The Heckscher-Ohlin versus Linder's Theory: evidence from Malaysian export

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Abstract

This paper analyzes the export destinations of Malaysia and top six trading partners (an average from 1995 – 2012) using gravity model and pooled ordinary least square (OLS) analysis. As suggested by the pioneer of gravity model (Tinbergen, 1962), the vibrancy of trading activities depend on the resemblance of exporting and importing countries which in parallel with Staffan Linder theory of trade(1961). These include similarities such as GDP per capita, international language, and border sharing and taste in product consume (Morales, Sheu and Zahler, 2014). The theory also highlights that the distance between the two trading countries does give significance effect on trading activities. However, the empirical study in the case of Malaysia proven opposite effect thus allowing Heckscher-Ohlin theory to be highlighted in contrast to Linder theory as H-O theory suggests that a particular country will trade with another country with dissimilar economic performance level. The general finding of this study suggest that Malaysia is more towards Linder theory based on the coefficient sign of GDP per capita differential.

1. Introduction

Quoting numerous studies such as (Bidlingmaier, 2007; Sun & Heshmati, 2010; Wang, Wei and Liu, 2010; Jarreau and Poncet, 2012), international trade without a doubt is one of many reasons a country can developed from time to time. Feder (1983) conducted an empirical study on export and economic growth where he concludes that a country should focus the labor and resources on export sector instead of non-export sector. By doing so, the productivity of exportable goods will increase thus give the country advantage in balance of payment. This strengthens the idea that export does give positive impact on the economic growth as highlighted by theory of comparative advantage by David Ricardo (1817). Being aware of this situation, Malaysia, one of the fastest developing country in Southeast Asia region, take advantage on the wealth of natural resources of the country. US Energy Information Administration reported in 2014 that Malaysia is the second largest exporter of refined petroleum as well as crude palm oil in Southeast Asia region standing after Indonesia. Thus, export activities are crucial in providing growth in Malaysia national income report.

In 2013 alone, Malaysia recorded a value of export at $254 billion enable her to make it into list of 20 largest exporter all over the world (The Observatory of Economic Complexity). The value rose at a rate of 4.2% compare to the year 2008 where the total export only worth $210 billion. This fact alone is enough to proved that Malaysia are aware of the relevancy of export towards her development which in line with statement stated by Yusoff (2005), as an open economy, Malaysia do rely upon her external trade for economic growth. Making into top 20 list of largest exporter, this raise the question of who trade the most with Malaysia and why? Is it involving neighbor countries or does it involve with half way around the world countries. Does distance play a significant role in determining export as suggested by gravity model?

Despite of the positive impact of export on economic growth, the evidence provided by previous studies are more to the exports determinants between the bilateral countries. There is less shed light focus on the application of the two theories of trade which are; (1) Heckscher-Ohlin (H-O) Theory (1933) and (2) Linder Theory (1961). H-O theory suggest that bilateral trade occur between two countries that does not possess the same level of economic development whereas Linder theory argue that bilateral trade will only happens between two countries which possess the same level of economic development. In other to determine the application of these theories, a gravity model developed by Newton theory of gravity and adopted in explaining bilateral trade first by Tinbergen

(1962) and Poyhonen (1963). Although, plethora studies have been published on both theories in the literature, to the best of our knowledge, there is yet evidence pertaining to whether Malaysia's trade follow either of these theories. Therefore, this study is trying to fill the aforementioned gap and extending the study conducted by Zainal Abidin, Islam and Haseeb (2015) using the gravity model in Malaysia.

The organization of this paper consists of four sections which are (1) literature review; (2) data and methodology; (3) analysis of findings and lastly (4) conclusion and recommendation.

2. Literature Review

The epistemology development on gravity model pertaining to bilateral trade has been investigated in the economics and finance literature since ages ago. To date, gravity model still holds a hypothesis of "the further the distance between two trading countries, the lesser the bilateral trade between them" where it shows a negative relationship of trade with distance (Tinbergen, 1962; Poyhonen, 1963; Bergstrand, 1985; Porojan, 2001; Rahman, 2003; Batra, 2006; Ravishankar and Stack, 2014). In simple words, distance always relate with transportation cost in which according to simple economic law of demand and supply; the higher the cost, the higher the price causing the demand to drop. A study by Linnemann (1966) states that there are three major cost that affecting trade which are; (1) physical shipping cost, (2) time-related cost and (3) cost of cultural unfamiliarity. This study is supported by Frankel, Stein and Wei (1997) stating that shipping cost is the most dominant cost compare to the other two. Thus, this implies that later in the regression, distance variable should bear a negative coefficient sign indicating the aforesaid gravity model of trade.

