BILATERAL TRADE BETWEEN ETHIOPIA AND SUDAN: DOES FTA MAKE THEM BETTER?

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This is to certify that the project prepared by Abebe Eshetu, entitled: Bilateral Trade Between Ethiopia and Sudan: Does FTA Make Them Better? and submitted in partial fulfillment of the requirements for the degree of Degree of Master of Arts (Applied Trade Policy Analysis) complies with the regulations of the University and meets the accepted standards with respect to originality and quality.

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ABSTRACT

Bilateral Trade Between Ethiopia and Sudan: Does FTA Make Them Better?

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This paper has tried to evaluate the determinants of bilateral trade flows particularly the effect of the Free Trade Agreement (FTA) between Ethiopia and Sudan during the years 2002 to 2011. Based on Panel data, Static and Dynamic Gravity models are applied to assess the determinants of basic and export trade flows including FTA, GDP, population, exchange rate and distance.

Estimation results of the static model indicates that Economic size, FTA, distance are the basic factors affecting trade flows. Whereas the dynamic model shows the existence of strong correlation between the Ethiopian contemporary trades (export) flows and those of the previous year. Therefore, we see that the dynamic model fits the data better than the static one.

Key Words: Free Trade Agreement, Trade Flows, Gravity Model, Ethiopia

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List of Acronyms

COMTRADE	Commodity Trade
ECA	Economic Commission for Africa
FTA	Free Trade Agreement
GDP	Gross Domestic Product
GMM	Generalized Method of Moments
IMF	International Monetary Fund
LSDV	Least Squares Dummy Variable
MoT	Ministry of Trade
MoWUD	Ministry of Works and Urban Development
NBE	National Bank of Ethiopia
ORF	Office of the Road Fund
PTA	Preferential Trade Agreement
RTA	Regional Trade Agreement
TradeSim	Trade Simulation
UN	United Nations
USD	United States‘ Dollar

Chapter One

1.1 Introduction

Foreign trade has increasingly become a keystone of economic prosperity in many countries of the world. In principle, both export and import trades are equally important. A country must import the required inputs, capital items and appropriate technologies to broaden its production base and foster export growth. Imports of consumer goods are also essential to meet the growing demand at home. Export trade, on the other hand, is crucial to fill the foreign exchange gap of a country and hence to increase import capacity and reduce dependence on foreign aid. For that reason, increased participation in world trade is considered as the single most important tool of rapid economic growth and development (Rahman, 2009).

According to Geda and Kibret (2007) the regional integration scheme arises from international trade theories that state free trade is superior to trade discrimination among trading partners. It is expected that free trade leads to expansion of trade among trading partners which in turn enhances economic growth. Trade agreements in Africa have a long history with establishment of the South African Customs Union (SACU) in 1910 and the East African Community (EAC) in 1919 was the leading regional trade agreements. Since then, a number of regional economic communities (RECs) have been formed across the continent, particularly since the 1970s. Currently, there are about 13 regional economic groupings in Africa. Today there is no country in Africa that isn't a member of at least one regional economic group. As reflected in the number of regional agreements both in the continent and world- wide, therefore, the issue continues to occupy a center-stage in the economic agenda of countries.

Free trade agreements (FTA) can cover entire regions with multiple participants or link just two economies. Under these agreements, parties enter into legally binding commitments to liberalise access to each other's' markets for goods and services, and investment. FTAs also typically address a range of other issues such as intellectual property rights, government procurement and competition policy.

The Ethio - Sudan FTA signed on April, 2002 – firmly convinced that this Agreement will foster the intensification of mutually beneficial trade relation between them and contribute to the process of integration in the sub-region.

The objectives of this agreement are

(1) to promote, through the expansion of trade, the development of the economic relations between the Parties and thus to foster the advancement of economic activity in the two countries, the improvement of living and employment conditions, and increased productivity and financial stability.

(2) to provide fair conditions of competitions for trade between the Parties.

(3) to contribute in this way by the removal of tariff barriers to trade, to the harmonious development and expansion of bilateral trade.

By Article 4(2) The Preferential Rate of Customs Duties on all imports originating from either Party specified under 2(2) shall be zero (Preferential Trade Agreement, 2002).

The motivation for this study is to find out the extent to which the FTA has contributed to the growing importance of Sudan to Ethiopia's external trade. The main objective of this

paper is to examine the influence of relevant variables including the effect of the Free Trade Agreement on the increasing trade flows between Ethiopia and Sudan.

1.2 Statement of the Problem

There is an emerging consensus in the empirical international trade literature that trade policy affects the level of export diversification. Several recent papers have found that tariffs faced countries significantly contribute to shape their export extensive margins, i.e., their ability to export new products. Most of them take as benchmark the Ricardian model that precisely predicts that a reduction in trade barriers leads to an increased range of exported goods (Dornbusch et al., 1977; Venables, 2003). Ruhl (2005) provides evidence that permanent tariff reductions raise the expected future gain from exporting impulsion more firms to enter the export markets and are therefore associated with increased extensive margins of trade.

Recently, the formulation of FTA is fashionable phenomena all over the world. Due to this most African countries became the member of different FTA – COMESA, SACU, WAEMU, CEMAC, ECCAS, ECOWAS, SADC, to mention a few. Moreover, some African countries also have bilateral FTA – Egypt and Tunisia, Tunisia and Morocco, Ethiopia and Sudan etc.

Khor (2008) mentions that, negotiating an FTA are a serious exercise as the outcome can have major implications for development policy and for social, economic and development outcomes. While it can result in some export gains, it can also: (a) result in increases in imports, with implications for the trade balance and the debt position; (b) facilitate import surges as tariffs decline or are eliminated, and this can adversely affect

the local industries and farms; (c) reduce tariff revenue, with consequences for the government budget; (d) restrict and in some cases remove policy space, or the options and instruments available to a country to institute certain social, economic and development policies.

