2nd International Conference and Call for Paper on Trade, 5th-6th September 2018, Trade Analysis and Development Agency, Ministry of Trade Republic of Indonesia

The Effect of Information and Communication Technology (ICT) on Indonesian Bilateral Trade: Evidence from ASEAN Countries

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Background

The advancement of electronics-based Information and Communications Technology (ICT) that develop people to become more modern society, has been linked to trade that is to reduce fixed costs include the searchin g cost of the market, advertising, and establishing network distribution. Furthermore, the use of ICT reduces delays in information transmission, to make trade planning more efficient and accurate.

RESEARCH QUESTION

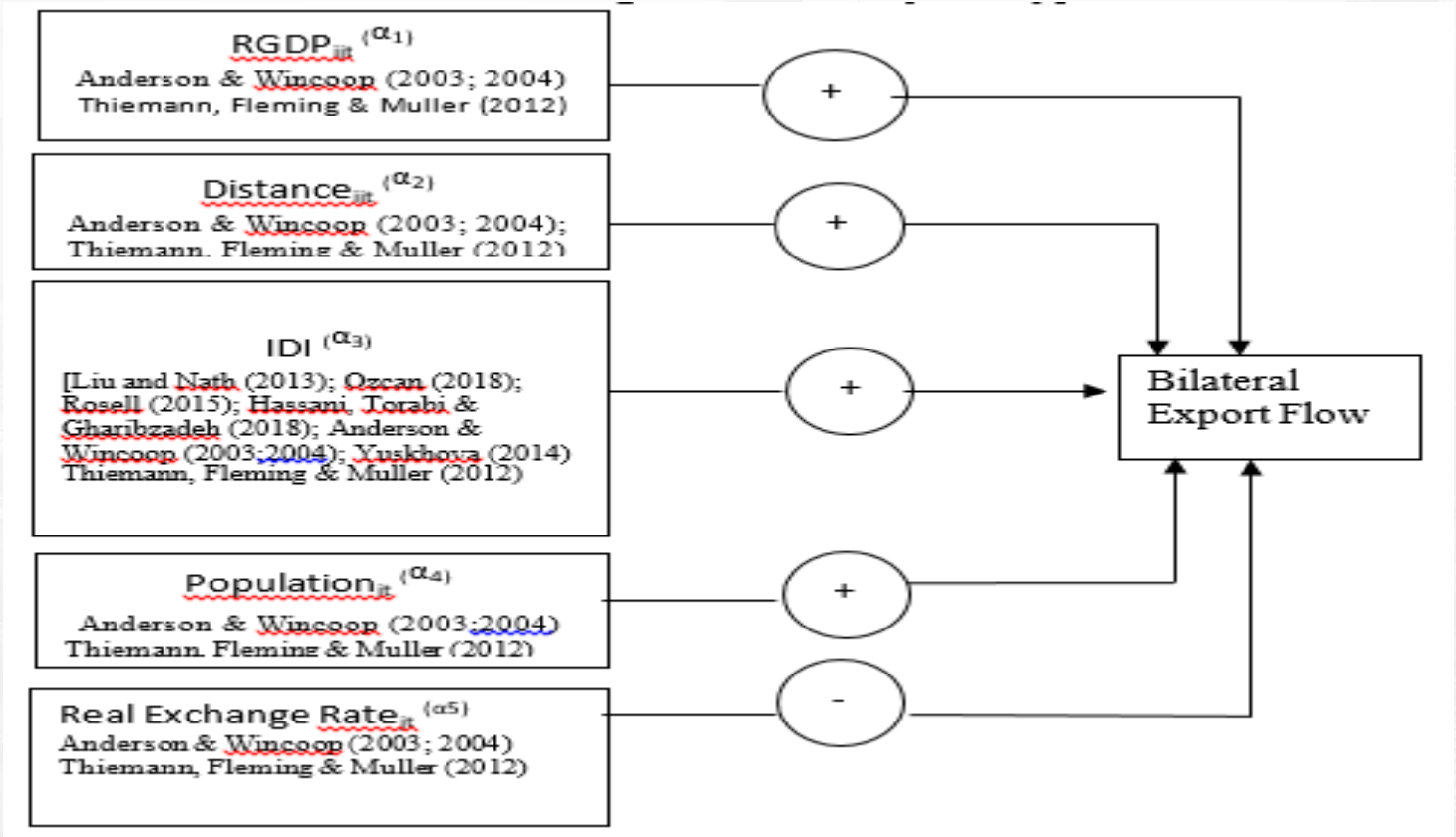
“What is the effect of ICT Development on bilateral trade between Indonesia and its trading partners in the ASEAN countries?”

