

Chapter Two: Theoretical Framework and Empirical Literature

In this Chapter both the theoretical and empirical literatures will be discussed. The gravity model is reviewed both theoretically and empirically. Section 2.1 and 2.2 covers the theoretical and empirical literatures of the gravity model. The literatures are evaluated in section 2.3 and section 2.4 presents the model intended to be used in the study.

2.1. Theoretical Literature

Historical perspective and related theories.

Sino – Ethiopian relationship is not a recent phenomenon. It had been evolving for a very long period of time. But in the past its course of growth had been decreasing at some times and intensifying the other times. The main reason for this is the change in regimes that occurred in Ethiopia. During the period of Haile Sellasie There was a peaceful bilateral relationship between Ethiopia and China. Ethiopia was also among the countries who supported China's bid in 1971 (Thakur, 2009). During the Derg regime relation between the two countries remained strained due to ideological differences and Ethiopia's close alliance with the Soviet Union.(Gedion 2009) Finally, in 1991, with the new transitional government in power, high level ministerial visits were commenced. Diplomatic ties became closer when Ethiopia hosted the second and fifth ministerial meetings of the Forum on China – Africa Cooperation (FOCAC) in 2002 and 2005. (Thakur 2009 Alemayehu 2008).

Gedion (2009), investigates the factors strengthening the current bilateral relations both from Ethiopian and Chinese side. On the Ethiopian side a number of factors enhanced the bilateral relations with China here are some factors listed by Gedion.

Firstly, Ethiopia needs economic assistance in the form of foreign aid, loans, investment and arms supply from China. Interestingly, in all of Ethiopian effort, China has rendered help without any political strings attached in those areas. Ethiopia has received over US \$ 500 million in concessional loan from the Chinese government and a further US \$ 1.5 billion of investments in telecoms infrastructure, as well as US \$ 1.5 billion in short term trade credits. (Gedion 2009).

Secondly, Ethiopia sees China as an alternative to the West. Ethio - China relations also reveals that China was the first top trade partner of Ethiopia in the previous few years. (Alemayehu 2008, Gedion 2009)

Thirdly, China's development in the past two decades is considered as a role model for Ethiopia. China helped millions of its people out of poverty and transformed itself from a backward agricultural country into a country with the highest growth rate in the world (Gaye, 2008:15-19 and Ndubisi, 2006:16 c.i. Gedion 2009).

The author also makes list of several factors that makes China to tilt towards Ethiopia. As of (Gedion 2009), these factors are listed as the following.

- i. On the first place, Ethiopia plays important role in African politics because of its strategic location in the region as the seat of African Union, Economic Commission for Africa and other specialized organs of the UN. One example for this argument is the new African Union headquarter which is funded by China and given as a demonstration effect to the AU. The building costs about \$200 million. It's over 100m high and is the city's tallest building (BBC.com 28-01-12).
- ii. Ethiopia is also a source of the Nile, the river which crosses Sudan and Egypt.
- iii. The other important factor which strengthened the bilateral relations is the Chinese need for markets. The regional competition between Chinese companies is consequently so fierce that products sold but not made in any given province are heavily taxed. Expansion into international markets provides greater scope for a product to attain bigger market distribution with fewer tax

obligations (Ming and Williamson 2003; 12 C.I. Gedion 2009). According to these writers, due to the domestic market saturation the need to find new markets for their products that are in over supply has become a matter of survival for many Chinese companies. These huge gross oversupply is mainly the products of Decades of industrially- led command economy in many sectors in China's domestic market. Ethiopia with more than 88 Million populations (CIA World Factbook 2011) is potentially a very lucrative market for the Chinese products.

Is Ethiopia benefited from this bilateral relation? This is not just a simple question posed to be answered by simple overlook of the countries. Many studies such as Thakur 2009, Alemayehu 2008 became inconclusive about the benefit of Ethiopia and it need further study to get the answer for the above question. But we can divide the relation in different sects to see the benefit of Ethiopia.

China's contribution to Ethiopia's economic development vis-à-vis infrastructure growth is undeniable (Thakur 2009). Chinese construction firms dominate the road construction industry. Chinese companies also contributed to a reduction of cost. This is especially the case in construction, where the Chinese companies charge reportedly 20-25% less than their competitors (Gedion 2009). The infrastructure improvements help Ethiopia to secure other loans and investment opportunities, contributing to an atmosphere of development that may one day change the country. (Alemayehu 2008, Gedion 2009)

Secondly, China assists developing countries to accelerate development including granting zero – tariff treatments for some exports from the least developed countries, increasing aid to the heavily indebted poor countries and least developed countries and cancelling debts contracted by them, providing concessional loans and effective human security agenda such as medicine for treating malaria, and training professionals. Consequently, Ethiopia is one of the beneficiaries as China is helping Ethiopia to reduce poverty and foster development endeavor.(Gedion 2009)

