CHAPTER 2

Theoretical Background Literature Review

This Chapter consists of two important parts. The first part of this chapter will be explained the theoretical background of international trade and bilateral trade base on the concept of modern trade theory. The modern trade theory has been developed from concepts in economic perspective. Especially, this first part will reflect the ideas of international trade flows of goods and services, by mercantilists and the classical economists such as Adam Smith, David Ricardo, and so on. Moreover, this part is mandatory to present the gravity trade theory which is a very popular trade model investigate determinants influence the international and bilateral trade. The second part of this chapter is about the literature review part. The relevant research papers have been reviewed. From the literature review part, the gravity model usage, new variables, proper econometrical estimations, and empirical results are summarized.

2.1 Theoretical Background

2.1.1 Absolute Advantage

According to Adam Smith (1723-1790) believed that trade between countries is based on absolute advantage. He insisted that products in which it is more productive than other countries should be exported; the goods in which it is less productive than other countries should be imported. Smith argued that world output will grow with free trade and government trade encouragement policies, because the capability to utilize of productive resources effecting from the idea of Smith's specialization and division labor. The geographic, climatic conditions, special skills and techniques, and the economic environment give natural or acquired absolute advantage to some countries in the production of certain goods and services over the others seem to go the way of Smith's absolute advantage. Conversely, the world trade today cannot be explained clearly by Adam Smith's absolute advantage; it is unable to precise the motive why

nations with more efficient in the production of all the traded goods still trade with partners which have absolute disadvantage in the production of all the traded goods (Carbaugh, 2010).

The absolute advantage can be presented by a simple example of two countries and two commodities (2x2 models). Each country can produce one product or good by using smaller spending of labor than the other countries, hence its good is cheaper than other countries. Therefore, one country has an absolute advantage in producing one specific product, while another country has an absolute advantage in producing a particular product. In table 2.1 is an example of two products (product 1 and product 2) and two countries (country A and country B). Country A can one unit of product 1 by using only 3 labor days, while country B can produce one unit of product 2 by consuming 6 labor days. Hence country A has an absolute advantage in producing product 1 by using less days of labor. Country B has an absolute advantage in product 2 because it required less days of labor (4 days) than country A (8 days).

Table 2.1 Example of absolute advantages

Days of labor required to produce one unit of	Country A	Country B
Product 1	3	6
Product 2	8	4

Source: Erasmus Journal for Philosophy and Economics (Schumacher, 2012)

2.1.2 Comparative Advantage

The weaknesses and dissatisfaction of absolute advantage theory of Smith on free trade theory was criticized by David Ricardo (1772–1823). He introduced his concept of comparative advantage. He explained that a country always can gain the benefit from trade. Even though a country has more absolute production efficiency in all goods than the other, the real costs ratios in terms of labor inputs provided the differences of relative costs of two or more commodities. Ricardo shows that, a country which has less productive in two goods still can gain from trade by exporting the good which has a smaller relative disadvantage; because the relative price of this good before trade will be lower than overseas. A country that has an absolute advantage in both goods gains by concentrating in the production of the good which has a better relative advantage. It

seems to gain from trade by importing the product which has a smaller relative advantage, since the foreign opportunity cost of producing it is lower. Hence, Ricardian model shows that the in technological differences between the nations will give the comparative advantage to some countries in the production of certain goods over others and stimulates gainful of international trade (Pugel, 2016; Suranovic, 2010).

Table 2.2 Example of comparative advantage

Days of labor required to produce	Portugal	England
Wine (1barrel)	3 days of labor	2 days of labor
Cloth (1bolt)	10 days of labor	4 days of labor

Source: International Economics, Sixth Edition (Dunn Jr & Mutti, 2004)

The comparative advantage of David Ricardo is presented in a very simple example of the perspective trade between two countries and two products. In table2.2 is an example of comparative advantage of the case in production of wine and cloth between Portugal and England. England can produce, 1 barrel of wine by required 2 days of labor and 1 bolt of cloth by using only 4 days of labor. However, Portugal can produce, 1 barrel of wine by requiring 3 days of labor and 1bolt of cloth using 3 days of labor. Hence, England is more competent at the production of both wine and cloth than Portugal, since England requires less days of labor than Portugal to produce wine and cloth. By this example, England has a comparative advantage in production of both wine and cloth. However, Portugal has an absolute disadvantage both wine and cloth, but it can choose to produce the wine rather than cloth due to wine requires less day of labor required than cloth. Hence Portugal has a comparative advantage in the production of wine.

