ADDIS ABABA UNIVERSITY
SCHOOL OF GRADUATE STUDIES

Evaluation of Ethiopia's Bilateral and Potential Exports in the Middle East: A Gravity Model Approach

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Acronyms

AGOA	African Growth Opportunity Act
COMESA	Common Market for Eastern and Southern Africa
CPI	Consumer Price Index
DOTS	Direction of Trade Statistics
EBA	Everything But Army
EU	European Union
GDP	Gross Domestic Product
GNP	Gross National Product
GSP	Generalized system of preference
G2SLS	Generalized Two Stage Least Square
IFS	International Financial Statistics
ITC	Index of Trade conformity
QWPDR	Quality Wines produced in determined Region
RI	Regional Integration
SITC	Standard International Trade Classification
TOT	Terms of Trade
UAE	United Arab Emirates
WDI	World Development Indicator
WTO	World Trade Organization

Abstract

The study analysis the major determinants of Ethiopian's bilateral exports and explores the unexploited export potentials that the country may have in the Middle East using two different methods.

First, the augmented gravity model estimated by G2SLS estimation technique using 13 years data of 15 exporting partners. The estimated coefficients then used to analyze the existing bilateral export and predict the export potential that the country could have in the three Middle Eastern countries. Accordingly, GDPpc of both exporting and importing countries found to have positive and significant impact on Ethiopia's bilateral exports whereas, distance between countries negatively affect their bilateral trade . In this light, the export potentials of the country are estimated using the estimated coefficients of the gravity model. Accordingly, Ethiopia has the highest unexploited potential in U.A. E and significant amount in Saudi Arabia.

Secondly, Using the ITC measure, the potential to increase Ethiopian's export in these countries and the top 20 commodities that highly contribute to increase the county's export potential are also identified. The finding of this index shows that gold, coffee and tea, fruits and vegetables, live animals, meat and meat preparations and cut flowers are among the products that have the highest potentials to increase Ethiopia's Export in the Middle East.

***Key Words**: Gravity Model; Export Potentials; Index of Trade Conformity; Middle East*

1. Introduction

Ethiopia is one of the poorest countries in the world. With an estimated GDP of $19.4 billion and Per Capita GNP is estimated to be about $220 in 2007. Other well-being indicators are also extremely low. For instance if we take some of the indicators such 47.8 years of life expectancy at birth, 40 per cent literacy rate. About 44 % of the population are also believed to be bellow poverty line[1].Even, more telling, if Ethiopia's GDP were to be uniformly distributed among all individuals, all Ethiopians would be bellow the internationally poverty line of $ 1 per day[2].

The country has a predominantly agrarian economy and depends on subsistence farming, with about 84% of the population living in rural area. As of 2006 the agricultural sector accounts for 48% of the GDP followed by service sector (39%) and industry (13%).

As the country has agrarian economy, most of its exports are composed of agricultural (primary) products and imports, machineries, oil, medicine and medical equipments and other high-tech industrial products. As of 2007 WTO Trade profile the primary commodities accounts 88.1% of the total merchandize export and manufactured products contributes only the remaining 11.9% of the total export.

A negative impact of dependence on exports of primary commodities is reflected in three interdependent phenomena. Firstly, a decline in prices faced by exports ("term of trade"), secondly, instability of export earnings. And, thirdly an absolute decline in levels of demand and supply (Alemayehu, 2002).

[1] Data from Human Development Report, 2006, UNDP, Ministry of Finance and Economic Development (2007)
[2] Ethiopia: Trade and Transformation, Diagnostic Trade Integration Study (2007).

Quoting from Prebisch (1950) and Singer (1950), Nissanke and Hewitt (1993) noted that the debate on whether or not there has been a secular decline in the net barter terms of trade of primary commodities and of developing countries (usually primary commodity exporters) has been alive. According to Sapasford et al 1992, as cited by Nisaanke and Hewitt (1993), there is also considerable agreement that there has been a corresponding decline in the relative term of trade of most developing countries vis-à-vis industrialized nations (Nissanke and Hewitt, 1993).

Alemayehu also noted that the term of trade of primary commodities continued to be characterized by secular decline and volatility over the last century or so. (Alemayehu 2007).As a result of this related phenomena, which are mainly caused by the exportation of few commodities that are mainly primary goods, combined with imports of large volume of both consumer and capital goods resulted in a widening gap between the two. To finance this trade deficit the government has depend on external finance in the form of aid and credit.

All these shows as Africa in general and Ethiopia in particular has performed poorly in international trade. For instance import of Ethiopia as a per cent of GDP constituted 24 and 32 while exports accounts only for 12 and 13 % in 2000 and 2007 respectively[3].Moreover, Ethiopia is a very small country in international trading system with its export and import share of total merchandise trade is only about 0.01 and 0.04 respectively.
Apart from being dependant on primary commodities, largest percentages of the country's exports are concentrated on few countries as a destiny for the exported products.

According to WTO trade profile of 2007, about 70.4% of Ethiopian exports are destined in the EU and other four non-EU countries. Here it is essential to raises the question why Ethiopian exports are concentrated in few markets and what factors determine Ethiopian bilateral trade. Moreover, Ethiopia is a signatory to a number of multilateral and regional trade agreements, which present challenge and opportunities[4]. As of 2008, Ethiopia is a member of COMESA and benefits from many industrial countries' Generalized System of Preferences (GSP) such as AGOA of USA and EBA of European Union.
In attempt to identify the major determinants of Ethiopia's exports, different researches have been conducted using different econometrics techniques. However, only very few

[3] Data from World Development Indicators Data Base, (2008)
[4] Digest of Ethiopian National policies, Strategies and programs, (2008)

works have been done using gravity model. Being the model a recent phenomenon, fast growing, and applying in international trade analysis, using the model in analyzing the country's bilateral trade helps us to look at the problem from different angles.