China is also a huge source of investment for Ethiopia. Following the cooperation agreement that began in early 1970's China has built for Ethiopia; highways, veterinary station, power stations and similar other projects. The major Chinese companies carrying out in Ethiopia include: China Imports and Exports (Group) Corporation for Complete sets of Equipment, China Highway Bridge Engineering (Group) Corporation, Zhongyuan Petroleum Prospecting Bureau, The Chinese public telecom giant ZTE Telecom. These are few dominant Chinese firms undertaking investment activities in Ethiopia (Alemayehu 2008). In 2007 the Chinese investment grew to 15.7% of the Total FDI to Ethiopia (Ethiopian Investment Authority).

There is indirect positive impact of China's Economic growth on the Ethiopian economy which materializes through the following channel. The growth of China will increase the demand for primary commodities in China which, in turn push up prices of these commodities. Thus, since Ethiopia is primary commodity exporting country, the growth of the Chinese economy will benefit the country from increased prices of the commodities. (Ethiopian Economic Association 2009)

Ethiopian consumers are getting cheaper imports from China even though its of low quality and standard (Alemayehu 2008). Alemayehu also noted that not only the consumers but also the producers are getting cheaper machineries From the Chinese companies. China has also emerged as the major donor to Ethiopia.

But, the bilateral relation encountered many challenges. These challenges can be broken down as follows:-

- I. One of these challenges is despite the fact that the value of imports and exports have been significantly increasing from time to time, the balance of payment is skewed heavily towards China. (Gedion 2009) this is caused mainly because of Ethiopia's heavy reliance on the primary sector as dominant components in its exports.

- II. Another pernicious side effect is manifested in the form of dumping of low price export goods such as textile and clothing, industrial products, electronic devices and machines, which find a huge demand in the Ethiopian market. (Alemayehu 2008, Gedion 2009) The competition from China in the emerging plastic and textile manufacturing industries is a particularly acute problem for Ethiopia.(Alemayehu 2008) Consumers may rejoice briefly over falling prices, but in the end it results in domestic Ethiopian producers being forced out of business because they cannot compete with such low price. Moreover, the low priced Chinese goods can undermine Ethiopian goods and services.
- III. As of Alemayehu (2008), The use of Chinese contract labor instead of local workers in some of Chinese sponsored projects is also another problem.
- IV. Another challenge that can be argued is the negative spin off effect of China on the democratization process of Ethiopia. This is because Unlike Western states the promotion of democracy is not an objective of China's foreign policy.

China's exporting performance

The expansion of China's participation in international trade has been one of the most outstanding features of the country's economic development. China is the world's third largest exporter and also the leader among the countries covered by the WTO in terms of export growth (Görg *et al.* 2008). Chinese exports rose on average 5.7 percent in the 1980's 12.4 percent in the 1990's, and 20.3 percent between 2000 and 2003. By 2003, China's export growth rate was seven times higher than the export growth rate of the world as a whole (Silva-Ruette 2006, Görg *et al.* 2008). China's export activities can be described as highly dynamic and diversified. As Silva-Ruette, 2006 argued, export concentration indicators show that China's export supply is highly diverse compared to that of other countries. Furthermore, current trends in the composition of Chinese exports suggest that their technological content is increasing. China's endowment structure gives it huge comparative and competitive advantages in labor intensive goods as Ethiopia is also a labor intensive country.

2.1.1. The Gravity model

It has long been recognized that bilateral trade patterns are well described empirically by the so called gravity equation. It is also used to be frequently stated that the gravity equation was without theoretical foundation Deardoff (1995). More recently, gravity model studies have achieved empirical success in explaining various types of inter- regional and international flows, including labor migration, commuting, customers, hospital patients, and international trade (Cheng and Wall 2004). It has long been recognized that bilateral trade patterns are well described empirically by the so called gravity equation, which relates trade between two countries positively to both of their incomes and negative to the distance between them usually with a functional form that is reminiscent of the law of gravity in physics. (Deardoff 1995, Anderson 1979, Zarzoso and Lehmann 2002)

The standard form of gravity as given by Tulugok (2010), Anderson 1979, Deardof (1995) looks like this; taking the log except for the dummies:

$$M_{ijt} = \alpha + \beta_1 Y_{it} + \beta_2 Y_{jt} + \beta_3 N_{it} + \beta_4 N_{jt} + \beta_5 d_{ij} + \beta_6 A + \beta_7 L + \beta_8 U_{ijk}$$

Where;

M_{ijt} = The volume of Import/ Export by country i from country j at period t

Y_{it} = Incomes in country i

Y_{jt} = Incomes in country j

N_{it} = Population in country i

N_{jt} = Population in country j

d_{ij} = the distance between countries i and j

A and L are two dummies that indicate whether countries share the same border and whether they share the same language, respectively they bear a positive sign.