Ethiopia's trade with Sudan has recently grown at a dramatic rate. After establishment of Ethio-Sudan FTA, the bilateral trade flows have soared. The two–way trade (imports and exports summed) burgeoned from 3.07 million Dollar (USD) in 2002 to USD 2,304.83 million in 2011 (ITC on UNCOMTRADE). Sudan has become an important partner. However, the bilateral trade remains small in relative terms especially from their import export, Ethiopia export USD 178.37 million and import USD 145.63 million in year 2011 (ITC on UNCOMTRADE).

Since the country is emerging, needs to pay more attention to improve its trade with world countries-especially with African countries. The better way of expanding market is through trade agreements. Mainly FTA leads diversify and expansion of trade among trading partners. Ethiopia signed FTA with Sudan on April 25, 2002 and negotiating with other countries (PTA, 2002). Hence, the study tries to address, what will be the impact of Ethio-Sudan in this bilateral FTA? Related to bilateral FTA, this paper is the first study. Besides, the analysis of the study will contribute for making policy decision as to whether continue to sign or not with other countries like Kenya, Turkey, China etc.

1.3 Objectives of the Study

The general objective of the study is to assess the impact of Ethio - Sudan FTA on merchandise trade.

The specific objectives of the study are:

- To investigate factors that affect Ethiopia's trade flow.
- To analyze the impact of Ethiopia and Sudan FTA on macro variable like Export.
- To identify who get a better benefit from this FTA.
- To suggest (forward) possible policy implications based on the study results.

1.4 Significance of the Study

This study provides important contributions. First of all, it provides a quantified assessment of Ethiopia's trade (removal of tariff barriers) with Sudan, which is scant in existing literature. The results from this analysis can give valuable insights into the prospects of significantly expanding trade agreements with other countries. In addition, the study will indicate a positive impact of the bilateral FTA. The empirical analysis will conduct in this paper; therefore, bear policy implications to expand the bilateral FTA. This paper can be a useful reference material for academic researchers who would like to do a more in-depth analysis of the Ethio-Sudan FTA.

1.5 Scope and Limitations

The present study is aimed to assess the impact of Ethio-Sudan bilateral FTA on trade. Due to time and data constraints, this paper confined only the border countries-Sudan, Kenya and Djibouti. The gravity model employed in this analysis and uses Countries income, population, exchange rate, FTA, and distance as variables; has also limitations such as culture and language. Future research can, thus, extend this study in several directions.

Chapter Two

2. Literature Review

2.1 Overview of Ethiopian Trade Policy and Economic Performance

We can classify Ethiopian trade policies in two categories, i.e., policies pre-1991/92 [both Imperial and Military (DERG) regimes] and post-1991/2 (EPRDF, current regime). Both Imperial and Military regime are classified in one category because in both regimes there were prolonged over valuation of exchange rate (on average 2.44 Birr per US dollar in Imperial and 2.07 Birr per US dollar in DERG regime), high tariff rates (on average 240 percent in both regimes), high export tax (7.7 and 10.1 percents of government revenue came from export tax in Imperial and DERG regimes respectively), extensive foreign exchange control and other non-tariff barriers. All these indicate both regimes were following a repressive trade policy with the objective of strongly inward oriented development strategy (Sied, 2008).

The current government who came in to power in May 1991 has undertaken major policy reforms. These measures include reduction of tariff and non-tariff barriers, harmonization and simplification of tariffs, including tariff lines and dispersions, removal or tarifficatin of quotas, reduction and gradual elimination of all controls including on domestic prices, deregulation and realignment of foreign exchange rates and liberalization of investment policies. The average tariff levels on luxury consumer goods were reduced from over 230 percent in the late 1980s to 28.9 percent in 1995 (early phase of the reform process) to

17.5 percent in 2002.The same average for LDCs as a group was about 20 percent in 2002. The range of tariff rates in Ethiopia narrowed, from 0-to-240 in the pre-liberalization period to 0-to-80 in 1995 and 0-to-35 in 2002. The degree of dispersion of tariff measured as coefficient of variation also declined from 82.4 percent to 69.7 percent during the same period. The country has also realigned its foreign exchange rate by substantially devaluating its currency (the Birr) from the official rate of 2.07 per a US dollar in the pre-liberalization period to 17.64 currently, bringing the parallel and the official market rates to symmetry (Sied, 2008). According to M.Delelegn (2005), the measures that the country has undertaken with respect to trade policy can group the country among the relatively open developing countries.

Ethiopian economy is currently among the top performing economies in Africa. Indeed, the economy continues to register high growth rates. For more than half a decade, real GDP has grown significantly on annual average of over 11 percent (NBE, 2009/10). In this regard, we suspect that the contribution of trade was considerable. Surprisingly, trade was about 40% of GDP in the years 2005 and 2006 (see table 2.1). Its share however seems unstable and fluctuating overtime. In a broader sense, this fluctuation might be due to the smallness (price taking nature) of the country at the international market emanating from supply rigidity, less variety and vulnerability (to external shocks) of export products.