Furthermore, Ethiopia has long and historic trade relationship with neighboring and some Middle East Countries. Saudi Arabia and Yemen are a few to mention. Moreover, with the growing trend of United Arab Emirates (UAE) being trade route and center for most countries initiates export potential that Ethiopia may have in these countries need to be identified and exploited.

According to a study[5], trade liberalization policies aimed at increasing exports and reducing import protection while obtaining market access in developed countries is a viable part to reduce poverty. It also states that if Ethiopia were able to market all its export potentials, the effect on poverty will be substantial. Hence, this paper aims to identify the main determinants of Ethiopia's bilateral exports and addresses the question of whether Ethiopia has untapped export potentials with the Middle Eastern Countries or not.

In what follows, we start in section two with a brief review of relevant literature, section three is devoted to model selection (specification), data, estimation result and analysis and the paper will be concluded in chapter four with conclusion and policy implications.

2. Literature Review

2.1 Theoretical Literature Review

2.1.1 The Gravity Model and Bilateral Trade

The Gravity Model, which first independently applied by Tinbergen (1962) and Poyhonen (1963) to analyze international trade flows, is originated in Physics by Newton (Dana et al, 2002). According to the Newtonian model of gravitational force, the force of attraction between two bodies is proportional to the square of the distance between their centers of gravity.

After the Pioneer independent works of Tinbergen and Poyhonen, the model has been extensively using in the field of international trade in analyzing bilateral trade flows, identifying potential trades, Preferential Trade Arrangements ,Generalized System of Preference (GSP) and examine trade creation and trade diversion effects of RTAs (Zarzoso and Lehman ,2002).

[5] Ethiopia: Trade and transformation, Diagnostic Trade Integration Study, (2004).

Since the pioneer works of Tinbergen and Poyhonen, according to Alemayehu and Atnafu (2008), the literature on gravity model has been growing fast. Among which, some have critsized the model for lacking of strong theoretical foundation. Howeever, other researchers have attempted to give it a sound theoretical basis (Alemayehu and Atnafu ,2008).

Mentioning the Newtonian physics notion as the first justification of the model, Rahman, quoting from Anderson (1979), explains that the gravity model can be derived using a trade share expenditure system. While Anderson's analysis is at the aggregate level, Bergstrand (1985, 1989) developes a microfoundation to the gravity model (Rahman, 2006). He opines that a gravity model is a reduced form equation of a general equilibrium of demand and supply system. (Rahman, 2006).

Moreover, Eaton and Kortum (1979) also drive the gravity equation from a Ricardian framework, while Deardoff (1979) drives it from H-O perspective (Rahman, 2006). Deardoff (1979), as cited by Rahman (2006), proves that if trade is impeded and each good is produced by only one country, the H-O framework will result in the same bilateral trade pattern as the model with differentiate products (Rahman ,2006).
Event and Keller (1998) also shows that the standard gravity equation can be obtained from the H-O model with both perfect and imperfect products specialization (Rahman, 2006).
Quating from Jakob (2001), Rahman (2006) concludes that the gravity equation can be derived assuming either perfectly competition or monopolistic market structure. Also neither increasing returns nor monopolistic competition is a necessary condition for its use if certain assumptions regarding the structure of both product and factor market hold (Rahman, 2006).

Enabling to drive the model with the assumption of monopolistic market structure rather than only based on the ideal perfect competition, strengths the validity of the model to fit to the real world.

Analyzing the theoretical foundation of the gravity equation, Evett and Keller (1998), as quoted by Rahman (2006), mentions and explain three types of trade models.

These models, according to him, differ in the way specialization is obtained in equilibrium. They are:

(1) technology difference across countries in Rircadian Model

(2) variations in terms countries' difference factor endowments in the H-O model

(3) Increasing return at the firm level in the Increasing Return to scale (IRS) model.

Pass (2000) explained that these are the perfect specialization model and are considered as limiting cases for a model imperfect product specialization. But empirically imperfect product specialization is important. In real life, though technologies and factor endowments are different in different countries, they change over time and can be transferred between countries (Rahman,2006). Pass (2000) insisted that trade theories just explain why countries trade in different products but do not explain why some countries' trade links are stronger than others and why the level of trade between countries tend to increase or decrease over time. This is the limitation of trade theories in explaining the size of trade flows (Rahman, 2006). Therefore, while trade theories cannot explain the extent of trade, the gravity model is successful in this regard. It allows more factors to take into account to explain the extent of trade as an aspect of international flows (Pass (2000).

In this simplest gravity model of bilateral trade flows between two countries are assumed to be proportional to the product of their gross domestic products (GDP) and inversely proportional to a measure of the distance between them. The model has been generalized to include other variables that could be expected either to facilitate or hinder bilateral trade flows between countries.

There are also two standard ways of measuring the size of the countries in the Gravity Model: GDP or population (Ram and Prasad, 2006).

Zarzeso and Lehman (2002) states that the population of the exporter country may have a negative or positive impact on the its exports depending on whether the country exports less when it is big (absorption effect) or a big country exports more than a small country (economies of scale). They also noted that, for similar reasons, the coefficient of the importer country has also an ambiguous sign.

A high level of income (GDP per capia) in the exporting country indicates a high level of production, which increases availability of goods for exports whereas a high level of income (GDP per capita) in the importing country suggests higher level of imports (Zarzeso and Lehman, 2002).

