table :

Table 1

The prices of the world crude oil

In 2000-2014 (USD per barell)

Year	2000	2001	2002	2003	2004	2005	2006	2007
Price	37,55	30,69	29,92	35,55	47,05	60,45	68,28	72,99
Year	2008	2009	2010	2011	2012	2013	2014	-
Price	100,01	58	77,1	91,39	88,95	92,41	89,08	-

Source: www.wikipedia/harga minyak mentah dunia

From Table 1 we know that price of the world crude oil is above the average for 2005 increased steadily until 2008 with a value of $ 100.01 per barrel and then fell to 58 USD per barell in 2009. In 2008 and 2009 there was the world economic crisis started from the United States and then spread to Europe and eventually the world. In the last two years (2013 and 2014) prices of crude oil was decline.

Alleyne and Lorde (2014) conducted a study of trade for the member countries of CARICOM and conclusion: differences in GDP per capita, the ratio of trade to GDP and language positive effect on trade, while the geographical distance, the excha-nge rate and the unexpected, the his-torical relationship of trade had a negative effect on trade. Another result is a variable exchange rate is very imp-ortant and CARICOM member coun-tries would be better if the trade with countries that have a higher standard of living.

Rely on these backgrounds the paper generates some research pro-blems namely:

Do GDPexporter, GDPimport-er, and prices of crude oil influence significantly to trade in Indonesia? Do GDPexporter, GDPimport-er, and pric-es of crude oil influence significantly to trade in in Malaysia? Do GDPexporter, GDPimporter, and prices of crude oil in-fluence significantly to trade in Th-ailand?

2. THEORETICAL FRAMEWO-RK AND HYPOTHESES

The literature review begins with Newton writing in the journal Philosophie Naturalis Principia Mathe-maatica (Wikipedia Indone-sian; Alleyne and Lorde (2014); Binh et al (.); Rahman (2009) on gravity using the formula:

$$F = G \frac{m1.m2}{r2}$$

Where: F is the great force of gravity between m1 and m2; G is the gravitational constant; m1 is the mass of the first object; m2 is the mass of the second object; r is the distance between multiple m1 and m2. The essence of Newton's gravitational force is mass m1 will always have attractive forces with other mass, m2 and is inversely related to the square of the distance between m1 and m2.

The first author, Jan. Tienber-gen (1962) in Rauch (2015: 1) uses gravity equation in economics with models:

$$E_{ij} = \alpha_0 Y_i^{\alpha 1} Y_j^{\alpha 2} D_{ij}^{\varepsilon 3}$$

where: Eij is export from country i to j; Yi showed GNP state i; Yj shows GNP state j; D show the distance between country i and country j; Estimates of the value of α1, α2 approaching α3 + 1 and the estimated value close to -1.

Anderson (2014) argues the ro-le of trade in national income in the

calculation of economic size: if the ratio Trade/GDP is large will lead to small economic size, whereas if the ratio of Trade/GDP is small it will lead to large economic size.

Anderson (2014) said in a trade many cost components other than the cost of transport. Other costs (dark cost) include: information cost, non-monetary barrier-regulating, licensing, taste differences, extortion, inscure contract.

Donaldson (2011) said that in addition to the transportation cost there are also the cost of trade. Total trade cost are all expenses incurred from the beginning to the goods and services reached the destinations. These costs include: tariff and non-tariff barriers (quotas, etc), transportation cost, ad-ministration hurdles, corruption, contrac-tual frictions, the need to secure trade finance (working capital goods while in transit).

Distance in gravity models is a proxy of transportation costs. Trans-portation costs can be broken down into two (2) (see Prentice et al (1998) in Vido and Prentice (2003: 127, 128); (Saddam and Kari, 2012: 155) that the cost of transport by sea (marine tran-sport Gravity Models) and cost of transport by land (land transport Gravity Models).