RESEARCH OBJECTIVE

This study aims to analyze the impacts of ICT Development on bilateral trade between Indonesia and its trading partners in the ASEAN countries

HYPOTHESIS

Figure 1



METHODS

Framework of Analysis

This research examine the effects of IDI on Indonesia bilateral exports using panel data models using a pooled OLS. Then, this research is proceed with Chow Test to determine which model is better between OLS and fixed effect. In addition, Lagrange Multiplier test is also performed to compare which model is better between pooled OLS and random effect. This research is taking period from 2010 to 2017 and there are 9 ASEAN member countries as Indonesian trading partners in this observation.

Operational Definition of Variables

Trade Flows (Export)

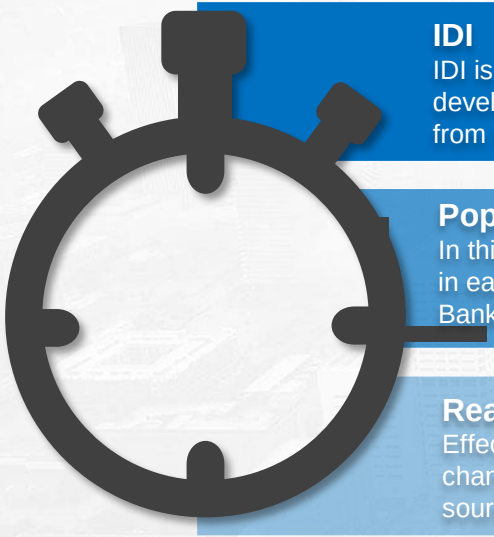
Majority of the studies on gravity model use total bilateral trade flows as dependent variable. However, the use of total bilateral trade flows could not distinguish between the impact of ICT development on export and import term. Therefore, this study is using only the value of exports (in U.S. dollars) as proxy of trade performance.

RGDP

The Real GDP variable in this study is the final value of goods and services produced by the destination country for a year. The GDP data used in the form of real GDP data at constant prices in 2010 converted from domestic currency into USD using the official rate for each year. GDP data was obtained from World Bank in million USD between 2010 and 2017.

Distance

The distance variable in this study is the distance between Indonesia and its trading partners which is calculated by unit kilom eters (km). Distance in this case is the distance of the capital of the two countries that are measured by air. The data obtained refers to the site www.distancefromto.net.



IDI

IDI is a composite index that combines 11 indicators into one benchmark measure. It is used to monitor and compare developments in information and communication technology (ICT) between countries and over time. Data was obtained from International Telecomunication Union (ITU).

Population

In this study we used the population of importing country. The population variable in this study is the number of population in each export destination country which is calculated by the unit of thousand people. Data was obtained from The World Bank from 2010 to 2017

Real Exchange Rate (RER)

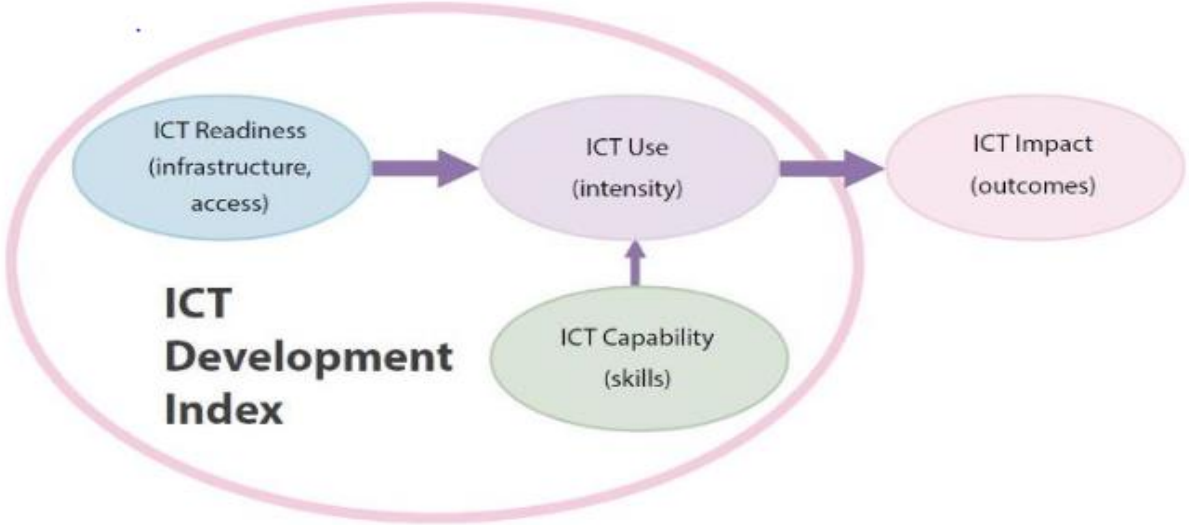
Effective real exchange rate measures the value of a currency against a basket of other currencies; it takes into account changes in relative prices and shows what can actually be bought. We have collected the data from each country. The data source is from World Bank in percent between 2010-2017.