2.1.3 Hechscher-Ohlin

Two Swedish economists Heckscher (1919) and Berlin Ohlin (1933) introduced a similar idea to the Adam Smith's and David Ricardo's concept. They supported that the factor determined a nation's comparative advantage is not deepened on only labor but also the factor endorsement (resource). The theory is known as Heckscher-Ohlin (H-O) theory focusing on the factor endorsements and its cost. According to H-O theory, a country exports products that use its relatively abundant factors, and imports products

that use its relatively scarce factors. As an example, India has relative abundance of labor will export shoes and shirts, while the United States has relative abundance of capital will export machines and chemicals (Carbaugh, 2010).

The factor-endowment theory is fully explained by some assumptions. Firstly, it assumes that the production of goods is conducted under perfect competition. It suggests that individual firms exert no significant control over product price. Second assumption reflects that each product is produced under identical production conditions in the two countries. If a producer increases the use of both resources by a given proportion, output will increase by the same proportion. Moreover, resources are free to move within a country, so that the price of each resource is the same in the two industries within each country. The last assumption reveals that resources are not free to move between countries, so that pre-trade payments to each resource can differ internationally; and that there are neither transportation costs nor barriers to trade.

2.1.4 Theoretical Analysis of Gravity Model

Gravity model is known as a popular trade model use to analyze the international trade flows of over 40 years. This model was adopted from Isaac Newton's theory which is called "law of universal gravitation" in physics. The idea of the law of gravity introduces that two masses in the universe attract each other with a force that is directly proportional to the product of their masses and indirectly proportional to the square of distance between them.

$$F_{ij} = G\frac{M_i M_j}{d_{ij}^2} \quad (1)$$

where F_{ij} is the gravitational force which proportionated directly to the product of mass M_i and M_j, and proportionated in reverse to the square of distance d_{ij} between them.

Later, the gravity model was first employed to analyze the determinants of bilateral trade flows by Tinbergen (1962) and Pöyhönen (1963). They stated that the trade volume between country i and j is based on the economic sizes (GDP) and distance between two countries. The gravity model was written:

$$T_{ij} = \frac{Y_i^a Y_j^b}{D_{ij}^c} \quad (2)$$

where T is the total trade volume between country i and countries j. It is positively proportional to economic sizes of country i and countries j (Y_i and Y_j), and inversely proportional to the distance between country i and countries j.

Linnemann (1966) added more variables in to the gravity trade model, and went further to a theoretical justification in term of Warasian General Equilibrium system as cited in (Bergstrand & Egger, 2011). He points out that the feature of gravity trade model is theoretically defined by three major aspects. The first characteristic of the gravity model is based on the quantity of the total exports of a country to the world market which is known as the potential supply. Secondly, he considered about the potential demand of a country which is the quantity of total imports of a country from the world market. The latter important factor is the resistance (barriers) to international trade which is able to impact on the degree of trade intensity between countries to other trading partners in the world. The trade resistances are naturally known as tariff barriers, transportation costs, and other trading barriers.

In the late of 1970s, gravity model started to become an attractive trade model along with the supported theoretical-explanation. Anderson (1979) propose the first economic foundation for the gravity model based on the Armington (1969). This foundation is based on the expenditure function as a form of a constant elasticity of substitution (CES) preferences and goods that are differentiated by region of origin.

Similarly, Bergstrand (1985) explored a relationship between trade theory and bilateral trade in series of works. He describes the gravity model based on the foundation of monopolistic competition in microeconomic aspect. He assumed that goods were not perfectly substitutes. The imported goods from other countries were relatively closer substitutes than domestic goods (Deardorff, 1998; Thai, 2006).