Table 2.1 Trends of Ethiopia's Trade (2002 – 2011)

Year	Value of Trade (USD Millions)			Growth of Trade (%)		Trade in GDP (%)
	Export	Import	Total	Export	Import	
2002	480	1593	2073			26.58
2003	512.7	2685.9	3198.6	6.81	68.61	37.19
2004	614.7	2873.8	3488.5	19.89	7.00	34.54
2005	926.2	4094.8	5021	50.68	42.49	40.82
2006	1043.0	5207.3	6250.3	12.61	27.17	41.12
2007	1277.1	5808.7	7085.8	22.45	11.55	36.15
2008	1601.8	8680.3	10282.2	25.42	49.44	38.65
2009	1618.2	7973.9	9592.0	1.02	-8.14	29.79
2010	2329.8	8601.8	10931.6	43.98	7.87	36.81
2011	2614.9	8896.3	11511.2	12.24	3.42	37.74

Sources: ITC on UNCOMTRADE Statistics

From 2006 to 2011, Ethiopia's exports increased on average by 21 percent each year and amounted to 2.6 bln US$ (see table 2.1). Imports showed a similar development with an average growth rate of 10.6 percent each year to reach 8.9 bln US$. The trade deficit became to 6.28 bln US$ in 2011 compared to 6.27 bln US$ in 2010. In 2011, Ethiopia's trade was diversified across partners; 14 (16) major partners accounted for 80 percent of exports (imports) respectively.

In recent years, Ethiopia has been engaging in different bilateral, regional and multilateral trade negotiation. Due to unilateral tariff reform measures taken, Ethiopia has reduced the tariffs rate over time. As we mentioned earlier, before this regime, Ethiopia‘s highest tariff rate was 230% but now the highest tariff rate is 35%. The country has signed bilateral free trade agreement with Sudan in 2002 to promote free trade by eliminating barriers to trade and promoting free competition.

In so far the Ethio – Sudan FTA is concerned there has been an increase in bilateral trade in the post FTA years (Table 2.2).

Table 2.2: Bilateral Trade Flows between Ethiopia and Sudan (2002 – 2011)

Year	Exports (USD in Millions)	Imports (USD in Millions)	Total Trade (USD in Millions)
2002	2.26	0.81	3.07
2003	7.50	5.97	13.47
2004	12.24	9.57	21.82
2005	21.58	49.27	70.85
2006	34.56	75.61	110.17
2007	49.49	27.14	76.62
2008	74.10	153.38	227.48
2009	76.91	71.53	148.44
2010	151.31	109.30	260.62
2011	178.37	145.63	324.0
% increase	2,278.27	2,338.19	2,304.83

Sources: ITC on UNCOMTRADE Statistics

As shown in table 2.2, merchandise exports to Sudan registered a growth of 2,278.27 % during 2002 and 2011 period i.e. an average increase of 228 % per annum as against the annual average increase of 42.8 % of total merchandise exports during the same period. The total trade flows (exports plus imports) between the two countries increased by 2,304.8 % during the same period.

2.2 Theoretical Review

Free Trade Agreement (FTA) is a trade treaty between two or more countries. Usually these agreements are between two countries and are meant to reduce or completely remove tariffs to trade. Although, FTAs are between two individual countries, agreements can be reached between a trade bloc (MercaTrade.com).

Feenstra (2002) express that group of countries maintains their own tariffs against the rest of the world, with zero tariffs internally, and then this is called a free trade area.

There are two possibilities in FTA, i.e. trade creation and trade diversion. Trade creation refers to a situation where two countries within the FTA begin to trade with each other, whereas formerly they produced the good in question for themselves. The countries go from autarky (in this good) to trading with zero tariffs, and they both gain. Trade diversion, on the other hand, occurs when two countries begin to trade within the FTA, but one of these countries had formerly imported the good from outside the union. We may presume that the importing country formerly had the same tariffs on all countries, but purchased from outside the union because that price was lowest. After the union, the country switches its purchases from the lowest-price to a higher-price country, so there is a negative efficiency effect, and the country could lose (Feenstra, 2002).

The basic features of Free Trade (wikipedia, 2006) are trade of goods and services without taxes (including tariffs) or other trade barriers, the absence of "trade-distorting" policies (such as taxes, subsidies, regulations, or laws) that give some firms, households, or factors of production an advantage over others, free access to markets, free access to market information, and inability of firms to distort markets through government-imposed monopoly or oligopoly power.

The value of free trade was first observed and documented by Adam Smith in The Wealth of Nations, in 1776. David Ricardo who expanded on it in his 1817 book On the Principles of Political Economy and Taxation, it makes a case for free trade based not on absolute advantage in production of a good, but on the relative opportunity costs of

production. A country should specialize in whatever good it can produce at the lowest cost, trading this good to buy other goods it requires for consumption. This allows for countries to benefit from trade even when they do not have an absolute advantage in any area of production. While their gains from trade might not be equal to those of a country which is more productive in all goods, they will still be better off economically from trade than they would be under a state of autarky. Under a policy of free trade, trade via specialization maximizes labor, wealth and quantity of goods produce, exceeding what an equal number of autarkic states could produce (Wikipedia, 2011).

Many classical liberals, especially in the 19th and early 20th century Britain (e.g. John Stuart Mill) and in the United States for much of the 20th century (e.g. Cordell Hull), believed that free trade promoted peace. The British economist John Maynard Keynes (1883–1946) was brought up on this belief, which underpinned his criticism of the Treaty of Versailles in 1919 for the damage it did to the interdependent European economy. After a brief flirtation with protectionism in the early 1930s, he came again to favour free trade so long as it was combined with internationally coordinated domestic economic policies to promote high levels of employment and international economic institutions that meant that the interests of countries were not pitted against each other. In these circumstances, 'the wisdom of Adam Smith' again applied, he said, Some degree of Protectionism is nevertheless the norm throughout the world. For example in most developed nations, controversial agricultural tariffs are maintained. From 1820 to 1980, the average tariffs on manufactures in twelve industrial countries ranged from 11 to 32%. In the developing world, average tariffs on manufactured goods are approximately 34% (Wikipedia 2011).