Twenty cohort study analyzes have examined the gravity model on bilateral trade but exploration of knowledge did not go beyond that where researchers did not particularly highlight on fundamental theories of trade such as Heckscher-Ohlin theory of trade and Linder theory of trade. Referring back to Bergstrand (1985), Rahman (2003) and Batra (2006) where they have discussed on gravity model towards trade determinants, they did mentioned on both of the H-O and Linder theories but just merely mentioned. As for the case of Malaysia international trade, Zainal et. al. (2015) only focusing the gravity model on targeted regional partnership such as Organization of Islamic Countries (OIC) and Association of South-East Asia Nation (ASEAN) but did not highlight the trade theories applicable in the case of Malaysia whether it is based on H-O theory or Linder theory or even neither of the theories.

In conjunction with previous paragraph, H-O theory of trade exist in the year of 1933 by Bertil Ohlin and Eli Heckscher where it emphasized that country with different level tend to trade more compare to country with the same level. This is argued by Staffan Linder (1961) where Linder highlights that country tend to trade with partners who share the same level of development because they tend to enjoy the same preferences but differentiated products. To clarify this argument, we will look at the coefficient of GDP per capita differential as suggested by Frankel et. al. (1997) in their books entitled *Regional Trading Blocs in the World Economic System*. The book stated that if the coefficient bears the positive sign, it means that the particular country implementing H-O theory. Opposite things happen when the coefficient carries negative sign which represent Linder theory is apply in the particular study. Hence, the second objective of this paper is to identify the theory applicable in the case of Malaysia and top six export destinations.

Over the past years, large number of studies has been conducted on determinants of export between two countries such as Yanikkaya (2003); Jongwanich (2010); Trang and Hieu (2011); Carneiro (2011); Agosin, Alvarez, and Bravo-Ortega (2012); Carrera, Grujovic, and Robert-Nicoud (2015); Zainal et. al. (2015) where among the independent variables included are gross domestic product, gross domestic product per capita, inflation rate, unemployment rate, trade openness, total population and exchange rate between those two trading countries. All of these economic terms influence the production in the country and at the same time influences the export of the nation. A positive coefficient is expected for GDP, GDPPC, trade openness and population as an increase of this variables will results in increase of export activities as reported in previous studies above. In contrast, distance, exchange rate, inflation rate and unemployment rate expected to carry a negative coefficient because these variables are inversely proportional to export level.

Considering all of these literatures and evidences, the general findings suggest that the gravity model produce consistent results on bilateral trade. However, repeating back in the case of

Malaysia, no literatures ever recorded about Malaysia's trade with six top exporting destination countries are due to H-O theory, Linder theory or neither both of it.

3. Data and Methodology

According to annual reports by MATRADE (an organization responsible for monitoring export activities of Malaysia), the top six export destinations of Malaysia from the year 1995 until 2012 on average are Singapore, China, Japan, United States of America, Thailand and Hong Kong. If we take a look from geographical perspective, only Singapore and Thailand share a border with Malaysia where Singapore are connected by bridge and Thailand are connected by land at northern state of Malaysia. The farthest country is United States of America which located 15 348 kilometers away from Kuala Lumpur. Table 1 presents the value of Malaysia export to top six export destinations and Table 2 presents the distance between Kuala Lumpur and destinations capital city.

Table 1: The Value of Malaysia's Export to Top Six Export Destinations

Year	Singapore	China	Japan	United States of America	Thailand	Hong Kong
1995	10744910094	2380657915	9255780554	11270765722	3171988253	2611358712
1996	10907415823	2077352358	10354553548	11153503656	3578043290	3056893901
1997	15212653011	2227216860	9948792995	12910620143	2947915137	3995304738
1998	11345631195	2206285963	7720606992	14340874804	2177444625	3293313875
1999	12222083380	2719777102	9408242436	16306794776	2527455371	3582666953
2000	16808608544	4200765141	13817702911	23959114895	3403417423	4617031478
2001	14605514194	4725799809	8354138841	21632831571	3134467776	4594904322
2002	15811167186	7425460161	9339801650	23403176366	3528524975	3808855445
2003	20105141944	10899030437	10513236793	25148312627	4748204558	5958408823
2004	23367439269	12892451445	13604541904	28235453789	5443063817	6975576951
2005	25926343504	14278393419	14032916075	32870195943	8189613956	8245964293
2006	29554761053	17179687919	14167698939	36349485466	8133163945	7950784258
2007	27119192908	16947801716	16147480347	33264038898	8172750730	8121796294
2008	28712592897	16620994438	20472572380	26678253069	9495935749	8454399840
2009	22004641865	19090876895	15055206259	21686771103	8439274401	8195147664
2010	27699814203	28587393747	20748165351	23523287152	10387065354	10117899381
2011	31104341241	34734435284	27334862134	22654979658	12005860404	10210521564
2012	31003655290	29587285258	29601418126	17460293845	12198097331	9732207885