Bhattacharyya and Banerje (2006) investigated the trade in India with gravity models. Research results: (1). The role model of gravity is able to explain 43 percent of India's trade fluctuation during the 21st century, (2). Response India trade smaller proportion to the size of the economy and a greater proportion to the distance, (3). Colonial heritage is still an important factor for the trade of India during the 19th century, (4). India trade better with negra advanced when compared to the less developed countries, and (5). The size of the economy affecting trade in India when compared to countries such trading partner.

Marimoutou et al (2010) studi-ed the behavior of national income (GDP) and distance (DISTANCE) to export to the gravity models. The final conclusion: national income are positi-ve and significant impact on exports, whereas the distance significant and negative effect.

Xuan Bac Nguyen (2010) in Dinh et al (.) Uses gravity model of research on Vietnamese exports during the last 20 years by the year 2006 with the export as dependent variable, while the independent variables are GDP, distance, average real exchange rate and a dummy variable ASEAN mem-bership. Research results: the value of Vietnamese exports to other countries positively influenced by GDP, excha-nge rate, and the membership of ASEAN; adversely distance a negatif influence on Vietnamese exports.

3. RESEARCH METHOD

Data and data sources

The data used in this research is secondary data obtained from ww-w.asian development bank, org / statistics / key indicators for asia and the pacific in 2015 with the observation period from 2000 to 2014; www.world indicatos.org develop-ment; www-.world-bank.org.

There are five countries surveyed, namely Indonesia, Malay-sia, Thailand, USA and Japan. Indonesia, Malaysia, Thailand is ASEAN members-3, while the USA and Japan are outside ASEAN. USA and Japan participated observed because both countries are major trading partners are the ASEAN-3.

Year 2000 as the be-ginning of the data examined the grou-nds starting in 2000 the economy is back to normal after three countries (Indonesia, Malaysia, Thailand) experienced a financial crisis, while the latest data surveyed in 2014 because of the availability of data.

Research Variables

Trade (LNTRADE)

Trade is exports plus imports of a country. The value initially in USD fo-rm then transformed into Natural Logarithm (Ln).

Gross Domestic Product (LNGDPimporter)

Gross Domestic Product is the income of a country importers that import (countries whose trade as independent variables). The value initially in USD form then transformed into Natural Logarithm (Ln).

Gross Domestic Product (LNGDPexporter)

Gross Domestic Product is the income of a country exporters who export (to a country whose trade as independent variables). The value initially in USD form then transformed into Natural Lo-garithm (Ln).

The Prices of the World Crude Oil (LNOPEC)

The Prices of the World Crude Oil is the price of crude oil which is managed by the World Organization of Petro-leum Producers (OPEC). The value initially in USD per barrel form then transformed into Natural Logarithm (Ln).

Model

The model used in this study are:

1).Gravity models as follows:

Initial formula by Jan Tienbergen (1962) in Rauch (2015: 1) used the equation:

$$E_{ij} = \alpha_0 \, Y_i^{\alpha 1} Y_j^{\alpha 2} D_{ij}^{\varepsilon 3}$$
$$(1)$$

if written in a linear equation then:

LN (Eij) = α0 + α1 Ln (Yi) + α2 Ln (Yj) - α3 Ln (D) + εij + e$_{ab}$ (2)

The formula is used a modified model (2) by substituting the distance (D) with the price of crude oil (OPEC) so that its becomes:

Ln (TRADE) = β$_0$ + β$_1$ ln (GDPa) + β$_2$ ln (GDPb) + β$_3$ ln (OPEC) + ε$_{ab}$ + e$_{ab}$ (3)

Where Ln (Trade) is Ln (Exports + Imports); Ln (GDPa) is Ln (GDPexporter); Ln (GDPb) is Ln (GDPimporter); Ln (OPEC) is Ln (prices of crude oil, OPEC); ε$_{ab}$ is u$_a$ + v$_b$ + w$_{ab}$ and e$_{ab}$ is residual; β$_0$ = consta-nt; β$_2$, β$_1$ is the regression coefficient of the expected value > 0; β$_3$ is expected regression coefficient value <0.