Currently, the World Bank believes that, at most, rates of 20% can be allowed by developing nations; but Ha-Joon Chang believes higher levels may be justified because the productivity gap between developing and developed nations is much higher than the productivity gap which industrial countries faced. A general feature is that the underdeveloped nations of today are not in the same position that the developed nations were in when they had a similar level of technology, because they are weak players in a competitive system; the developed nations have always been strong players, although formerly at an overall lower level. If the main defense of tariffs is to stimulate infant industries, a tariff must be high enough to allow domestic manufactured goods to compete for the tariff to be possibly successful. This theory, known as import substitution industrialization, is largely considered to be ineffective for currently developing nations and studies by the World Bank have determined that export-oriented industrialization policies correlate with higher economic growth as observed with the Four Asian Tigers. These assessments are based mainly on theory and observational study of correlations, and thus suffer from a number of weaknesses such as small sample size and numerous confounding variables (Wikipedia 2011).

2.3 Empirical Review

FTAs are a means to increase trade among the member countries and to achieve economic growth. FTAs are also a channel for economic integration as they aim to eliminate or minimize tariff and non-tariff barriers. Baier and Bergstrand (2005) cited in Gonuguntla (2011), in their comprehensive study of the effects of FTAs on international trade concluded that an FTA will on average increase the trade between two member countries by 86% after 15 years. Duran, Mulder, and Onodera (2008) in a study on trade

liberalisation and economic performance found that the East Asian countries have been more successful both in terms of integration with the global economy and achieving higher economic growth. Efficient resource allocation among the member countries is possible through regional economic integration resulting in improved profitability to the firms and higher per capita income to the households.

Gonuguntla (2011) investigated the effect of the Closer Economic Partnership (CEP) agreement negotiated by New Zealand and Singapore in 2001, on the bilateral trade flows during the post-CEP era. Gravity model was applied to assess the impact of respective national incomes, populations, distance, and the dummy variable CEP. The results indicate that New Zealand's GDP has a positive effect on trade. Whereas, Singapore's GDP has a negative influence on trade but found to be statistically not significant. Overall, an increase in national incomes means an increase in bilateral trade. As can be expected, populations in both countries indicate a positive influence on trade. Both the countries being open economies, growth in population means increase in demand for imports. The variable, distance, a proxy for transaction costs, as can be expected has a negative influence on bilateral trade flows. This is no surprise given the fact that New Zealand is geographically isolated and is away from most of its export markets. Finally, the dummy variable, CEP, indicates a positive impact on bilateral trade flows, which means that the free trade agreement between the two countries has indeed contributed to the growth in the bilateral trade flows.

Athukorala and Kohpaiboon (2011) examine the impact of the Australia-Thailand free trade agreement (TAFTA) on bilateral trade between the two countries, paying attention to the implications of rules of origins (RoO) and the utilization of tariff preferences. It is

found that trade has expanded faster following TAFTA came into effect, but the impact has heavily concentrated in a few product lines in Australian imports from Thailand, reflecting the influence of commodity specific, supply-side factors which have a bearing on the rate of preference utilization. The findings, inter alia, suggest that the use of officially announced preference rates in trade flow modeling is likely to exaggerate trade flow effects of FTAs.

Francois (2007) analyzes the effects of potential measures to liberalize trade between the European Union (EU25) and South Korea (hereafter Korea). Using a computable general equilibrium (CGE) model of world trade, incorporating the most recent GTAP database, have evaluated an EU-Korea free trade agreement (FTA) and compared it to the maximum potential given by a full free trade agreement. The Study shows that a realistic FTA yields a total gain for the two economies of 26 percent of the potential in a full FTA. If liberalization of trade in services is taken a step further, total gains increase to 46 percent of the total potential from a full FTA between EU and Korea. The results show that both economies stand to gain economically from all analyzed levels of trade liberalization, but the gains are unevenly distributed. Korea will obtain two-thirds of the total gains from an EU-Korea FTA, basically because the Korean economy initially is more protected from international competition than the EU economy, and therefore will benefit more from increased competition.

To examine the impact of the Common Market for Eastern and Southern Africa on the flow of Kenya's exports, Musila (2004) uses the gravity model. The empirical results suggest that COMESA has the effect of trade creation. No evidence for trade diversion is found. Accordingly, COMESA has helped to improve Kenya's export performance and,

in turn, assisted in the effort to achieve the Millennium Development Goals. The results also show that nominal GDP of importing countries, distance, adjacency, and common official language have an expected statistically significant impact on the flow of Kenya's exports.

A paper by Martincus and Gómez (2009) assesses Colombian export to the United States and whether an FTA with US would help Colombia to diversify its exports. Simulations performed with computed general equilibrium models (CGE) and those using econometric tools as well, to examine the impacts of FTA. The result shows that tariff cut helped Colombia to diversify its exports to the United States. More specifically, lower tariffs have been associated with both a larger number of products exported Colombia to the United States at the sector (chapter) level and a higher probability of exporting a particular product. Predictions suggest that the FTA is likely to induce further diversification, but to a certain point.

As Yeboah, Shaik, Allen and Ofori-Boadu (2007) mentioned, the DR-CAFTA was negotiated as regional trade agreement (RTA) between United State (U.S.), Costa Rica, Dominican Republic (DR), El Salvador, Guatemala, Hondurans and Nicaragua. The study developed gravity models to estimate and predict the potential bilateral trade flows between U.S. and Central America Free Trade Agreements (CAFTA) countries using panel data. The study has revealed that CAFTA could have a positive effect on trade flows. All the six CAFTA countries but one (Costa Rica) will be trade creators. The potential trade created ranges as low as 1% for Guatemala to a high of 13% for Nicaragua. The study also shows the important and positive effects of differences between resource endowment, relative size of the economies, and exchange rates on trade

flows. Distance, though less significant is seen as a factor that can potentially raise trade costs. Given these results, there is no doubt that implementing the DR-CAFTA will lead to an expansion of trade between the United States and the DR-CAFTA countries. As it stands, there appear to be advantages for U.S. producers from the Agreement, given the already low duties on agricultural imports from these countries to the U.S. and the relatively high duties placed on U.S. agricultural exports.