Physical distance and a dummy for country adjacency are the two most commonly used variables to capture proxies for transportation cost. Transport cost creates natural obstacle to trade, thereby making the product less price competitive in the importing country and hence reduce the volume of traded goods between countries. Hence, the closer the countries are the less cost associated with and the more likely they are to trade with each other and vice-versa (Ram and Prasad, 2006).

Frankel (1997), cited in Rahman 2006, mentioned three kinds of costs that are associated with doing business at a distance:

(1) physical shipping costs

(2) time-related costs and

(3) Costs of (cultural) unfamiliarity.

In addition to the basic gravity variables (such as GDP and distance), cultural similarity, colonial ties, exchange rate and the presence or absence of PTA/GSP are among the most common variables that believed to affect international trade (Carillo and A li ,2002). Measure of 'cultural distance' have also been considered as a determinant of international trade and the most commonly used measure of 'cultural distance' is an indicator of common language (Baxtel and Kosparits, 2005)

The impact of a country's being a member of trade agreement or beneficiaries of GSP can also be assessed using the augmented version of the model. Recent studies have introduced dummy variables for participation in Regional Trading Arrangements (RTA) and Preferential Trading Arrangements (PRA) to analyze the potential for such membership (Srinivasan and Archana, 2008). To analyze the impact of Real Exchange Rate (RER) on the direction of trade, Berstrand (1985, 1989) first introduced it in the gravity model (Zerzoso and Lehman, 2002).

Moreover, different economists have developed various theories regarding the relationship between ER and the trade balance. The most conventional, as stated by Tochitskaya (2005) are the elasticity, monetary and absorption approaches. The elasticity approach out forward by Bickerdike, et al (1920), as cited by Tochitskaya (2005), commonly known as the BRM model, says that a nominal devaluation improves the trade balance in the Long Run (LR), although the short run (SR) effects may be adverse (famous J-curve hypothesis). The effect of devaluation on trade balance depends on the elasticity of exports and imports. This is so called particular solution for the BRM condition, known as the Marshall-Lerner Condition (Marshal (1923), Lerner (1944)). This condition states that for a positive effect

of devaluation on the trade balance the absolute value of the sum of import and export demand elasticities must exceed unity. The BRM model and M-L condition have become the underlying assumptions for those who focus on the ER as a major determinant of trade balances, and support the hypothesis that devaluation or depreciation increases exports by making export relatively cheaper, and discourage imports by making imports relatively more expensive, thus improving trade balance (Tochitskaya ,2005).

Despite substantial empirical research, there are still heated debates concerning the effects of exchange rate changes on the trade balance (Tochitskava, 2005).

2.2 Empirical Literature Review

Despite various literatures against gravity model for the lack of theoretical foundation, and the corresponding attempts to give it theoretical base, the model has great acceptance from empirical validity and has been applied in various studies. Among those, it has been using to analyze bilateral trade flows between countries, to evaluate main determinants of international trade, identify potential trade and analyze the impact of RTA/GSP on countries' as well as region's trade flows. Out of several applications (studies) of the model, some are briefly highlighted bellow.

Simwaka (2006) applied the gravity model to analyze Malawi's trade flows with its trading partners using five years data of eight countries. Apart from the basic gravity variables, his model is augmented by exchange rate volatility and dummies for membership to similar regional integration agreement and common border. The result of his analysis shows that all variables have the expected sign but are insignificant except for the product of exporting and importing countries. Exchange rate volatility has also a negative but statistically insignificant impact on Malawi's bilateral trade.

Blasi et al (2007) applied the gravity model to analyze the effects of political-economic integration and trade liberalization on exports of Italian Quality Wines produced in determined region (QWPDR). The specified gravity model includes two dummy variables to estimate the regional integration effect: one related to EU member countries and the other related to some Central and Eastern European countries (EUAN).The data set for this analysis has 605 observations over a period of 11 years (1995-2005) and 55 the largest importers of QWPDR from Italy. The estimation of the model resulted in coefficients of all

variables (including dummies) that are positive and significant except distance, which is negative.

Pass (2000) also applied the gravity model to estimate the determinant of Estonia trade with its major trading partner and found that GDP of both importing and exporting country had positive impact on trade flows between Estonia and a trading partner while the distance between pair countries significantly and negatively affect their bilateral trade.

Furthermore, different empirical researches have been conducted to predict trade potentials using gravity model. Ram and Prasad (2006) and But (2008) are a few to name.

Ram and Prasad (2006) have tried to assess Fiji's global potential. In doing so, they specified both the basic and augmented gravity model equation. The augmented version of the model, which used first to analyze international trade flow, includes dummy variables that accounted for the effect of boarder, language, RTA, Colonial links, Island and landlockedness. Regarding the methods of estimation, they used two stages of estimation. They estimated both specified models for world trade flow in the first stage and the estimated coefficients from this first stage used to analyze Fiji's trade in general and with some regional grouping in particular. OLS technique is applied to estimate the models and the estimation result shows that the coefficients of variables (including all dummies) are statistically significant. Pair countries' GNP, border, language, RTA, Island and colonial links are found significantly trade enhancing while distance and landlockedness resist trade flows between countries. The authors used the previously estimated gravity model to predict (estimate) the trade potential for the country and compared it with the actual trade flows between countries. Computing the ratio of estimated trade potential with the actual trade flow, they found that as the country has the maximum potential with countries like Australia, new Zealand, Thailand, the United States, Japan and Samoa and the minimum, which is more than twice the level of actual trade, with countries like China, India, Indonesia, Malaysia and Korea. The study also predicted the country's potentials in terms of different regions of the world.