4. DATA ANALYSIS AND DISCUSSION

The following is figure from the five countries GDP from the year 2000-2014:

Figure 1
GDP countries is Analyzed
Years 2000-2014 (Billion USD)
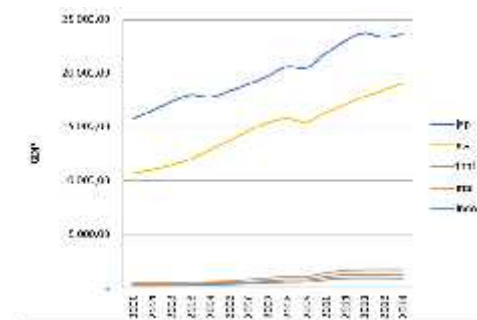
Source:www.adb.org/statistic/key   indicators for asia and the pacific 2015, proceed

From Figure 1 we see that the GDP of Japan and the United States are very high when compared with the three ASEAN countries (Indonesia, Malaysia, Thailand). We also see that trend GDP of the three countries all increased. GDP rise in the exporting and importing countries would lead to an increase in trade.

All the variables to be analyzed must be tested first to see if the data has been stationary at I (0), I (1), I (2) or even stationary. If the data is stationary at level, I (0) then it could dilanjutkn to be analyzed with static data panel, but if the data is stationary I (1) or I (2) should be done with dynamic panel data. There are many options for analyzing stasionaritas but in the current study researchers used a model Hadri.

Result of stationary panel data test with Hadri model can be look at this table:

Table 1
Summary of Result Analysis Panel data Unit Root with Hadri Model
Research Variables in ASEAN-3

INDONESIA				
Variable	L e v e l		1-st Difference	
	Common	Common and Trend	Common	Common and Trend
LNTRADE	5,34325* (0,00000)	2,62671* (0,00043)	-1,14721 (0,55855)	3,52350* (0,00002)
LNGDPA	5,26937* (0,00000)	4,19522* (0,00000)	4,47214* (0,00000)	20,74008* (0,00000)
LNGDPB	5,53446* (0,00000)	3,08642* (0,00010)	-0,02599 (0,51004)	4,10860* (0,00000)
LNOPEC	4,75843* (0,00000)	3,06450* (0,00011)	-0,53330 (0,703	3,88171* (0,00001)

		1)	
MALAYSIA			
Variable	L e v e l		1-st Difference	
	Common	Common and Trend	Common	Common and Trend
LNTRADE	5,22192* (0,00000)	4,97029* (0,00000)	1,38854*** (0,0825)	5,97224* (0,00000)
LNGDPA	5,64275* (0,00000)	13,5714* (0,00000)	1,66521** (0,0479)	10,7135* (0,00000)
LNGDPB	5,31599* (0,00000)	3,10911* (0,00009)	1,70452** (0,0441)	10,6827* (0,00000)
LNOPEC	4,75843* (0,00000)	3,06450* (0,00011)	-0,53330 (0,7031)	3,88171* (0,00001)
THAILAND			
Variable	L e v e l		1-st Difference	
	Common	Common and Trend	Common	Common and Trend
LNTRADE	5,49668* (0,00000)	3,17160* (0,00008)	1,72976** (0,0418)	6,40611* (0,00000)
LNGDPA	5,65222* (0,00000)	3,63799* (0,00001)	0,26591 (0,3952)	4,49189* (0,00000)
LNGDPB	5,32628* (0,00000)	3,69007* (0,00001)	1,88580** (0,0297)	11,37329* (0,00000)
LNOPEC	4,75843* (0,00000)	3,06450* (0,00011)	-0,53330 (0,7031)	3,88171* (0,00001)

Source: www.adb.org/statistic/key indicators for asia and the pacific 2015, proceed
Note: * significant in 1%;   ** significant in 5%;   *** significant in 10%

Unit root test results of four research variables in Table 1 shows: to Indonesia (in level: common or com-

mon and trend) variables: LNTRADE, LNGDPa, LNGDPb, and LNOPEC are stationary; to Malaysia (in level: com-mon or common and trend) variables LNTRADE, LNGDPa, LNGDPb and LNOPEC are stationary; to Thailand (in level: common or common and tre-nd) variables: LNTRADE, LNGDPa, LNGDPb, and LNOPEC are stationary. All variables proved to have passed the test stationary so that analysis of data can be forwarded to the static panel data.