Rajan and Sen (2002) Japan – Singapore Economic Partnership Agreement (JSEPA) is expected to provide significant mutual benefits to the two participating countries. Beyond the gains from the elimination of tariffs on most products, both countries can be expected to enjoy cost savings due to less delay from the streamlining and harmonization of customs procedures, development of orderly dispute settlement mechanisms, paperless trading, and mutual recognition of standards in the area of testing and certification. The agreement has also established norms for the liberalisation and facilitation of trade and investment in the services sector. Given the relatively low penetration of FDI in this sector in Japan, Singapore, which has a growing comparative advantage here, can be expected to reap significant economic gains. Specific services that Japan has committed for trade under the JSEPA are professional services, construction services, computer services, distribution services, telecommunication services, financial services, and transport services. Conversely, trade and investment diversion remains a real concern particularly with regard to the services sector.

Australia-Mexico Joint Experts Group (JEG) – Joint Report (2009) notes that the Australian-Mexican economic relationship is in good shape, with trade and investment increasing, but that there are potential synergies and advantages in closer economic

relations that have not yet been fully exploited. Mexico was Australia's largest merchandise trading partner in Latin America in 2006 and 2007 with total two-way trade in merchandise goods worth approximately US$2 billion in 2006 and US$1.7 billion in 2007. The Report also draws attention to Australia's emerging importance as a trading partner for Mexico in the East Asian region.

While exports of Australian have expanded significantly in recent years, there is a more modest trade in various agricultural goods and in services (mostly education and other personal travel services). There is substantial potential for further growth in agricultural trade, including in the export of Mexican agricultural products to Australia. There is also significant potential for Mexico to expand its exports of industrial goods to Australia, building on current exports such as automotive products, telecommunications equipment and computers.

The Report details significant limitations holding back stronger economic relations. These include a lack of awareness (particularly in Mexico) of the Australian market and the value Australia offers as a base for dealing with East Asia. Lack of good transport links also serves as an impediment in developing trade. There is a perception in Australia that Mexico's applied tariff on industrials (the average applied tariff in 2007 was 9.66 per cent) and its applied tariffs on agricultural imports are significant trade barriers, although Mexico noted that nearly 80 per cent of Australian goods which entered the Mexican market in 2007 entered free of duty. The JEG noted a range of non-tariff barriers, including in services trade, standards setting and customs procedures impeding trade. Mexico also drew attention to its long-standing requests for Australia to make import risk assessments for possible exports of agricultural products such as avocadoes.

The JEG identified options to enhance the bilateral economic relationship. These range from more joint promotion to increase awareness of commercial opportunities in respective economies, to strengthening and expanding the operation of the 1994 Trade and Investment Agreement and finally to the negotiation of a comprehensive high quality bilateral Free Trade Agreement (FTA). The JEG is confident this would provide an immediate means of strengthening bilateral trade and investment.

Chapter Three

3. Methodology

3.1 Sources and Nature of the Data

Our study has been conducted based on bilateral trade flows between Ethiopia and border countries–Sudan, Kenya, and Djibouti. These three trading partners are chosen considering the free trade agreement between Ethiopia and Sudan. Moreover, Ethiopia and Sudan are neighboring countries, for our study Kenya and Djibouti another neighboring countries are included for comparison. Since Ethio – Sudan FTA starts in 2002, the study uses Panel data for the period 2002 to 2011 for three border countries and Ethiopia.

Annual data for the years 2002 through 2011 about Ethiopia and the trading partners are collected from the following sources: Ethiopian GDP and the 3 partners' GDP are collected from International Monetary Fund's (IMF) International Financial Statistics database. Ethiopia's bilateral exports and imports are from the International Trade Centre (ITC) UN COMTRADE Online Database. All monetary values are measured in dollar at the current prices. Population data (in millions) was accessed from the world Economic Outlook Database, while the distances in kilometers between the capital cities are from the website http://www.indo.com/distance/. The exchange rates are gathered from the National Bank of Ethiopia. As the bilateral exchange rates between the Ethiopian birr (ETB) and trading partner's currencies are not available, they are calculated through the US dollar (USD) by multiplying the value of foreign currencies per US dollar with the ETB/USD exchange rate.

3.2 Model Selection

3.2.1 Description of the model

To explain the effect of free trade agreements, the most commonly used approaches in the literature are a set of trade indices, gravity models and Computable general equilibrium (CGE) models. As noted by Mikic and Gilbert (2007), trade indicator is that it is an index or a ratio that can be used to describe and assess the state of trade flows and trade patterns of a particular economy or economies and can be used to monitor these flows and patterns over time or across economies/regions. Different trade indicators are used to analyses bilateral trade and international trade at national, regional or global level. Such trade indicators are Trade and economy (trade dependence index, marginal propensity to import, import penetration, etc.), trade performance (growth rate of trade (exports/imports), normalized trade balance, export/import coverage), Direction of trade (trade intensity, intra-regional trade shares, trade entropy) and so forth. Because it is difficult here to present these numerous trade indices, concentration is given to those indicators which are of particular interest—trade share, trade intensity and trade entropy. These indicators are more relevant for assessing regional or bilateral trading agreements (or trade blocs).