Deardorff (1984), Helpman and Krugman (1985) introduced the new trade theory, designed by raising three major facts. Firstly, they explained that the increase in GDP will lead to the increase in the volume of bilateral trade between two countries. Secondly, the new trade theory also discusses on the trade among industrialized

countries. Finally, they studied on a large size of trade in industry level, especially concentrated on enormous intra-industry trade (Bergoeing, Kehoe, & en Economía, 2001). Under the imperfect substitute model, the authors explained that each firm produces a product which has an imperfect substitute for another product. Additionally, each firm has monopoly in its own product; and consumers can choose the products they want to consume based on their preferences. When the size of the domestic economy increases twice, the consumers increase their utility in the form of greater variety rather than greater quantity. Hence, once two countries have comparable technologies and preferences, they are most likely to expand the number of available choices for consumption by trading more with each other. They also pointed out that Ricardian model and the Heckscher-Ohlin model is failed to explain the facts of bilateral trade, because those models cannot prove that the bilateral trade depends on the products of incomes while the gravity model does (Bergoeing et al., 2001).

On the other hand,(Deardorff, 1998) revealed that a simple gravity model could be derived from the Heckshcer-Ohlin model without assuming product differentiation. He insisted that a country can choose trading partners in homogenous-product with producers and consumers indifferences, where have no trade barriers (BONUEDI, 2013; Greene, 2013). Additionally, it illustrates that the gravity equation can derive from the proportionate to factors explanation of trade. However, the foundations of gravity model cited above are not considered as the full gravity foundation, because it is failed to include the role of distance. Lately, distance variable is commonly accepted that relative distance causes more matters than the absolute distance for bilateral trade flows in the gravity estimation (Sohn, 2005). van Wincoop and Anderson (2003) demonstrated that trade volume between country pairs will be larger and smaller proportionate negatively to distance between them. The further distance causes the smaller trade volume between country pairs, while the smaller distance causes the larger trade between two country pairs (Sohn, 2005). Especially, van Wincoop and Anderson (2003) show that it is important to control for relative trade costs in gravity model. Likewise, their theoretical results demonstrate that a country relative trade costs determine the bilateral trade. Moreover, they also said that multilateral resistance terms (known as ceteris parisbus) matters bilateral trade. For instance, if the a country has multilateral resistance (high bilateral barrier), it will trade more with a country which has a low multilateral

resistance (low bilateral barrier) (as cited in BONUEDI (2013)).

2.2 Literature Review

Sohn (2001) used the gravity model to analyze the trade patterns of Korean. He introduced the basic gravity model by using the sum of exports and imports between Korea and its trading partner as a dependent variable of the bilateral trade flow; and the basic dependent variables such as the product of GDPs of Korea and its trading partners, the product of per capita GDPs of Korea and its trading partners, and the distance between them. Another important dependent variable in his study was added in to the gravity model which is the Trade Conformity Index, to observe whether the trade patterns of Korea are based on the Heckscher-Ohlin (H-O) model or the products differentiation model. Finally, he added APEC dummy as an independent variable into the gravity model. The results from OLS show that GDPs and per capita GDPs of Korea and its trading partners has a positive coefficient at a significant level, while distance has a negative impact on the bilateral trade between Korea and its trading partners. For Trading Conformity Index (TCI) variable has possibly impact on the Korea's bilateral trade; the trade complementarity (TCI) causes the Korea's bilateral trade to increase. Lastly, the APEC dummy shows a positive impact on the Korea's bilateral trade, where the arrangement of regional trade agreement can decrease the economic distance.

Besides that, augmented gravity model was applied to measure Mercosur-European Union trade, and trade potential following the agreements reached recently between both trade blocks **(Martínez-Zarzoso & Nowak-Lehmann, 2003)**. The study covers 19 countries including 4 members of Mercosur, Chile, and other 15 countries in the European Union. The authors applies econometrical analysis of panel data frame work. They estimates the gravity by using the fixed effect and random effect model. According to the result, the study prefers fixed effects to random effects model. Furthermore, some other variables are added in his study such as infrastructure, income differences and exchange rates. They are found to be important determinants of bilateral trade flows.