Summary of the results of OLS and FEM analysis for Indonesia:

Table 2
Summary of OLS and the FEM
Trading in Indonesia

Variable	OLS		FEM	
	Coefficient	t-test (significance)	Coefficient	t-test (significance)
Constant	4,218507	1,241864	2,636725	0,779554
LNGDPA	0,358114	2,145392**	0,400364	2,400983**
LNGDPB	0,256663	9,811718*	0,258688	10,01785*
LNOPEC	0,572908	1,898424***	0,656435	3,429884*
1. Mal			1,577641	
2. Thai			0,999187	
3. USA			-2,010204	
4. Japan			-0,566623	
Observasi	**n = 60**		**n = 60**	
R²	0,797287		0,853886	
R² Adjusted	0,786427		0,846053	
F-test	73,41746		109,0871	
S.E. of regression	0,387051		0,386203	
DW	0,272844			

Likelihood Ratio			68,651828	

Note: * significant in 1%;   ** significant in 5%;   *** significant in 10%

From Table 2 (Indonesia) we see that the OLS model analysis resulted in the conclusion that the variable income exporting countries (LNGD-Pa), income importing countries (LN-GDPb), and the price of crude oil (LN-OPEC) positive and significant impact on trade (LNTRADE). The regression coefficient world crude oil prices (LN-OPEC) is positive not as expected. Variations were able to explain the va-riables of 79.73%, while the remaining 20.27% is explained by other var-iababel outside the model.

Still on Table 2 we see that the FEM model analysis resulted in the conclusion that the variable income exporting countries (LNGDPa), inco-me importing countries (LNGDPb), and the price of crude oil (LNOPEC) positive and significant impact on trade (LNTRADE). The regression coeff-icient world crude oil prices (LNO-PEC) is positive not as expected. Varia-tions were able to explain the variables of 85.39%, while the remaining 14.61% is explained by other variables outside the model.

The findings by the FEM stating economic size positive and significant effect on trade supports previous findings from Alleyne and Lorde (2014), Bhattacharyya (2006), Marim-outou (2010), Bac Xuan Nguyen (2010) in Dinh et al (.). Variations are able to be explained by the prices of crude oil and its economic size Indonesia with trading partner countries amounted to 85.39%. The magnitude of the variation is much higher than

the findings of the trade in India for the 21st century with a gravity model that is only 43%.

Summary of the results of OLS and FEM analysis for Malaysia:

Table 3
Summary of OLS and the FEM
Trading in Malaysia

Variable	OLS		FEM	
	Coefficient	t-test (significance)	Coefficient	t-test (significance)
Constant	10,39278	2,896292*	8,827062	6,356961*
LNGDPA	0,096030	0,587165	0,197356	3,042251*
LNGDPB	0,309143	13,79515*	0,265773	13,48179*
LNOPEC	0,523255	2,751350*	0,577456	5,982611*
1. Thai			0,496828	
2. Indo			-0,142399	
3. USA			-0,313979	
4. Japan			-0,040455	
Observasi	n = 60		n = 60	
R²	0,829811		0,827733	
R² Adjusted	0,820693		0,818504	
F-test	91,01513		89,69222	
S.E. of regression	0,300727		0,346971	
DW	0,379776			
Likelihood ratio			39,928825	

Note: * significant in 1%; ** significant in 5%; *** significant in 10%

From Table 3 (Malaysia) we see that the OLS model analysis resulted in the conclusion that the variables: income importing countries (LNG-DPb), and the price of crude oil (LNOPEC) positive and significant impact on trade (LNTRADE), but income exporting countries (LNGDPa) positive and not significant impact. The regression coefficient world crude oil prices (LNOPEC) is positive not as expected. Variations were able to explain the variables of 82,98%, while the remaining 17,02% is explained by other variables outside the model.