Butt (2008) also tried to examine Pakistan's export potential using gravity model. He used 2002-03 average data of 132 exporting countries and 154 importing countries and applied cross-sectional data simulation estimates for finding the trade potential for the total of 19

industry sectors. The estimation result shows that Pakistan has trade potentials with India, Japan, Hong Kong, China, USA, Singapore, Sweden, and Australia; whereas the country is exporting either close to or in some cases above the trade potentials with the rest of selected countries.

Nam (2004) used different kinds of methodologies in order to analyze trade structure and trade potential between three Asian countries namely China, Japan and Korea. As the first step of his analysis, he applied Index of Trade Conformity (ITC) for each pair countries to analyze the export and import structure of pair countries. Then, after applying ITC for each pair countries in both directions (export and import of a country) using somehow disaggregated import and export of commodities data of some periods, he took the "relative ITC measure" that gives country k's export potential to country j relative to the potential for country j's import from country k. He concludes this part of his analysis with identifying top 25 complimentary commodities that can be regarded as having relatively high potential to increase trade between the two countries in concern.

By going through the literature, it is observed that the application of gravity model on Ethiopia is a recent phenomenon and very limited. So far most of studies on Ethiopian foreign trade have been used other econometrics methods rather than gravity model approach. However, recently a few literatures have been emerging in application of the model for Ethiopia context.

Alemayehu and Atnafu (2008) have applied the model to test whether African manufactured exports are displayed by Chinese and Indian export growth in the third market or not. Making import of country i from the African country j at time t as a dependant variable, they have included independent export of China and India to third market i ,real per Capita GDP of importing and exporting countries, the importer country and time effects and the basic gravity variables augmented by binary dummies for border sharing, common language, same colonizer, being colonized and a variable for importer's corruption index at time t. The specified model was estimated by Generalized two Stage least square estimation method and the estimation result shows that common border, common language, importer's colonization history of African exports have positive impact on third market import of clothing and accessories from Africa while distance statistically significantly and negatively affect it. In sum, the result of the estimation indicates that China's export of clothing and accessories has significantly displaced African export of

same while Indian manufacturing exports are found to compliment African exports of same commodity in the third market.

On the other hand, Hussien (2008) applied the model to analyze the impact of Ethiopia's COMESA membership on its export. In his specification he used the augmented version of the model augmented by dummies for adjacency, two regional integration (RI) variables for intra-COMESA and extra-COMESA, as proxies for intra-regional trade effect and extra-regional trade effects on exports and applied two estimation techniques. The result from both techniques reviled that most of the traditional gravity variables are significant in explaining Ethiopia's export flows. The coefficients for the variable GDP and population are positive and statistically significant while the variable distance has negative but statistically insignificant impact on Ethiopian trade flows. However, the coefficient for adjacency is highly significant. The coefficients for both intra-COMESA and extra-COMESA dummy variables are positive but statistically insignificant implying for the absence of export diversification and weak participation of Ethiopia within COMESA region and membership of COMESA has neither export trade-creation nor export-trade diversion effects on the flow of Ethiopian exports.

3. The Model, Data, Estimation and Analysis

3.1 Model Specification

As it is shown in the previous section, the gravity model is originated from the Newtonian Gravitational Force law. Since the independent pioneering works of Tinbergen (1962) and Poyhonen (1963) in applying the Newtonian Gravitational force Law to find trade relationship among countries, several economists have widely applied the model in analyzing bilateral as well as potential trade flows (Zarzoso and Lehman,2002). The basic concept of the model states that the volume of trade between two countries is proportional to their respective economic masses and inversely proportional to the distance between them, which is expressed as follows (Ram and Prasad, 2006):

$$Trade_{ij} = \alpha \frac{M_i M_j}{Distnce_{ij}} \quad \text{----------(1)}$$

Where: M_i *and* M_j are economic masses of country i and j while $Distnce_{ij}$ represents the distance between country i and country j.

For empirical estimation, normally the gravity model has been used in the log linear form while the coefficients represent elasticities of bilateral trade to estimated parameters (Butt, 2008).Taking this fact into account and applying to the basic concept of the gravity model gives us the following linear form of equation:

$$LnTrade_{ij} = \alpha + \beta_1 LnM_i + \beta_2 LnM_j - \beta_3 LnDIS_{ij} + \epsilon_{ij} \text{ ----------(2)}$$

Where $Trade_{ij}$ is the trade flow between countries that may take total trade flow, average total trade flow or only export or import flow of a country and M_i *and* M_j are economic size/mass of the two countries which can be represented by economic variables such as GDP,GNP,Per capita GDP,Per capia GNP and Population, and the variable DIS_{ij} stands for distance between trading countries as a proxy for transportation cost.

Most of the empirical literature on gravity model uses total bilateral trade flow as dependent variable. However, some empirical studies such as Blasi et al (2007), Rahman et al (2006), Butt (2008), and Kristjansattir (2006) have used total export flow as dependent variable. This study also uses export as dependent variable.

Apart from the above basic gravity variables, there are so many additional variables that may either enhance or discourage bilateral trade between countries.

Following the pioneering work of Linneman (1966) of including several additional variables to the basic gravity model, numerous empirical studies (see for example, Harris and Matyas (1998), Carrillo and Barta (2004), A li (2002), Rahman (2006), Ram and Prasad (2006), Kriistjansdottir (2006), Alemayehu and Atnafu (2008) and Dascal et al (2002) have included additional explanatory variables in the model.