De Groot, Linders, Rietveld, and Subramanian (2004) illustrated the gravity equation in the purpose of investigating the pattern of bilateral trade of each pair of countries in

their study, which concentrated on trade patterns in 1998 with a scope of more than 100 countries. The dependent variable of gravity trade equation is the bilateral export. The independent variables they added besides from basic variables (national income, per capita income, the distance) are dummy variables such as a land border, the primary language, membership in a regional preference trade agreement, the main religion, common colonial empire, and two more interesting variables (the level of subjective institutional quality variable and the similar quality of institutions dummy). The basic results from OLS estimation show that national income and per capita income have a positive impact on the bilateral export between pair countries, while distance coefficient is significantly negative to the bilateral export between them. Moreover, the dummies (common language, common religion, common colonial history, common membership in regional blocs, and common border) show the positive coefficients at the significant level. The most important part of this paper proved that the institutional factors have an impact on the bilateral trade. The similarity of institutional effectiveness is positively significant impact on the bilateral trade, while institutional quality differences between each pair of countries have a negative impact on the bilateral trade.

Furthermore, **Kim (2006)** has focused on the investigation of the trade flows of Cambodia by employing the gravity trade model. This study tries to indicate the important elements that influence the trade between Cambodia and its 20 major trading countries during the period of 1994 to 2004. This study employs Pooled OLS model to estimate the gravity model. The finding shows that all of the main variables (GDPs, Distance, and border) are statistically significant. On the other hand, the exchange rate volatility has a negative impact on the Cambodia's trade. Essentially, the ASEAN variable is statistically significant with positive impact on Cambodia's trade in the period of 1999 to 2004. For the whole period of study, ASEAN has negative impact on the Cambodia's trade, but it is insignificant. The value of coefficients DIST and BORD are statistically significant in the period of 1994 to 1998, but both DIST and BORD are week in this period. Anyways, the DIST and BORD variables are not significant during the period of 1999 to 2004. The expected finding in this paper is caused by including the dummy variable of ASEAN in to the model.

A small country like Malawi was investigated the bilateral trade flows with her main

trading countries by **Simwaka (2006)**, using the gravity trade model. They studied Malawi's trade with 6 major trading partners, namely Zambia, Zimbabwe, Mozambique, South Africa, UK and USA during the period of 2000 to 2004. The product of the trade between two trading countries as an endogenous variable, and the exogenous variables like real GPD, exchange rate volatility, distance, a dummy for membership to similar regional integration agreement, and a dummy for a common border. The result from simple OLS with pooled data model, fixed effects and random effects estimator show that GDP's coefficient is significantly positive, while distance's coefficient is negatively with significant level. Moreover, the common border causes the bilateral trade to increase, while the regional economic grouping variable is insignificantly positive. Lastly, the exchange rate volatility coefficient is insignificantly negative.

Similarly, **Huot and Kakinaka (2007)** investigated the structure trade and Cambodia's bilateral trade flows by employing the gravity model. The study was done by using data in the period of 2000 to 2004, one year after the Cambodia become the ASEAN Free Trade Area (AFTA). Moreover, there were 20 major trading partners selected as a scope of the study. In his study, he introduced total bilateral trade of Cambodia as dependent variable, and independent variables such as GDPs, per capita GDPs, the distance, exchange rate volatility, dummy variable, and the trade conformity index. The result from the pooled OLS estimator shows that the GPDs and per capita GDPs of Cambodia and the trading partners are statistically significant with positive sign. On the other hand, the geographical distance is statistically significant with negative sign. Surprisingly, the ASEAN dummy variable has a large positive coefficient, and it is statistically significant. The exchange rate volatility variable is statistically significant with negative sign. Lastly, the trade conformity index (TCI) is statically significant with positive sign, which shows that the factor endowments (in Heckscher-Ohlin) can push up the trade flows in Cambodia.

The analysis of Xinjiang's trade performance and degree of trade integration has been revealed base on the gravity trade model **(Chen, Yang, & Liu, 2008)**. They introduce new explanatory variables such as GDP, GDP per capita and Shanghai Cooperation Organization (SCO) to construct an extended trade gravity model which fits to

Xinjiang's bilateral trade. Those three variables have a positive effect on the Xinjiang's bilateral trade due to the empirical analysis of the model. However, geographic distance is a factor influencing Xinjiang's bilateral trade negatively and significantly. Then, by the extended trade gravity model, this article analyzes the present trade situation between Xinjiang and its main trade partners quantitatively in 2004. The results of extended gravity trade model of Xinjiang's bilateral trade in 2004 indicate that Xinjiang has recognized successfully trade partnership with Central Asia, Central Europe and Eastern Europe, Western Europe, East Asia and South Asia.