In the above standard equation, Y_{it} and Y_{jt} capture the size of the trading countries through their respective GDP's and expected to have a positive effect with the dependent variable i.e. Export/Import. N_{it} and N_{jt} capture the population of the respective countries and expected to bear a positive sign. D_{ij} is transport cost captured by the distance between the trade centers of the respective countries and will have a negative effect on the Import/Export between the two countries.

We find two strands of literatures regarding the gravity model. The first strand is composed of peoples who argue that the gravity model does have only empirical success and no theoretical justification. But the other strand tried to develop theoretical justification for the model and argue gravity is more beyond empirical success.

2.1.2. Researches on the Theoretical Foundation of Gravity Equation

The widespread use of gravity equations is despite the fact that they have, until recently, tended to lack strong theoretical bases (Zarzo and Lehmann 2002). Deardoff states that it is certainly no longer true that the gravity equation is without theoretical basis, since several of the same authors who noted its absence went to provide one (Deardoff 1995).

The Gravity model is a bilateral trade model pioneered by Tinbergen (1962) and Poyhonen (1963) independently. And later on Linneman (1963). In its basic form, the amount of trade between two countries is assumed to be increasing in their sizes, as measured by their national incomes, and decreasing in the cost of transport between them, as measured by the distance between their economic centers. (Cheng and Wall 2004, Deardoff 1995, Zarzo and Lehmann 2002 Tulgok 2010). The gravity equation for describing trade flows first appeared in the empirical literature without much serious attempt to justify it theoretically. Linnemann (1966) included population as an additional measure of country size and went a little further towards theoretical justification.(Deardoff 1995)

Alan V. Deardoff argues that it is not all that difficult to justify even simple forms of the gravity equation from standard trade theories because the gravity model appears to characterize a large class of models, its use for empirical test of any of them is suspect. (Deardoff 1995; 26-27) He questions whether the gravity model works in neoclassical world.

Deardoff 1995 derived equations for the value of bilateral trade from two extreme cases of the H-O Model, both of which also characterize a variety of models as well. The first case was frictionless trade, in which the absence of all barriers to trade in homogenous products causes producers and consumers to be indifferent among trading partners, including their own country, so long as they buy or sell the desired goods. He derived expected trade flows that correspond exactly to the simple frictionless gravity equation whenever preferences are identical and homothetic. Then individual bilateral trade flows will vary around this frictionless gravity value. If one country tends to overproduce what the other over-consumes then exports of the former to the latter will be above that value, and if one tends to under-produce what other over-consumes, this export will be below that value (Deardoff, 1995:15). With the impeded trade case the results of his derivation are read as: if importing country, j 's relative distance from exporting country i is the same as the average of all demanders' relative distances from i , then exports from i to j will be the same as in the Cobb-Douglas case. That is c.i.f exports will be given by the simple frictionless gravity equation, while fob exports will be reduced below that equation by the transport factor from i to j , much as in standard gravity equation with transport factor measuring distance Deardoff (1995:23,26)

Tulugok (2010), raises the drawbacks of gravity model and try to solve the problems arising from them. As Tulugok argued, Firstly, data on trade and income should be expressed in real terms, which need for a deflator. The choice of an adequate deflator is not straight forward. GDP deflator raises a problem since inflation is not homogenous across goods and services. The more disaggregated the analysis the less relevant it might be. To convert from nominal to real terms, he introduced a price deflator, pit , and defined as the difference between pit^m , the import price deflator and pit^y , the GDP deflator (both in logs).

Secondly, the standard model of gravity ignores price competitiveness effect. As changes in competitiveness vary across countries, in order to explain imports from a specific country, he also include a measure of competitiveness based on the relative unit labor costs between the importing and exporting countries (Tuglok 2010).

Thirdly, the standard model imposes, without testing, constant income elasticities. Although theoretically very convenient, this restriction may be empirically not validated and if this is the case, it could be a source of heteroscedasticity. While the assumption of constant own-income elasticity makes sense in macroeconomic relationship, it becomes questionable at a less aggregated level. Indeed when income grows, the structure of final demand, and therefore the structure of import changes. This evolution is more flexible than the one implied by the standard model. Therefore he chose to use the average per capita income of the countries and thus the estimated income elasticity at that point. Empirically, this specification has also the advantage of reducing the problem of heteroscedasticity generally present with panel data (Tuglok 2010:3).