Notes: All the values are in USD as reported by The Observatory of Economic Complexity.

Table 2: Distance to Export Destinations

Capital City	Distance	Capital City	Distance
Singapore	300	Washington D.C (USA)	15348
Beijing (China)	4335	Bangkok (Thailand)	1191
Tokyo (Japan)	5318	Hong Kong	1561

Notes: The distance is measured from Kuala Lumpur and values are in kilometers.

For estimation purpose, STATA 11 software is chosen due to accuracy and capability of the software to deal with panel data. There are few advantages of using panel data estimation such as it can capture relevant relationship between countries over time and can monitor unobservable individual effect (Rahman, 2009).

In order to standardize the data, we transformed it into natural logarithm form as presented by the abbreviation of *ln.* Then, stationarity test was conducted to ensure that the data are not following particular trend of movement to avoid absurd estimations. Levin-Lin-Chu (LLC) unitroot test was chosen which carry a hypothesis of; (1) Ho: Panels contain unit roots and (2) Ha: Panels are stationary. LLC test results on natural log variables show that only four variables are stationary and the rest contain unit root. To treat this problem of non-stationary, first order difference is conducted on all variables and LLC test was re-estimate where the results is presented in Table 3 below.

Table 3: Descriptive Statistic of First Order Difference and Levin-Lin-Chu Unitroot Test

Variable	Obs	Mean	Std. Dev.	Min	Max	LLC test (p-value)
d1lnexpijt	102	0.0769	0.1868	-0.5032	0.4519	(0.0001)***
d1lngdpit	102	0.0726	0.1298	-0.3278	0.2020	(0.0001)***
d1lngdpjt	102	0.0576	0.0897	-0.2993	0.2576	(0.0002)***
d1lngdppcit	102	0.0527	0.1311	-0.3527	0.1856	(0.0001)***
d1lngdppcjt	102	0.0479	0.0899	-0.3109	0.2525	(0.0001)***
d1lngdppcijt	102	-0.0013	0.1204	-0.4622	0.3259	(0.0001)***
d1lninfit	102	-0.0432	0.7950	-2.2330	1.0756	(0.0001)***
d1lninfjt	102	-0.0388	1.2611	-3.3350	4.4004	(0.0001)***
d1lnuneit	102	-0.0019	0.1118	-0.2151	0.2877	(0.0001)***
d1lnunejt	102	0.0081	0.2219	-0.4055	1.3291	(0.0001)***
d1lntrait	102	-0.0112	0.0566	-0.0857	0.1207	(0.0001)***
d1lntrajt	102	0.0207	0.0894	-0.3420	0.1952	(0.0001)***
d1lnpopit	102	0.0198	0.0033	0.0156	0.0255	(0.0001)***
d1lnpopjt	102	0.0096	0.0104	-0.0148	0.0532	(0.0001)***
d1lnexrijt	102	-0.0156	0.1427	-0.3883	0.3778	(0.0001)***

Notes: ***, ** and * are significance at 1%, 5% and 10% respectively.

Table 3 shows the descriptive statistics of overall data consisting 102 observations. LLC test conducted shows that the probability values are all less than 0.01 which means we fail to reject null hypothesis. This concludes that the data is stationary at first order difference compare to raw data and natural log data. After that, Breusch – Pagan Lagrangian multiplier was conducted and the test results shows probability value is more than 0.05 thus indicating we fail to reject null hypothesis. Null hypothesis stated that pooled ordinary least square need to be conducted to avoid wrong estimation procedure.

Not just that, since the distance data is in static form for all period of time, we need to conduct two stage regression where Individual Effect are extracted from first regression before re-estimate it with distance as independent variable as reported by Rahman (2003); Batra (2006); and Zainal et. al. (2015). The equation and model specification are explained in the next subsection.