Furthermore, **Lwin (2009)** used gravity model to analyze on the patterns international trade of CLM countries, since they became members of AFTA. He employs the gravity model to investigate the CLM's trade flows to 27 major trading countries in the world during the period of 1998 to 2007 after Laos and Myanmar became ASEAN member, except Cambodia. This study employed Pooled OLS to estimate the gravity model. The estimation result shows that the nature of CLM's trade are mainly affected by its trading partners GDP, the difference between per capita GDPs of CLM and its trading partners', distance, common border, and presence in particular FTA. CLM has a high potential trade with East Asian countries including China, Japan and Korea. These findings suggest that CLM countries needs to stimulate their bilateral trade with countries where located close to them. Moreover, CLM should promote their international trade with countries that have a large economic size and high consumers' purchasing power by speeding up their trade liberalization efforts, especially in free trade agreements process.

Binh, Duong, and Cuong (2011) investigated the bilateral flows of Vietnam by using the gravity model by employing the panel data of 60 major trading partners over the year 2000 to 2010. They introduced independent variables such as GDP, distances, population, exchange rate, culture and strategic partner have an impact on Vietnam bilateral trade with its trading partners. The panel data framework in this study employed pooled OLS, random effects and fixed effects model to estimate the gravity model. The results from the estimation shows that GDPs, population, distance and national culture are the main factors affecting Vietnam bilateral trade. The increase in GDP and population of Vietnam and its trading partners positively impact on the bilateral trade between them, while distance between them shows the negative impact

on the Vietnam bilateral trade. Surprisingly, the exchange rate coefficient is statistically positive, but it is insignificant. The authors also determined the potential of Vietnam bilateral trade flows, which results a high potential trade with European countries, Africa regions and Western Asia.

Thapa (2013) illustrated the use of gravity trade model to predict the potential of Nepal trade in 2009. The study conducted by using secondary data with 19 trading partners. The result shows that the bilateral trade between Nepal and her trading partners is positively affected by the economic size of Nepal and her trading partners, while the distance causes the bilateral trade between them decrease. The most important part of this paper was demonstrated that the potential of Nepal bilateral trade has exceeded the possible trade with 10 trading countries especially her two largest trade partners (India and China). On the other hand, there is a possible room for Nepal to increase her bilateral trade in other 9 partner countries like Japan, Denmark, France, Germany, Hong Kong, Netherlands, Italy, Bangladesh, and Brazil.

Table 2.3 Summary of literature review

No.	Author (s)/Year/Title	Variables	Model	Results
1	A Gravity Model Analysis of Korea's Trade Patterns and the Effects of a Regional Trading Arrangement **Sohn (2001)**	T_{ij}, $(Y_i \cdot Y_j)$, $[(Y/P)_i \cdot (Y/P)_j]$, $D_{ij,}$ TCI_{ij}, $APEC_{ij}$	The gravity Model	- $Y_i \cdot Y_j$) have a positive impact on T_{ij} - $[(Y/P)_i \cdot (Y/P)_j]$ has a positive coefficient and significant - D_{ij} has a negative coefficient and significant - TCI_{ij} has a positive coefficient and significant - and $APEC_{ij}$ has a positive coefficient and significant
2	Augmented gravity model: An empirical application to Mercosur-European Union trade flows **Martínez-Zarzoso and Nowak-Lehmann (2003)**	$X_{ij,}$ Y_i, Y_j, N_i N_j, D_{ij}, A_{ij}, P_{ijh} I_i, and I_j	The gravity Model	- Y_i (Y_j)=positive sign - N_i = large and negative effect in export while N_j= large and positive effect on exports - D_{ij} is statically significant with negative sign - P_{ijh}= positive sign and are statistically significant - I_i and I_j are positive but not significant

Table 2.3 Summary of literature review (continued)