Trade share index is the percentage of the region under study's trade (imports plus exports) with another region of interest, in the total trade of the region under study. This index ranges from 0 to 100 per cent, with higher values indicating greater importance of selected trading partner. Index of trade intensity (ITI) is the ratio of two export shares. The numerator is the share of the destination of interest in the exports of the region under study. The denominator is the share of the destination of interest in the exports of the

world as a whole. ITI range is between 0 and +∞, values less than 1 (low intense) two countries have much bilateral trade to reap between them, while the reverse is true if values greater than 1. Trade entropy index is calculated by summing the export shares multiplied by the natural log of the reciprocal of the export shares (a weight that decreases with the size of the share) of the country under study across all destinations. Takes a value between 0 and +∞. Higher values indicate greater uniformity in the geographical dispersion of exports. The value of the index is maximized when the export share to every market is the same (Mikic and Gilbert, 2007).

Though their importance to explain the state of trade flows, trade indices do not enable researchers quantify the amount of trading partner among nations. These indicators can also suffer from other problems like share increase may be misleading when comparing the share across different blocks; share changes (high or low share or intensity) reflect numerous factors other than trade policy, an aggregation biases, inability to show dynamic effects and to examine the impact of policy shocks, etc. This situation has led Mikic and Gilbert (2007) to perceive trade indices as the "second best as compared to the first best modeling tools."

Gravity models, on the other hand, are econometric models that many economists often use for ex-post analyses of international trade flows. If after estimation the model is used for simulations, it can also predict future values (Piermartini and Teh, 2005). The gravity model of trade is based on the idea that overall trade volumes between two nations depend on the size of the two nations and the distance they are apart (Armstrong, 2007). Unlike trade indices, the gravity model of trade is one of the most empirically successful

approaches in economics, both to explain the state of trade flows and estimate trade potentials (Helmers and Pasteels, 2005). It is also widely used as a baseline model for estimating the impact of a variety of policy issues (Baldwin and Taglioni, 2006). We can generally say that the estimation of trading partners within the gravity framework is a line of research that has been studied extensively (Helmers and Pasteels, 2006). There are a couple of reasons for the central role played by the gravity model in such empirical works (Piermartini and Teh, 2005). The first has to do with the high explanatory power of the model in explaining bilateral trade flows. The second reason is that it provides an easy method to test the role that other variables play in affecting trade. Besides, the model can overcome the basic limitations of trade indices. For instance, it can incorporate dynamic effects (Bun and Klaassen, 2002), measure the impact of policy shocks or trade agreements (Piermartini and Teh, 2005) and capture the level as well as structure of trade (Alemayehu et al, 2010). It should be noted, however, that in analyzing trade between two countries, say X and Y, the model makes no provision for third party effects (Batra, 2004). That is, the model does not capture the conditions and opportunities that prevail between X and Z as well as Y and Z.

According to Mikic and Gilbert (2007) Computable general equilibrium (CGE) models are numerical models based on general equilibrium (GE) theory which turn abstract models of general equilibrium theory into a practical tool for policy analysis. A number of features distinguish GE models. They are multi- sectoral, and in many cases multi-regional, and the behavior of economic agents is modeled explicitly through utility and profit maximizing assumptions. In addition, economy-wide constraints are rigorously enforced. In other words, the markets in a CGE model are all linked together. Distortions

in an economic system will often have outcomes far beyond the sector in which they occur. By linking markets, CGE techniques are effective at capturing the relevant feedback and flow-through effects. CGE models have been widely adopted in the bilateral trade policy literature - Scollay and Gilbert (2000), Gilbert and Wahl (2002), Robinson and Thierfelder (2002), Lloyd and MacLaren (2004) and Hertel and Winters (2005). Limitations are uncertainty over parameters, specification, and experimental design, Miss Key features of critical sectors, involves comparative statics.

In our case, there are two basic advantages that gravity models can offer, while trade indices and computable general equilibrium cannot. The model enables us to (i) incorporate dynamic effects in our analysis and (ii) quantify bilateral trade among economies. This circumstance makes the gravity model more appropriate for our study.

3.2.2 Gravity Model

Tinbergen (1962) and Poyhonen (1963) were the first authors to developed Gravity models of international trade.

$$T_{ijt} = K\,(GDP^{\alpha}_{it} \;.\; GDP^{\beta}_{jt}) \,/\, (DIS^{\lambda}_{ij}) \text{-------} \quad \textbf{(1)}$$

In its basic formulation, the gravity model explains bilateral trade flows in analogy to Isaac Newton's law of gravity, by the attraction of two countries' "masses" (measured by GDP and/or population), reduced by the "distance" (which is a proxy of transport costs) and expanded by preferential trade agreements between them and by other factors, as, for example, a common language or exchange rate. Some recent studies (Bergstrand, 1989; Limao and Venables, 2001; Soloaga and Winters, 2001) contribute to the refinement of the traditional explanatory variables and to the addition of new ones. Others (Mátyás,

1997; Cheng and Wall, 2005; Breuss and Egger, 1999; Egger, 2000) improve the econometric specification of the model (Cardamone, 2009).

Some criticism for the lack of theoretical foundations has emerged. However, as empirical applications of the gravity model have grown, theoretical bases of the model have also been proposed. Indeed, Anderson (1979) derives a theoretical foundation for the gravity model based on constant elasticity of substitution (CES) preferences and goods that are differentiated by region of origin. Subsequent extensions (Bergstrand 1989; Deardoff, 1995) consider monopolistic competition or an Heckscher-Ohlin structure to explain specialization.

Finally, Anderson and van Wincoop (2003, p.174) manipulate the "CES expenditure system to derive an operational gravity model with an elegantly simple form". According to the generalized gravity model of trade, indicating with (i,j) a pair of countries, the volume of exports of country i towards country j (X_{ij}) depends on their incomes, measured by GDPs (Y_i and Y_j), their populations (N_i and N_j), their geographical distance (D_{ij}), h preferential trade variables (P_{ij}), and a k-dimension vector of country-pair specific factors that affect trade (F_{ij}).