Accordingly, the model which I am going to use will be augmented by dummy variables for absence or presence of common border and presence or absence of Generalizes System of Preference (GSP/EBA) scheme and benefits between countries. To capture the impact of depreciation or appreciation of domestic currency, the model is also augmented by including Real Exchange Rate between Ethiopia and the selected trading partner countries.

Harris and Matyas (1998) stated that a major drawback of all studies prior to Matyas et al. (1997) lies in the nature of the data used, and the explicit (or implicit) model restriction on implied by it. Invariably, inference was drawn either upon a cross-section of country data in one time period or upon single time-series of data in country by country approach. However, heterogeneity across countries in trade flows is extremely likely, and should

therefore be accounted for in the model (Harris and Matyas, 1998). Moreover, the business cycle (i.e. "time") will also undoubtedly affect bilateral trade flows. Erroneously ignoring either of these effects will lead to seriously miss-specified econometric models and biased and miss-interpreted parameter estimates (Harris and Matyas, 1998).

Moreover, the model which I am going to use is generally augmented by country-pair specific and time-specific dummies to control for omitted (unobservable variables) that are cross-sectionally specific but remain constant over time and common shocks affecting all countries in the sample respectively. Cheng and Wall (2005), cited by Rahman et al (2006), noted that the incorporation of country-pair specific fixed effect is the best way to control for heterogeneity in gravity model.

In this particular study, the form of the gravity model which I am going to use takes the following form.

$$lnX_{ijt}=\beta_0 + \alpha_t + \beta_1 lnGDPpc_{it} + \beta_2 lnGDPpc_{jt} + \beta_3 lnPOP_{it} + \beta_4 lnPOP_{jt} + \beta_4 lnREER_{it} + \beta_5 lnDIS_{ij}+\beta_6 GSP_{ijt}+\beta_7 ADJ_{it} + \theta_{ij} + \varepsilon_{it} \quad \text{.....(3)}$$

Where:

X_{ijt} is the export flow from country i to country j at time period t.

θ_{ij} the country pair fixed effects.

α_t the year (time) specific effect.

GDPpc the GDP per capia of exporter country at time period t measured interms of Dollar.

GDPpc the GDP per capia of importing country j at time period t measured interms of Dollar.

POP_{it} the population of country i at time period t.

POj_{it} the population of country j at time period t.

EXC_{ijt} the real exchange rate between exporting and importing country at time period t.

DIS_{ij} the distance between exporting country i and importing country j measured in kilometer.

GSP_{ijt} binary Dummy taking the value of one if country j offer generalized system of preference scheme (GSP) and exporting country is the member of the beneficiary of the scheme, zero otherwise.

ADJ_{ij} binary dummy taking the value of one if pair countries in concern are adjacent (share common border), zero otherwise.

ε_{it} white noise disturbance term

The estimation technique and result of the model will be presented in section 3.3.

Brief Analysis of Ethiopia's exports in the Middle East.

In the last 10 years, the trend of Ethiopia's export to the Middle East has showed a large increase. The export totals of Ethiopia in this region increased from 73.65 million US Dollar in 1997 to111.42 million US Dollar in 2005 and 176.56 million US Dollar in 2007 respectively. It also showed a 51% increase between years 1997 to 2007 and 58.6% increase between 2005 and 2007. Comparing the country's exports in this region with the world total exports, the region accounted for 11% in 1995, 13% in 2003 and 15% in 2007.

The empirical data also indicates that the three Middle Eastern countries, namely Saudi Arabia, United Arab Emirates (UAE) and Yemen, have accounted for the largest percentage share of Ethiopia exports in the Middle East. For instance, out of the total exports of Ethiopia in the Middle East, these countries accounted for 81.8 and 86% share in 1997 and 2007 respectively. On the other hand, Ethiopia's export to these three countries has increased from 15% in the years between 1999-2001 to 62.3% in years between 2003 and 2005 respectively.

Methods for Analyzing Ethiopia's Export potentials

Different methodologies have been employed to identify countries' trade potential .Sebei (2006) has employed the trade potential index (TPI) method to predict the trade potential between south Africa and Kenya. According to this scoring system, the five trade indicators will be assigned score of either one or zero based on the set criteria. Some of the criteria are; one, whether the current trade exist in the form of import or not. Two, whether there is growth in import demand and export growth in the importing and exporting country respectively. Three, whether there exists a positive "indicative trade potential" or not will be examined and assigned a score of one or zero. Where this "indicative trade potential" it self is based on a rough estimate of how much countries could "theoretically" trade between them. In doing so, the total export demand and total export capacity of a country are used as a base of estimation. Finally, the assigned scores are aggregated to give a total score, which is measured against a final score of five However, the result of this method tells just simply whether there is a potential or not and does not tell the type of the product on which the country may have a better potential trade.

Cassim (2001), Butt (2008), Ram & Prasad (2006), have independently applied the gravity model to analyze trade potential between countries. In this method, the potential trade can be predicted based on the estimated gravity model of bilateral trade flow. It states that the coefficients that will be obtained from the estimated gravity model will then be used to predict the country's trade potential.

On the other hand, to analyze the structure and trade potentials between China, Japan and Korea, Nam (2004) has used index of trade conformity (ITC) that measures the share of each commodity in the aggregate export or import of the countries concerned. In doing so, he applied relative ITC measures between countries and calculated ITCjk (between country J's export structure and country K's import structures) and ITC kj (between country J's import structure and country K's export structure). According to Nam (2004), the former implies the potential that country j's export to country K can be increased while the latter implies the potential that country j's import from country K can be increased.