3.2 Model Specification

The first stage pooled ordinary least square regression is explained in the following equation:

$$d1ln(EXP_{ijt}) = \beta_0 + \beta_1 d1ln(GDP_{it}) + \beta_2 d1ln(GDP_{jt}) + \beta_3 d1ln(GDPPC_{it}) + \beta_4 d1ln(GDPPC_{jt}) + \beta_5 d1ln(GDPPC_{ijt}) + \beta_6 d1ln(INF_{it}) + \beta_7 d1ln(INF_{jt}) + \beta_8 d1ln(UNE_{it}) + \beta_9 d1ln(UNE_{jt}) + \beta_{10} d1ln(TRA_{it}) + \beta_{11} d1ln(TRA_{jt}) + \beta_{12} d1ln(POP_{it}) + \beta_{13} d1ln(POP_{jt}) + \beta_{14} d1ln(EXR_{ijt}) + \varepsilon_{ijt}$$

Where the variables are explained as follow:

d1	= First Order Difference
ln	= Natural Logarithm Form
i	= Home Country (Malaysia)
j	= Destination Country (Top 6 Malaysia Trading Partners)
ε	= Error Term
EXP	= Export value of Home Country (Malaysia) to Top 6 Destinations
GDP	= Gross Domestic Product (current USD)
GDPPC	= Gross Domestic Product Per Capita (current USD)
INF	= Inflation Rate (annual percentage)
UNE	= Unemployment Rate (percentage of total labor force)
TRA	= Trade Openness (percentage of GDP)
POP	= Total Population
EXR	= Exchange Rate of 1 Ringgit to Destination Country Currency

The second stage regression involves the implementation of gravity model in our estimation. We are unable to include the distance variable in the first regression because the data on distance between capital cities of trading countries are static over time and unable to be process together with unbalanced data as mentioned by Rahman (2003) in his study. Thus, the linear equation of second stage regression is as follow:

$$IE_{ij} = \beta_0 + \beta_1 ln(DIST_{ijt}) + \varepsilon_{ijt}$$

Where the variables are explained as below:

IE	= Individual Effect (Home Country and Destination Country)
DIST	= Distance between Capital City of Home Country and Capital City of Destination Country (in Kilometers)

3.3 Data Source

The data used in this study are obtained from multiple sources consists of international data storage covering the time period of 18 years starting from the year 1995 until 2012. The data of GDP, GDPPC, INF, UNE, TRA and POP are obtained from the *World Development Indicators (WDI)* database of the World Bank. All the values of GDP and GDPPC are originally in the form of USD whereas INF, UNE and TRA are in percentage. As for the exchange rate data, it was taken from United States foreign exchange website at *www.usforex.com* and the data are in yearly average of 1 Ringgit Malaysia against export destination currency. Moreover, the data of exports between Malaysia as home country to top six destinations are acquired from the Observatory of Economic Complexity at *atlas.media.mit.edu* in the measurement of USD. Finally, the distance data are obtained from an Indonesian tourism website at *www.indo.com/distance* and the value are all in the unit of kilometers.

4. Analysis and Findings

The pooled OLS regression results are reported in Table 4.

Table 4: Results on Pooled Ordinary Least Square Estimation

Dependent Variable: d1lnexpijt						
Independent Variable	**Coefficient**	**Standard Error**	**t**	**P>t**	**R^2**	**F-stats**
d1lngdpit	(omitted due to collinearity)				0.6285	12.55 (0.0001)***
d1lngdpjt	(omitted due to collinearity)					
d1lngdppcit	0.0445	0.2724	0.16	0.8710		
d1lngdppcjt	1.1371	0.2246	5.06	(0.0001)***		
d1lngdppcijt	-0.2253	0.1153	-1.95	(0.0540)*		
d1lninfit	-0.0653	0.0206	-3.17	(0.0020)***		
d1lninfjt	-0.0046	0.0111	-0.41	0.6790		
d1lnuneit	-0.0601	0.1983	-0.30	0.7630		
d1lnunejt	-0.0677	0.0742	-0.91	0.3640		
d1lntrait	0.0270	0.3563	0.08	0.9400		
d1lntrajt	1.5280	0.2679	5.70	(0.0001)***		
d1lnpopit	11.6657	4.7695	2.45	(0.0160)**		
d1lnpopjt	-0.4019	1.2600	-0.32	0.7500		
d1lnexrijt	-0.1919	0.1016	-1.89	(0.0620)*		
constant	-0.2444	0.1006	-2.43	0.0170		

Notes: ***, ** and * are significance at 1%, 5% and 10% respectively.