Despite the fact that the gravity model is formulated in the multiplicative form, most studies have estimated the gravity parameters using the following log-linearised form (Cardamone, 2009):

$$\ln(X_{i\,jt}) = \alpha_0+\beta_1\ln(Y_{it}) +\beta_2\ln(Y_{jt}) +\beta_3\ln(N_{it}) +\beta_4\ln(N_{jt}) +\beta_5\ln(D_{ij}) +\Sigma\delta_h P_{ijh} + \Sigma\lambda_{ijk} + U_{ij} \quad \textbf{---(2)}$$

Where U_{ij} is the error term

The coefficient β1 is expected to be positive, since a high level of the domestic output indicates a high level of availability of goods to be exported. Also β2 is expected to be positive, because a high level of the importing country's income implies potentially high imports. The distance coefficient is expected to be negative, because distance is a proxy of transportation costs. The signs expected for populations are ambiguous; there is no empirical evidence of a consistent sign for β3 and β4 (Cheng and Wall, 2005). Indeed, in most papers β3 and β4 are expected to be positive because it is believed that larger countries trade more. However, it has been shown (Oguledo and Macphee, 1994) that if an exporter is large in terms of population it may either need its production to satisfy domestic demand, so that it exports less, or it may export more than a small country, as it is the case when large firms achieve economies of scale. The same reasoning can be applied to the case of the importing country: if it is large, it may either import less because it is likely that the domestic sector develops and makes the country self-sufficient, or it may import more because it cannot satisfy all domestic demand with its own production (Pusterla, 2007).

The h PTAs are generally represented in the model by adding dummy variables. Finally, the typical country-pair specific factors that affect trade considered in gravity models are common border, language, religion and past colonial ties.

As mentioned in the previous paragraphs, the objective of papers was to evaluate the trade creation effect of FTAs. Generally, this objective has been pursued by augmenting the gravity equation by a dummy variable equal to one if both countries in the pair are members of a specific FTA and zero otherwise. Besides the assessment of the trade creation effect, studies evaluate if, and to what extent, FTAs divert trade; this is done by

adding two dummy variables: the first is equal to one if only the importer belongs to the specific FTA considered and zero otherwise, the second is equal to one if only the exporter belongs to the specific FTA considered and zero otherwise. These two dummies allow assessing the impact on the two countries' imports and exports, respectively, of the trade diversion effect due to a specific PTA (Cardamone, 2009).

As far as the dependent variable is concerned, some use total (or average) trade while others adopt data on exports or imports only. With regards to independent variables, the most used variables are GDPs as proxy of countries' income. GDPs of the importer and the exporter enter into the regression separately, but there are authors considering a single variable, given by the product of the GDPs of the two countries (Rose, 2004a; Faruqee, 2004).

Furthermore, the distance among the capital cities of the two trading partners is used to proxy transportation costs, even if it could be subject to criticism on the grounds, for example, that transport by land and sea is assumed to have the same cost (Ram and Prasad, 2007).

According to Bun and Klaassen (2002), the estimate for lagged trade represents not only dynamic effects, but also the impact of unobserved pair-specific factors which are invariant overtime. Benedictis and Vicarelli (2005) noted that the existence of sunk costs borne by exporters to set up distribution and service networks in the partner country may generate inertia in bilateral trade flows, and countries trading with each other at time t will tend to trade more at time t+1 too. Incorporating dynamics, the standard gravity model of trade can be written as follows:

$$\ln(X_{i\ jt}) = \beta_0+\beta_1\ln(X_{i\ jt-1})+\beta_2\ln(Y_{it}) +\beta_3\ln(Y_{jt}) +\beta_4\ln(N_{it}) +\beta_5\ln(N_{jt}) +\beta_6\ln(D_{ij}) +\Sigma\delta_h P_{ijh} + \Sigma\lambda_{ijk} + U_{ij} \quad \text{----------} \quad \textbf{(3)}$$

Where all the variables are the same as in model (2) except X_{ijt-1} which indicates the volume of exports of country i towards country j in the previous year (t-1), while other parameters β0 … β6 are to be estimated.

In addition to a static model, we also estimate a dynamic gravity model as export series are often highly persistent. In fact, initial investments or sunk costs borne by exporters to establish new distribution and service networks often generate persistency in exported goods through consumption habits and distribution channels newly established in the foreign market. As a result, trade flow performance achieved in the previous year provides a basis for the trade flow activities in the current year. A static gravity model which ignores the fact that lagged trade affects current trade may lead to an incorrect inference (Nguyen, 2010).

3.2.3 Model Specification

Egger (2002) suggested using panel data in the dynamic gravity model because panel data is a general case of cross sectional data and time series data. For this reason, our paper uses panel data. The data are collected from 2002 to 2011 for both Ethiopia and its trading partners. Annual time series data (2002-2011) are pooled across export markets to obtain more observations for regressions. As the panel data offer more variability, more degree of freedom and reduce the multicollinearity among explanatory variables, they improve the reliability of the regression results.