Applying both the gravity and ITC method for analyzing trade potential has dual advantages. First, using the estimated gravity coefficients it is possible to predict the amount of export potentials that the country could have with countries in concern. Second, applying ITC enables not only to explore whether there exists export potential for the country but also to identify the group of commodities (or single commodity) on which the country may have trade potentials with its trading partners in a more realistic and reliable way.

Hence, this study utilizes both the gravity and ITC methods to identify whether there exists export potential between Ethiopia and the selected Middle Eastern countries or not.

3.2. The Data

For analyzing the major determinants of Ethiopian bilateral trade with its trading partners, the specified model is estimated using 15 sample countries for the period of 1995-2007. Among which, Kenya, and Sudan are selected from Africa while China, Japan, Saudi Arabia, Egypt and Yemen have been selected from Asia and Belgium, German, Switzerland, Italy, The Netherlands, France, United kingdom, from Europe and U.S.A from the American continent have been selected. The countries have been selected based on their importance as trading partnership and availability of data in the sample period.

In attempting to identify the trade potential that Ethiopia may have in the Middle East; Saudi Arabia, United Arab Emirates and Yemen have been selected. United Arab Emirates has been selected based on the growing trend of the country being the biggest trade route as well as trade center of most countries' commodities. Saudi Arabia and Yemen have also been selected for being two of the major exporting partners of Ethiopia in the last decade.

Regarding the source, our main data source on US Dollar value of total export of Ethiopia to the listed trading partners in the sample period and detailed commodities import-export data on SITC Rev-3 are the IMF data base of the direction of trade statistics (DOTS) and UN COMTRADE respectively. IMF's world economic outlook (2008) and World Development Indicator (WDI) are used to access data on GDP per capita and population over the sample period.

Data on exchange rate (ER) and consumer price index (CPI) are obtained from International Financial statistics Year Book and the distance between pair countries is extracted from a Norway based company[6].

3.3. Empirical Result

3.3.1 The Gravity model

The existence or absence of missed observations in the sample could lead to the choice of the kind of estimation technique that need to be employed. Madala (2002) states that it is preferable to use truncated regression model when we have no data on either the dependent variable or explanatory variables for some countries and a simple tobit if we have full observations on the explanatory variables but some missed observations of the dependent variable for some countries. However, our data samples of the selected countries in the sample period have complete data of Ethiopia's exports. Hence, we use neither simple tobit nor truncate regression. Rather in order to identify the major determinants of Ethiopian's bilateral export, the specified augmented gravity model is estimated by Generalized Two Stage list Square (G2SLS) estimation method. The Hausman specification test also confirms the model to be Random Effect; failing to reject the null-hypothesis (of difference in coefficients not systematic)

Moreover, the estimated results depict that the model fits well with the data. Furthermore, the G2SLS estimation has fully controlled for endogeneity of Ethiopia's real GDP per capia and its export, hetroskedasticity and autocorrelation problems and gives the following results.

[6] It can be accesses at www.timeanddate.com/worldclock/distance.html

Table 1:Generalized Two Stage Lease Square (G2SLS) IV Regression Result: Dependant Variable log of Ethiopia's total export to its trading Partners.

Explanatory Variables	Coefficient	t-ratio	p-value
$LnGDPpc_{it}$	1.294949	3.12	0.002
$LnGDPpc_{jt}$	.7551192	4.49	0.000
$LnPOP_{it}$	.0297277	0.30	0.764
$LnPOP_{jt}$	.2511401	2.47	0.014
$LnRER_{ijt}$	.0642364	1.24	0.213
$LnDIS_{ij}$	-.9016696	-2.65	0.008
GSP_{ij}	-.3695902	-1.45	0.147
ADJ_{ijt}	-1.247118	-2.31	0.021
Constant	-4.126111	-1. 43	0.151
R-sq: Within = 0.2429			
Between = 0.8389			
Overall = 0.5050			
Wald chi^2 (8) 95.37			
Number of Observations 180			
Prob> chi^2 0.0000			
Sigma 'U 0 .40			
Sigma 'e 1.08			
Rho 0 .12 (fraction of variance due to U_i)			

As it can be clearly seen from the above table, the estimated coefficient on distance has the anticipated negative sign and is statistically significant. It implies that, ceteres paribus, trade between a pair countries falls by 0.9% for every 1 per cent increase in distance between them and vice versa.

The coefficient on the GDP per capita of both exporting and importing countries are positive and statistically highly significant, indicating that all other things remains the same, a one per cent increase in GDP per capita of exporting and importing countries, increases bilateral trade by approximately 1.3 and 0.76 percent respectively.

The estimation result also shows that the population of the exporter country has positive but statistically insignificant impact on the country's exports. On the other hand, importer

population has a positive as well as statistically significant impact on the country's exports implying that bigger countries import more than smaller countries and vice versa.

The estimated coefficient of adjacency between countries is unexpectedly negative and statistically significant implying that Ethiopia exports less to neighboring countries that share common border with it. The underlining reason may be due to the problem of lack of peace and stability along the border between Ethiopia and countries selected in the sample (Kenya and Sudan)[7].As a result, bilateral trade between these countries could be impeded.
Real exchange rate (RER), though have the expected positive sign which is to mean depreciation of country's RER improves bilateral trade and vice versa, it is found statistically insignificant showing that it has little impact on bilateral trade between Ethiopia and importing countries
On the other hand, the sign of generalized system of preference (of EBA) has the unexpected negative sign and is statistically insignificant. In this case, the underlining reason for this may be due to the competitive problem that Ethiopia has faced in these countries. Since about 50 developing countries, which are found at different level of development, are eligible under the EBA scheme, those countries that performed better in both product quality and price in this market may cause to reduce Ethiopia's exports in the same market.
Apart from using to analyze the actual trade between Ethiopia and its trading partners, the above estimated coefficients of the gravity model are also used to predict the country's export potentials that it may have in the Middle East.