No.	Author (s)/Year/Title	Variables	Model	Results
3	The Institutional Determinants of Bilateral Trade Patterns **De Groot et al. (2004)**	X_{ij}, Y_i, Y_j, y_i, y_j, D_{ij}, Adj_{ij}, $Lang_{ij}$, PTA_{ij}, $Religion_{ij}$, Col_{ij}, $Inst_i$, $Inst_j$, $SimInst_{ij}$	The gravity Model	- Y_i, Y_j, y_i, and y_j have a positive impact on X_{ij} - D_{ij} have a negative impact on X_{ij} - Adj_{ij}, $Lang_{ij}$, PTA_{ij}, $Religion_{ij}$, and Col_{ij}, $Inst_i$ and $SimInst_{ij}$ have a positive impact on X_{ij} - $Inst_j$ has a negative impact on X_{ij}
4	An Analysis of Cambodia's Trade Flows: A Gravity Model **Kim (2006)**	EXP_{cit} , EXP_{ict}, GDPct, GDPit VOL_{cit}, $DIST_{ci}$, $BORD_{ci}$, and ASEAN	The Gravity model	- GDP_c and GDP_i have a positive coefficient - VOL_{ci} negatively impact on trade - $DIST_{ci}$ and BORD weak negative [1994-1999] - ASEAN= not significant from [1994-1999], but significant [1999-2004]

Table 2.3 Summary of literature review (continued)

No.	Author (s)/Year/Title	Variables	Model	Results
5	Dynamics of Malawi's trade flows: a gravity model approach **Simwaka (2006)**	(X_{ijt} X_{jit}), (GDP_{it} GDP_{jt}), $Dist_{ij}$, $EXVOL_{ijt}$, $CBORD_{ij}$, REG_{ijt}	The Gravity model	- (GDP_{it} GDP_{jt}) and $CBORD_{ij}$ have a positive impact on (X_{ijt} X_{jit}) - $Dist_{ij}$ has a negative impact on (X_{ijt} X_{jit}) - $EXVOL_{ijt}$ and have a negative coefficient but statistically insignificant - REG_{ijt} has a negative coefficient, but it is statistically insignificant
6	Trade Structure and Trade Flows in Cambodia: A Gravity Model **Huot and Kakinaka (2007)**	T_i, Y_i, Z_i, D_i, $ASEAN_i$, VOL_i, TCI_i	The Gravity model	- Y_i and Z_i are significantly positive coefficients - D_i and VOL_i are significantly negative coefficients - TCI_i and $ASEAN_i$ is significantly positive coefficient

Table 2.3 Summary of literature review (continued)

No.	Author (s)/Year/Title	Variables	Model	Results
7	Empirical Analysis of Xinjiang's Bilateral Trade: Gravity Model Approach **Chen et al. (2008)**	T_{lj}, GDP_1, GDP_j, GDP_{pc1}, GDP_{pcj}, D_{1j}, SCO	The gravity Model	- GDP_1, GDP_j, GDP_{pc1}, GDP_{pcj}, and SCO are positive and statistically significant; if those factors increase, the trade of Xinjiang will increase. - D_{1j} is negative and statistically significant; it means the longer distance discourage the Xinjiang's trade
8	Analysis on International Trade of CLM Countries **Lwin (2009)**	$T_{ij,}$ Y_i, $Y_{j,}$ GAP_{ij}, D_{ij}, FTA_{ij}, GSP_{ij}, ADJ_{ij}, ε_{ij}, SANC	The gravity Model	- Partner country's GDP, the difference between per capita GDPs of two countries, distance, adjacency, and presence in particular FTA are the main factors affected the CLM's trade patterns

Table 2.3 Summary of literature review (continued)

No.	Author (s)/Year/Title	Variables	Model	Results
9	APPLYING GRAVITY MODEL TO ANALYZE TRADE ACTIVITIES OF VIETNAM **Binh et al. (2011)**	T_{ijt}, Y_{it}, Y_{jt}, N_{it}, N_{jt}, D_{ij}, EX_{ijt}, C_{ij}, P_{ijt}	The gravity Model	- Y_{it}, Y_{jt}, N_{it}, and N_{jt} have a positive impact on Vietnam's trade while D_{ij} has a negative impact on Vietnam's trade - EX_{ijt}, and C_{ij} has a positive impact on trade between Vietnam and country j - P_{ijt} does not impact trade (inefficient)
10	Nepal's Trade Flows: Evidence from Gravity Model **Thapa (2013)**	T_{ij}, (Y_i* Y_j), (Y/P_i*Y/P_j), D_{ij}	The gravity Model	- (Y_i* Y_j) and (Y/P_i*Y/P_j) have a positive impact on trade between Nepal and countries j - D_{ij}'s coefficient is significantly negative; the longer distance the higher barrier of Nepal's trade