Referring to table 4, out of 14 variables, two was omitted due to collinearity problem which are GDP of home country and destination country. GDP per capita of destinations country bear a positive coefficient indicating that an increase of 1% of destination country GDP per capita, the export will increase 1.1371%. Next, the differential GDP per capita between home country and destination country bear a negative coefficient which means that the export value will decrease by 0.2253% if the difference in GDP per capita increase by 1%.

Inflation rate of home country proven to be significant at 1% confident level where it carry a negative coefficient as expected. This shows that an increase of inflation rate of Malaysia by 1% will reduce the export value by 0.0653%. Apart from that, trade openness of destination country also show a significant level at 1% confident interval. It bears a positive sign as expected means that the more lenient the trade barriers are, the higher the value of export towards the destination country.

Furthermore, population of home country result show a positive relationship where an increase in population of Malaysia by 1% will results in the increase of export by 11.6657%. Finally, exchange rate which is one of the popular determinants of export shows a 10% confident interval with negative coefficient. This explains that as the home country currency devaluate, in this case Ringgit Malaysia, the volume of exports will decrease by 0.1919.

On the other hand, it is quite surprising that six of the variables show insignificant probability values which made up of GDPPC of home country, INF of destination countries, UNE of both home and destination country, TRA of home country and lastly POP of destination countries.

By considering the full pooled OLS regression results, the overall model suggest that the result tends to reject the null hypothesis at 1% level indicating the model overall goodness of fit. Following that, R^2 proved that the independent variables can explain the dependent variable at 62% whereas the remaining 38% is due to omission of other important independent variables.

To achieve the second objective of determining H-O or Linder, we need to take a look at the coefficient sign of GDPPC differential which is obviously negative and significant at 1% interval. Quoting from literature, this is a sign of Malaysia are actually obeying the Linder hypothesis stating

that we are trading with those country the most because we are having the same preferences as them.

Table 5: Results on Second Stage Individual Effect and Distance Estimation

Dependent Variable: Individual Effect						
Independent Variable	Coefficient	Standard Error	t	P>t	R^2	F-stats
lndist	0.0079	0.01499	0.528806	0.6249	0.065341	0.279636

Interestingly, the most surprising aspect of this regression is in second stage estimation results where the coefficient of distance against export value supposes to be negative as proven by numerous studies. However in this case, it bears a positive sign which means even the distance increase by 1%, the export value still increase by 0.0079%. Fortuitously, the probability value is exceeding rule of thumb of 0.05 confident levels which is not significant and independent variable is not able to explain dependent variable.

A diagnostic testing on econometrics' problems has been conducted to test the existence of multicollinearity, heterokedasticity and serial correlation. According to Montgomery (2001), Variance Inflation Factor (VIF) values should be less than 5 or 10 to prove that the regression coefficient does not suffer from multicollinearity problem where the mean VIF value for above regression stands at 2.7 which are below 5. Next test conducted on the regression is Cook Weisberg (1983) heteroskedasticity test which carry a null hypothesis of there is no heteroskedasticity problem and vice versa for alternative hypothesis. The results of Cook Weisberg test on the regression shows a probability value of 0.6574 which is higher than 0.05 thus fail to reject null hypothesis. To complete the econometrics unbiased test, Woolridge (2002) test is conducted to test on serial correlation problem with null and alternative hypothesis are as follow; (1) Ho: There is no first order autocorrelation and (2) Ha: There is first order autocorrelation. The results of probability value stands at 0.5146 which is higher than 0.05 indicating that we are fail to reject null hypothesis thus showing the regression are free from serial correlation problem.

Thus, the diagnostic results indicates that our regression comply with the Best Linear Unbiased Estimation (BLUE) theorem by Gauss-Markov theorem as proven by previous econometrics' problems testing.

5. Conclusion and Recommendation

The present study was designed to see the gravity effect of export towards the top six destination countries as well as proving the theory Malaysia implementing whether it is H-O theory or Linder theory. We have used 102 observations comprising of 14 independent variables of home and destinations country in the pooled ordinary least square analysis due to violating against the panel data assumption.

Estimated results reveal that Malaysia tend to trade the most with the closest, largest and sharing similarity to us which is why our neighbor country (Singapore) are standing first the list of top six export destinations. The results also reveal that we are trading with the countries who share similar taste of product consumption to us as explained by Linder theory of trade. However, this does not mean we are not implementing H-O theory at all, it is just proving that Linder theory is more superior in explaining Malaysia trade partners rather than H-O theory.