To tackle the problem of over or under estimating the country's export potentials that may arise due to the fluctuations of the country's exports from year to year, we have averaged three years exports of the country and then the predicted exports are compared with these averaged actual exports.

The actual, predicted and the potential of export that Ethiopia may have in the selected three Middle Eastern countries are presented in table 2 bellow.

[7] Here it is important to note that due to a number of reasons there are frequent unistability along the border between Ethio-Kenya (at Moyale) and Ethio-Sudan (at Humera) that could have negative impact on the Ethiopia's exports in these neighboring countries.

Table 2: Actual and Potential Bilateral Exports of Ethiopia in the selected Middle Eastern Countries from the Estimated Gravity Model.

Exporting Country	Importing Country	Actual Exports	Predicted Exports	Export potentials
Ethiopia	Saudi Arabia	68,736,666.00	76,624,200.00	7,887,530.00
Ethiopia	U.A.E	31,140,000.00	79,712,910.00	48,572,910.00
Ethiopia	Yemen	27,460,000.00	13,936,260.00	-13,523,700.00

As it can be clearly seen from the above table, United Arab Emirates unveil the highest untapped potentials for Ethiopia exports. This indicates that Ethiopia has not yet exploited its exports market in the U.A.E, which is significantly large amount. The result also shows that Ethiopia can expand its export more by about 8 million US dollar in Saudi Arabia. On the other hand, the export potentials of Ethiopia with Yemen found to be negative. However, it does not mean that the country has overexploited trade with Yemen. Rather negative export potentials indicate export beyond model predictions (Soderling, 2005).

On the aggregate level, the gravity model identifies the amount of untapped export potentials that the country could have in the respective countries. However, in order to exploit these sizeable amount of untapped export potential a more disaggregated and commodity level analysis is essential. Hence, in the following section the study employs Index of Trade Conformity (ITC) to identify commodities that could highly contribute to increase the country's export potentials in the selected countries.

3.2.3 Index of trade conformity (ITC)

Linnemann and Beers (1988), as cited by Nam (2004), explained that the ITC can be used to measure the extent of overall similarities between a country's (j) export structure and a trade partner country's (k) import structure by commodity.

The former implies the potential that country J's export to country k can be increased. In turn the letter implies the potential that country J's imports from country k can be increased (Nam, 2004).

Understanding the importance of this index and as a complimentary with estimated potential using the estimated gravity model, the study has applied it for Ethiopia and tried to identify potential that Ethiopia's export can be increased in countries such as Saudi Arabia, U.A.E and Yemen. Since trade structure as the share of each commodity in the aggregated trade of an economy may fluctuate year by year, we have used and analyzed the

import and export data of three Middle Eastern countries with 3 year SITC Revision 3 commodities from 2005 to 2007. We can get somewhat stable trade structure by averaging the trade share of each commodity for some years (Nam, 2004).

In doing so, the study concentrated in identifying export potential that Ethiopia could have in the selected countries rather than identifying trade potential between Saudi Arabia and Yemen and U.A.E and vice versa.

As it is shown in table three bellow, Ethiopia has relatively large ITC measures between its export structure and import structure of Yemen and Saudi Arabia while it is relatively low with U.A.E.

Table 3: ITC measures between Ethiopia, and the selected Middle East countries

Destination / Origin	Saudi Arabia	U.A.E	Yemen	Ethiopia
Ethiopia	0.494	0.296	0.497	n.a
Saudi Arabia	n.c	n.c	n.c	0.794
U.A.E	n.c	n.c	n.c	0.326
Yemen	n.c	n.c	n.c	0.442

Where: n.c and n. a stand for 'not calculated' 'not available' respectively

This implies that Ethiopia has relatively larger potential to increase its exports to both Yemen and Saudi Arabia. Interestingly, this result also confirms the findings of the above gravity model. Because the country can largely exploit its export potential, only if it has large potential to increase its exports in that country. Otherwise, ample amount of export potentials may remain unexploited. This is the reason why we found relatively larger ITC measure for Yemen (0.497) and Saudi Arabia (0.494), which are combined with negative and small amount of unexploited export potential in the above gravity model.

Furthermore, the reason for the finding of large amount of unexploited export potential in U.A.E from the estimated gravity model can also be explained by the low ITC measure between Ethiopia and U.A.E. This implies that the country has low potential to increase its export to U.A.E (0.296) and U.A.E intern has relative low potential to increase its import

from Ethiopia. Though the potential that Ethiopia can increase its export to U.A.E seems relatively small, it is significant in absolute term.

Looking at the contributions of each commodity to the export potential of Ethiopia and import potential of the respective countries, the top 20 commodities are selected and presented in table Four bellow.

Table 4: SITC Rev. 3 commodities by their contribution to the ITC between Ethiopia's exports and the three Middle East countries' imports.

Rank	Saudi Arabia	United Arab Emirates	Yemen
	SITC	SITC	SITC
1	07	97	07
2	05	07	05
3	97	05	04
4	00	222	00
5	01	01	06
6	04	65	01
7	012	01	012
8	65	04	222
9	222	06	65
10	292	012	292
11	06	292	97
12	84	84	84
13	121	00	85
14	85	61	26
15	26	121	08
16	5671	85	61
17	2927	6813	121
18	08	2927	48
19	61	26	653
20	048	653	0819

Note: please refer to the appendix to see the corresponding names of the above SITC Rev.3 commodities

As it can be clearly understood from the above table, coffee and tea (SITC 07) and fruits and vegetables (SITC 05) stands at first and second positions in their contribution for Ethiopia's export potential with both Saudi Arabia and Yemen. On the other hand, SITC 97, 07, 05 (gold, non monetary), (coffee and tea), and (fruits and vegetables) take the first top three positions in complimenting Ethiopia's exports with U.A.E.