Still on the Table 3 we see that the FEM model analysis resulted in the conclusion that the variable income exporting countries (LNGDPa), inco-me importing countries (LNGDPb), and the price of crude oil (LNOPEC) positive and significant impact on trade (LNTRADE). The regression coeffi-cient world crude oil prices (LNOPEC) is positive not as expected. Variations were able to explain the variables of 82.77%, while the remaining 17.23% is explained by other variabel outside the model.

The findings by the FEM sta-ting economic size positive and signi-ficant effect on trade supports previous findings from Alleyne and Lorde (2014), Bhattacharyya (2006), Marim-outou (2010), Bac Xuan Nguyen (2010) in Dinh et al (.). Variations are able to be explained by the price of crude oil and its economic size Malaysia with trading partner countries amounted to 82.77%. The magnitude of the variation is much higher than the findings of the trade in India for the 21st century with a gravity model that is only 43%.

Summary of the results of OLS and FEM analysis for Thailand:

Table 4
Summary of OLS and the FEM
Trading in Thailand

Variable	OLS		FEM	
	Coeficient	t-test (significance)	Coeficient	t-test (significance)
Constant	0,320432	0,038733	1,671984	0,580989
LNGDPA	0,542927	1,454079	0,426168	3,448864*
LNGDPB	0,278372	8,956954*	0,330414	31,99333*
LNOPEC	0,322266	0,822779	0,440929	3,574333*
1. Mal			0,470772	
2. Indo			-0,401671	
3. USA			-0,442052	
4. Japan			0,372951	
Observasi	**n = 60**		**n = 60**	
R^2	0,720737		0,797418	
R^2 Adjusted	0,705777		0,786565	
F-test	48,17603		73,47696	
S.E. of regression	0,4384		0,457275	
DW	0,097794			
Likelihood ratio			202,805540	

Note: * significant in 1%;   ** significant in 5%;   *** significant in 10%

From Table 4 (Thailand) we see that the model analysis OLS produ-ce a conclusion that the variable inco-me importing countries (LNGDPb) positive and significant impact on trade (LNTRADE), while the income of the exporting country (LNGDPa) and crude oil prices (LNOPEC) positive effect but not significant. The regre-ssion coefficient world crude oil prices (LNOPEC) is positive not as expected. Variations were able to explain the variables of 72.07%, while the remaining 27.93% is explained by other variables outside the model.

Furthermore, still from Table 4 we see that the FEM model analysis resulted in the conclusion that the variable income exporting countries (LNGDPa), income importing countri-es (LNGDPb), and the price of crude oil (LNOPEC) positive and significant impact on trade (LNTRADE). The regression coefficient world crude oil prices (LNOPEC) is positive not as expected. Variations were able to explain the variables of 79.74%, while the remaining 20.26% is explained by other variables outside the model.

5. CONCLUSION,IMPLICATION, SUGGESTION, AND LIMITATI-ONS

For Indonesia: GDPexporter, GDPimporter, and the price of crude oil respectively positive and significant ef-fect on trade. The coefficient of crude oil prices is positive, not as expected in which the initial expectations are nega-tive. Variations are able to be explained by the price of crude oil and its eco-nomic size Indonesia with trading partner countries amounted to 85.39%.

For Malaysia: GDPexporter, GDPimporter, and the price of crude oil respectively positive and significant effect on trade. The coefficient of crude oil prices is positive, not as expected in which the initial expectations are negative. Variations are able to be explained by the price of crude oil and its economic size Malaysia with trading partner countries amounted to 82.77%.

For Thailand: GDPexporter, GDPimporter, and the price of crude oil respectively positive and significant effect on trade. The coefficient of crude oil prices is positive, not as expected in which the initial expectations are negative. Variations are able to be explained by the price of crude oil and its economic size Thailand with trading partner countries amounted to 79.74%.

As the prices of the world cru-de oil can explain the behavior of inter-national trade so that could be used as an alternative to the distance variable. Researcher concerns to put new varia-bles for improve the model and general results.

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