THREE STAGE OF ICT DEVELOPMENT

Based on Three ICT Development Sub Indices

- **Stage 1: ICT readiness** – reflecting the level of networked infrastructure and access to ICTs;
- **Stage 2: ICT intensity** – reflecting the level of use of ICTs in the society; and
- **Stage 3: ICT impact** – reflecting the results/outcomes of more efficient and effective ICT use.

Figure 1: Three stages in the evolution towards an information society



Source: ITU.

THREE ICT DEVELOPMENT SUB-INDICES

Based on this conceptual framework, the IDI is divided into the following three sub-indices, and a total of 11 indicators (Figure 2).

- ***Access sub-index***: This sub-index captures ICT readiness, and includes five infrastructure and access indicators (fixed-telephone subscriptions, mobile-cellular telephone subscriptions, international Internet bandwidth per Internet user, households with a computer, and households with Internet access).
- ***Use sub-index***: This sub-index captures ICT intensity, and includes three intensity and usage indicators (individuals using the Internet, fixed broadband subscriptions, and mobile-broadband subscriptions).
- ***Skills sub-index***: This sub-index seeks to capture capabilities or skills which are important for ICTs. It includes three proxy indicators (mean years of schooling, gross secondary enrolment, and gross tertiary enrolment). As these are proxy indicators, rather than indicators directly measuring ICT-related skills, the skills sub-index is given less weight in the computation of the IDI than the other two sub-indices.

Figure 2: ICT Development Index: indicators, reference values and weights

ICT access	Reference value	(%)
1. Fixed-telephone subscriptions per 100 inhabitants	60	20
2. Mobile-cellular telephone subscriptions per 100 inhabitants	120	20
3. International Internet bandwith (bit/s) per internet user	2'158'212*	20
4. Percentage of households with a computer	100	20
5. Percentage of households with Internet access	100	20
ICT use	**Reference value**	**(%)**
6. Percentage of individuals using the Internet	100	33
7. Fixed-broadband subscriptions per 100 inhabitants	60	33
8. Active mobile-broadband subscriptions per 100 inhabitants	100	33
ICT skills	**Reference value**	**(%)**
9. Mean years of schooling	15	33
10. Secondary gross enrolment ratio	100	33
11. Tertiary gross enrolment ratio	100	33

Note: *This corresponds to a log value of 6.33, which was used in the normalization step.

Source: ITU.

Regression Model

In this paper, the effect of ICT Development on Indonesia bilateral trade toward ASEAN countries is estimated based on regression model. The equation of this study is formally provided by,

$$tradeijt = \alpha_0 + \alpha_1 rgdpjt + \alpha_2 distijt + \alpha_3 idijt + \alpha_4 popjt + \alpha_5 rerjt + ui$$

Where:

$Trade_{ijt}$	: trade export flows from country i to country j at year t
$rgdp_{jt}$	: Real Gross Domestic Product (RGDP) of trading partners in ASEAN
$dist_{ijt}$	: the distance between country reporter and trading partners
idi_{jt}	: Information and Communication Technology Development Index (IDI)
pop_{jt}	: population of reporter and trading partners
rer_{jt}	: Real Effective Exchange Rate (RER) of trading partners
u_{ij}	: random error term
α0	: constant

Table 1. Regression Result

Variables	Pooled OLS	Fixed Effect	Random Effect
log rgdp (partners)	-0.243* (0.046)	-0.233* (0.048)	-0.243* (0.046)
log dist	-2647* (0.317)	-2481* (0.361)	-2647* (0.317)
idi (partners)	0.354* (0.085)	0.426* (0.110)	0.354* (0.085)
log pop (partners)	1922* (0.143)	1892* (0.150)	1922* (0.143)
rer (partners)	-0.289* (0.036)	-0.266* (0.043)	-0.289* (0.036)
R-squared	0.924	0.923	0.924