Ethiopia's exports have also relatively high complimentarity with U.A.E (6^{th}) and both Saudi Arabia (8^{th}) and Yemen (9^{th}) in SITC 65 (Textile Yarns and related products).Furthermore, the country has high complimentarity with the three countries in SITC 00 (Live Animals) and SITC 01 (meat and meat preparations). In addition, its exports have relatively high complimentarity with Yemen (5^{th}) and U.A.E (9^{th}) in SITC 06 (sugar, sugar preparation and Honey). Ethiopia's export of cut flowers (SITC 2927) has also good complimentarity with both Saudi Arabia (17^{th}) and U.A.E's (18^{th}) imports. SITC 85 (footwear) also ranked at 14^{th} and 16^{th} in complimenting Ethiopia's exports with both Saudi Arabia and U.A.E's imports.

4. Conclusion and policy implications

In this paper, we tried to identify the major determinants of Ethiopian's bilateral trade as well as the potential exports that the country may have in some Middle Eastern countries.

Applying the specified Gravity model of bilateral trade flow with 13 years (1995-2007) panel data of the top 15 major Ethiopian trading partners, we found that, the GDP per capita of both exporting and importing and the population of importing countries significantly and positively affect Ethiopians bilateral export. Whereas, the population of the exporting country and Real Exchange Rate between trading countries, have the expected positive sign but have been found to have insignificant impact on the country's export. On the other hand, the distance between the exporting and importing countries is found to be the significant variable that negatively affects the volume of trade between countries. The dummy variable for GSP (EBA) presents the unexpected negative sign but is statistically insignificant; suggesting that belonging to EBA's preferential arrangement has no impact in fostering Ethiopia's exports.

In attempting to try to address the question whether Ethiopia has export potential in the selected Middle Eastern countries, we have employed the estimated gravity equation supplemented by a more disaggregated analysis using Index of Trade Conformity. The ITC index calculated and compared between Ethiopia on one side and Saudi Arabia, U.A.E and Yemen on the other.

The findings of the gravity equation reveal that Ethiopia has the highest unexploited export potentials with U.A.E. On the Other hand, the ITC measures for trade complimentarity in terms of Ethiopia's export and trading partners import are found relatively to be higher with Yemen (0.497) and Saudi Arabia (0.494) and lower with U.A.E (0.296). This implies that Ethiopia has better potential to increase its exports highly to Yemen and Saudi Arabia, though the Saudi Arabia's potential is slightly lesser than that of Yemen.

The study also identified the top 20 SITC Rev.3 commodities that highly contributed for trade complimentarity in terms of Ethiopia's export and the trading partners' imports.

In the list, ITC 07 (coffee and tea) and ITC 05 (fruits and vegetables) ranked at first and second in their contribution for the trade complimentarity between Ethiopian's export and Saudi Arabia and Yemen's imports. Whereas ITC 97, (gold, non monetary excluding ores) has ranked in the first and fourth top positions in trade complementarily between Ethiopian's export on one side and U.A.E's and Saudi Arabia's imports on the other.
Thus, exploring the major determinants of Ethiopia's bilateral trade (export) combined with identified exporting potential countries and products have the following important policy implications.

First, in designing trade policies that aimed at increasing Ethiopia's bilateral export should pay due attention to variables that are large in magnitude and statistically significant.
Second, for the best use of the country's resources, the government should focus on building capacity that improves the quality as well as quantity of products that are found to have high export potential.

Third, in order to fully exploit the untapped export potential of the country, any kinds of bureaucracy that discourages export should be eliminated and all possible means of trade facilitating mechanisms between countries should be maintained.
Forth, the government or any concerned body need to establish an information system that makes exporters better informed as to what products to export and to which countries.

Lastly, the country also requires to undertake a thorough research and able to identify and prioritize the countries as well as types of products on which it has better export potential. Furthermore, to reach at better conclusion and design valuable and practical trade policies, a detail as well as broad based further research should be under taken.

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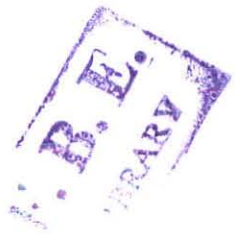

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Appendix-1

Table 3: SITC Rev. 3 codes of the selected commodities and their corresponding names

SITC Rev. 3 Commodity Codes	Corresponding Names
07	Coffee and Tea
05	Vegetables and Fruits
97	Gold, non monetary excluding ores
00	Live Animals
01	Meat and meat preparations
04	Cereals and Cereals Preparations
012	Other meat, meat offal
65	Textile Yarns and Fabrics etc
222	Oil seeds
292	Crude vegetable materials nts
06	Sugar, sugar preparations and honey
84	Articles of apparel and clothing accessories
85	Footwear
26	Textile fibres (other than wool tops & other combined wool) and their wastes
292	Cut Flowers and foliage
08	Feeding Stuff for Animals
61	Leather and leather manufactures etc
653	Fabrics ,man-made fibres
42	Vegetable fats and oils, crude, refined or fractioned
081	Food waste, animal feeds
611	Sheep, lump skin leather

Declaration

The project is my original work. It has not been presented for a degree in any other University and that all resources of materials used for the project have been duly acknowledged.

Written by:

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