References

Abidin, I. S. Z., Jantan, M. D., Satar, N. M., & Haseeb, M. (2014). Trade Linkages between Malaysia and the OIC Member Countries: Empirical Evidence Based on Gravity Model. *American Journal of Applied Sciences*, *11*(11), 1938.

Agosin, M. R., Alvarez, R., & Bravo-Ortega, C. (2012). Determinants of export diversification around the world: 1962–2000. *The World Economy*, *35*(3), 295-315.

Batra, A. (2006). India's global trade potential: The gravity model approach. *Global Economic Review*, *35*(3), 327-361.

Bergstrand, J.H. (1985). The gravity equation in international trade: some microeconomic foundations and empirical evidence. The Review of Economics and Statistics, 67: 474-81. Harvard University Press.

Bergstrand J.H. (1989). The generalised gravity equation, monopolistic competition, and the factor proportion theory in international trade. Review of Economics and Statistics: 143-53.

Bidlingmaier, T. (2007, June). International trade and economic growth in developing countries. In *presentation at the DEGIT XII conference in Melbourne in June*.

Breusch T, Pagan A. The LM test and its applications to model specification in econometrics. Review of Econometric Studies 1980; 47: 239-254

Carneiro, J., Rocha, A. D., & Silva, J. F. D. (2011). Determinants of export performance: a study of large Brazilian manufacturing firms. *BAR-Brazilian Administration Review*, *8*(2), 107-132.

Carrère, C., Grujovic, A., & Robert-Nicoud, F. (2015). *Trade and frictional unemployment in the global economy* (No. 10692). CEPR Discussion Papers.

Cook, R. D., & Weisberg, S. (1983). Diagnostics for heteroscedasticity in regression. *Biometrika*, *70*(1), 1-10.

Frankel, J. A., Stein, E., & Wei, S. J. (1997). *Regional trading blocs in the world economic system*. Peterson Institute.

Jarreau, J., & Poncet, S. (2012). Export sophistication and economic growth: Evidence from China. *Journal of development Economics*, *97*(2), 281-292.

Jongwanich, J. (2010). Determinants of export performance in East and Southeast Asia. *The World Economy*, *33*(1), 20-41.

Linnemann, H. (1966). *An econometric study of international trade flows* (Vol. 234). Amsterdam: North-Holland Publishing Company.

Montgomery, D. C., Peck, E. A., Vining, G. G. (2001). Introduction to linear regression analysis, 3rd edition, Wiley, New York.

Morales, E., Sheu, G., & Zahler, A. (2014). *Gravity and extended gravity: Using moment inequalities to estimate a model of export entry* (No. w19916). National Bureau of Economic Research.

Odell, P. L. (1983). Gauss–Markov theorem. *Encyclopedia of statistical sciences*.

Porojan, A. (2001). Trade flows and spatial effects: the gravity model revisited. *Open economies review*, *12*(3), 265-280.

Rahman, M. M. (2003). A panel data analysis of Bangladesh's trade: the gravity model approach. In *Proceedings of the 5th Annual Conference of the European Trade Study Group (ETSG2003)*. European Trade Study Group.

Rahman, M. M. (2009). Australia's global trade potential: evidence from the gravity model analysis. In *Proceedings of the 2009 Oxford Business and Economics Conference (OBEC 2009)* (pp. 1-41). Oxford University Press.

Ravishankar, G., & Stack, M. M. (2014). The Gravity Model and Trade Efficiency: A Stochastic Frontier Analysis of Eastern European Countries' Potential Trade. *The World Economy*, *37*(5), 690-704.

Sun, P., & Heshmati, A. (2010). International trade and its effects on economic growth in China.

Trang, P. T., & Hieu, T. H. (2011). Effects of Population Growth on Economic Growth in Asian Developing Countries. Bachelor Project in Economics, Malardalen University.

Wang, C., Wei, Y., & Liu, X. (2010). Determinants of bilateral trade flows in OECD countries: evidence from gravity panel data models. *The World Economy*, *33*(7), 894-915.

Wooldridge, J. M. 2002. Econometric Analysis of Cross Section and Panel Data. Cambridge, MA: MIT Press.

Yanikkaya, H. (2003). Trade Openness and Economic Growth: A Cross-Country Empirical Investigation. Journal of Development Economics, 72, pp. 57- 89.

Yusoff, M. (2005). Malaysian bilateral trade relations and economic growth. *International Journal of Business and Society, 6*(2), 55-68.