Note: *** p<0.01, **p<0.05,*p<0.1; standard errors are in parentheses

Source: Author Estimation

CONCLUSIONS

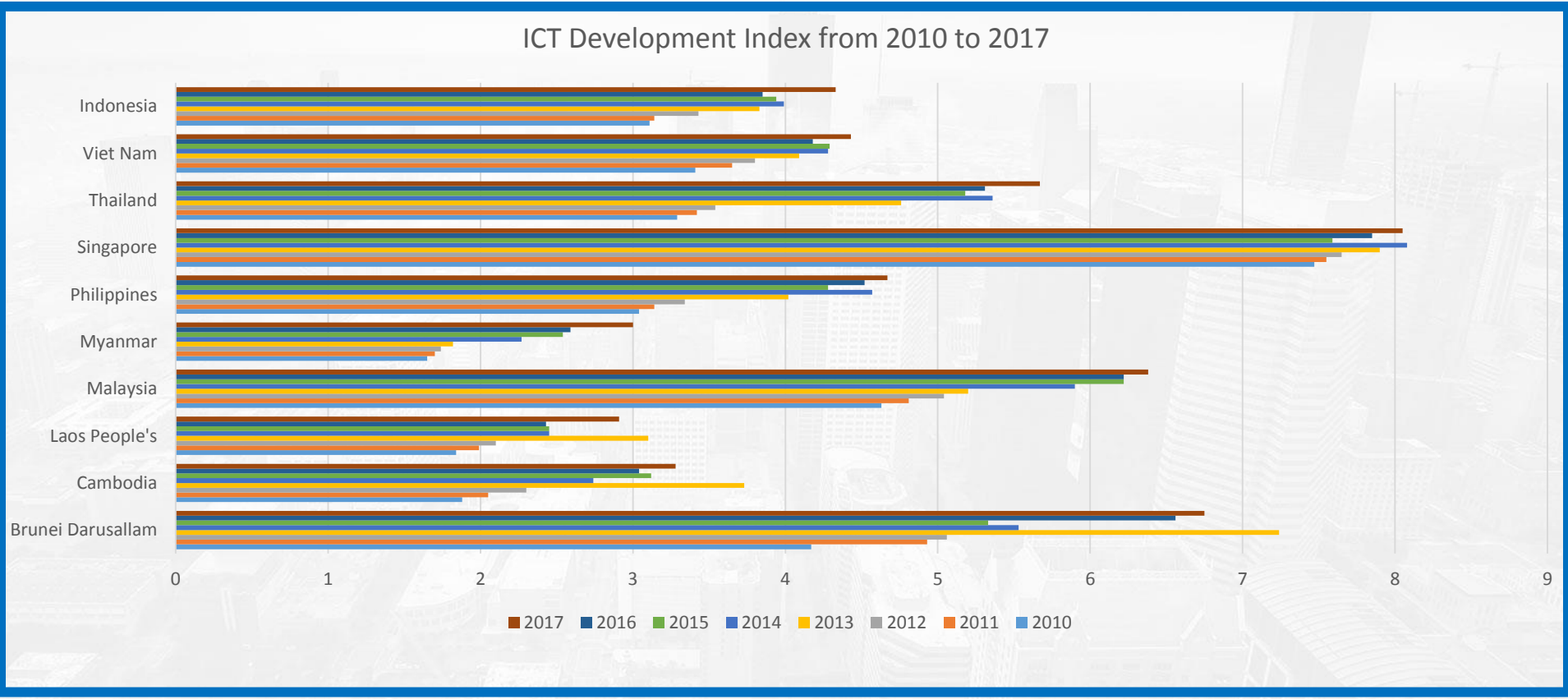
As can be seen in the regression results, five control variables accompanied ICT Development In dex are significant in the degree of 1%, 5% and 10% toward Indonesian export. Results also show that distance has negative and significant effect on trade, this result.

The regression model specification shows that, distance as a representation of transportation has significant impact on in ASEAN countries Indonesian export. The shorter distance from Indonesia to its partner, the higher export. Besides, population has positive effect on Indonesian export, trade policy of Indonesian government should direct to the countries that have the large size of population.

POLICY RECOMMENDATION

ICT Development has positive and significant impact on Indonesia’s export, therefore, Indonesia shall develop strategic trading partnerships with countries that have achieved high levels of ICT development, in order to increase its overall trade. In addition, based on the IDI data, there are top three countries that have high IDI among ASEAN countries such as Singapore, Brunei Darussalam and Malaysia. From the top three, Singapore has the highest of ICT Development Index among all Indonesian trading partners.

Figure 3. ICT Development Index among ASEAN Countries




Thank you