2.2. Empirical Evidence

The gravity model has been used widely as a baseline model for estimating the impact of a variety of policy issues, including regional trading groups, currency unions, political blocs, patent rights, and various trade distortions (Cheng and wall 2004).

Alemayehu and Atnafu (2008), estimated the displacement of 13 African countries exports by the two Asian drivers China and India on the third market using trade data from the UN Comtrade database and IMF's Direction of Trade Statistics (DOTS), income and related data from World Bank's World Development Indicators (WDI) and the usual gravity variables (distance, common border and common language) from Feenstra's website and Encarta Encyclopedia 2007. Their study covers the period 1995 to 2005, Real GDP and GDP percapita are in constant 2000 US dollars. Imports and exports are deflated by US CPI (2000 = 100) to have them in real terms. They concluded that China and India affect Africa differently. Their effect is also found to vary across time. In the early years of the study

period, particularly before the year 2000, the overall impact of China was crowding out African labor intensive manufacturing export. Their other major finding is that the impact varies across countries. The source of these variations could also be different (Alemayehu and Atnafu 2008).

2.3. Evaluation of The Theoretical and Empirical Literature In The Context of This Study

There are basically two types of arguments regarding the effect of population on bilateral trade flows. Some authors, like Matyas 1997, finds that population has a tendency to increase trade and the level of specialization by producing gains from specialization. On the other hand, (Dell'Araccia 1999 C.I. Nuroglu 2011) finds a negative population coefficient. Moreover Bergstrand (1989) reports a positive GDP per capita coefficient, which means a negative relationship between population and trade flows. But for the case of Ethiopia since the exports are highly labor intensive commodities, population growth will have a positive effect on the bilateral trade.

The issue of exchange rates is also arguable regarding its effect on bilateral trade. Authors like Either 1983, Akhtar and Hilton 1984 C.I. Nuroglu 2011) finds that uncertainty in the future exchange rates reduces level of trade. But, Hooper and Kohlhagen 1978, analyze the impact of exchange rate uncertainty on the volume of the US – German trade for the years 1965 – 1975, and find no statistically significant effect. An IMF study (1984) summarizes that the large majority of empirical studies could not find a significant relationship between exchange rate variability and the volume of trade (Nuroglu 2011). In this study the second argument is used owing to the insignificance of the uncertainties of exchange rate on trade flows. But this does not prove that the relationship does not exist.

2.4. Model Specification

We have reviewed both the theoretical and empirical literatures regarding the gravity equation. In this section we will present the model that is going to be used in this particular study.

The determinants of a gravity model are fundamentally three. Those related to the exporting country's potential supply, those linked to the importing country's potential demand and those related to the natural or artificial resistance to trade. The explicative variables generally used have been: the GDP (the expectation is that trade two countries would grow in size and, therefore the gross product proves a good proxy), the per capita GDP of the importing and exporting countries (the higher the development level the greater the variety of products demanded and supplied) and the distance between each pair of countries serving as the resistance proxy.

Because the principal aim of this work is to determine whether China's exports has displaced Ethiopia's exports, the gravity equation specification that follow, according to Eichengreen *et al.* (2004) and Greenway *et al.* (2008) and Recalde *et al.* (2010) is adopted.

$$\ln M_{ijt} = \beta_0 + \beta_1 \ln XCH_{it} + \beta_2 \ln GDP_{it} + \beta_3 \ln GDP_{jt} + \beta_4 \ln Y_{it} + \beta_5 \ln Y_{jt} + \beta_6 \ln D_{ij} + \beta_7 BORD_{ij} + \epsilon_{ij}$$

Where:

M_{ijt} - Imports of country *i* from Ethiopia

XCH_{it} – Chinese Export to country *i*

GDP_{it} – Real GDP of importing country

GDP_{jt} - Real GDP of Ethiopia

Y_{it} - Real GDP Per capita of importing country

Y_{jt} - Real GDP Per capita of Ethiopia

Dij – Distance between *i* and *j*

BORDij – Binary dummy which is one if *i* and *j* share a land border, zero otherwise

ϵ_{ij} – Error term

Ethiopia a county that had never been colonized. Therefore the standard dummy variable of colony will become insignificant as our estimation is on Ethiopia and its trading partners. So as the dummy of common language because languages spoken in Ethiopia are very rarely spoken in Ethiopia's trading partner countries and for this study we won't use them.

The coefficients corresponding to the variables **GDPit**, **GDPjt**, **Yit**, **Yjt** and **BORDij** are expected to bear a positive sign while **Dij** is expected to be negative.

If Chinese exports displacement of other countries in the region is indeed the case, the coefficient of the variable **XCHit** should be negative and statistically significant.