Our econometric model draws on Nguyen's (2010) gravity equation with some modifications made to this equation based on Harris and Mátyás (1998) to derive a more proper specification. Specifically, we estimate static and dynamic models as follows:

Static gravity model

$$\ln X_{ijt} = \beta_0 + \beta_1 \ln GDP_{it} + \beta_2 \ln GDP_{jt} + \beta_3 \ln POP_{it} + \beta_4 \ln POP_{jt} + \beta_5 \ln(ex\Delta rate_{ijt}) + \beta_6 (FTA_{ij}) + \beta_7 \ln RDIS_{ijt} + \epsilon_{ijt} \quad \text{----------} \quad \textbf{(4)}$$

$$\ln T_{ijt} = \beta_0 + \beta_1 \ln(GDP_{it} * GDP_{jt}) + \beta_2 \ln(PoP_{it} * PoP_{jt}) + \beta_3 \ln(ex\Delta rate_{ijt}) + \beta_4 FTA_{ij} + \beta_5 \ln RDIS_{ijt} + \epsilon_{ijt} \quad \text{----------} \quad \textbf{(5)}$$

Equation (4) is an export model whereas equation (5) a basic trade model. Variables are defined as X_{ijt} is the value of export flows from country i to j at time t, T_{ijt} is trade flows between country i and j at the same time, and the GDP gross domestic product in year t that indicate economic size, pop countries population size, $RDis_{ijt}$ is Relative distance between Country i and country j. Since physical distance (Dis_{ij}) is a fixed variable overtime, the estimation procedure of dynamic panels that employs first differencing drops it out of specification. For that reason, a concept developed by Karagöz and Saray (2008) was applied to make it a time varying variable. Armstrong (2007) also suggested the use of relative distance instead of absolute distance to explain gross trade volumes. Mathematically, this weighted distance is calculated as:

$$RDis_{ijt} = (DIS_{ij} * GDP_{it}) / \Sigma GDP_{it}$$

Where $RDiS_{ijt}$ is the relative (weighted) distance between trading partners, DiS_{ij} is the aforementioned geographical distance, GDP_{it} is the gross domestic product of country i

(Ethiopia) at time t and that ΣGDP_{it} is the sum of all GDPs of Ethiopia over the study period.

FTA_{ij} is dummy variable for free trade agreement, and $ex\Delta rate_{i\ j\ t}$ indicates average real exchange rate of country i and j at time t.

Dynamic gravity model

$$\ln X_{ijt} = \beta_0 + \beta_1 \ln X_{ijt-1} + \beta_2 \ln GDP_{it} + \beta_3 \ln GDP_{jt} + \beta_4 \ln POP_{it} + \beta_5 \ln POP_{jt} + \beta_6 \ln(ex\Delta rate_{ijt}) + \beta_7 (FTA_{ij}) + \beta_8 \ln RDIS_{ij} + \epsilon_{i\ j\ t} \quad \text{----------} \quad \textbf{(6)}$$

$$\ln T_{ijt} = \beta_0 + \beta_1 \ln T_{ijt-1} + \beta_2 \ln(GDP_{i\ t} * GDP_{j\ t}) + \beta_3 \ln(PoP_{it} * PoP_{jt}) + \beta_4 \ln(ex\Delta rate_{ijt}) + \beta_5 (FTA_{ij}) + \beta_6 \ln RDIS_{ij} + \epsilon_{i\ j\ t} \quad \text{----------} \quad \textbf{(7)}$$

Where all the variables are the same as in model (1) except Tijt-1 which indicates the Ethiopian trade flow to country j in the previous year (t-1), while other parameters β0 … β6 are to be estimated.

The dependent variables, T_{ijt} and X_{ijt} are the dollar value of trade flows and export between countries i (Ethiopia) and countries j (Sudan, Kenya and Djibouti) and trade consists of both exports plus imports. (GDP_{it}, GDP_{jt}) are the national incomes of both the countries as represented by their respective gross domestic products (GDP). As the national income increases countries can be expected to trade more with each other and hence the GDP co-efficients are expected to have a positive sign. Bilateral trade flows between the countries are likely to increase/decrease as the population grows over a period of time and the co-efficients are expected to have a positive/negative sign. $RDis_{ijt}$ denotes the relative distance between the two countries. This variable is indicative of the

degree of trade resistance between the trading partners. Higher the distance, higher the transportation costs and hence the co-efficient is expected to have a negative sign. The dummy variable i.e., the FTA agreement between the two countries can be expected to have a positive influence on the bilateral trade flows. This variable can take the value one if partners have bilateral free trade agreement and zero otherwise. Similarly, $ex\Delta rate_{ijt}$ designates the real exchange rate expected to bear a positive sign under the assumption that a depreciation of the Ethiopian birr makes exported goods cheaper relative to foreign goods, and therefore raises the quantity demanded for the Ethiopian trade.

3.3 Econometric Issues

3.3.1 Hausman test

Our paper uses a panel data framework. The advantage of the panel data is that time series and cross-section observations are combined to increase the sample size, give more variability and reduce the multicollinearity among variables.

Whether the fixed effect model or random effect model is appropriate depends on the potential correlation of explanatory variables with the unobserved effects. If the unobserved effects are uncorrelated with all the explanatory variables, it is better to use the random effect model while the fixed effect model is more appropriate when there is a correlation between the regressors and the unobserved effects. We use the Hausman test (1978) to choose between the two models.

As can be seen from Annex D-1.1 and D-1.2, with respect to trade flow and exports equations, the Hausman test shows that we cannot reject the null hypothesis that there is no misspecification for the random effect model at all levels of significance. In other

words, the REM is more appropriate for the data. Accordingly, we only report and discuss the random effect estimations for both trade and export.

3.2.2 Heteroskedasticity

While estimating dynamic panel data (DPD) models, the default generalized method of moments (GMM) estimators yield homoskedastic standard errors. The Breusch and Pagan Lagrangian multiplier (1980) test of residuals was performed to check whether heteroskedasticity exists. Results of the test (Annex D-4) suggest that the variances of our models are homoskedastic.

3.3.3 Serial Correlation

For consistent estimation of dynamic models, the GMM estimators require that the error term (εijt) be serially uncorrelated (Stata, 2009). Specifically, if εijt are serially uncorrelated, then $\Delta\varepsilon ijt$ are correlated with $\Delta\varepsilon ijt\text{-}1$ because $Cov(\Delta\varepsilon ijt, \Delta\varepsilon ijt\text{-}1) = Cov(\varepsilon ijt - \varepsilon ijt\text{-}1, \varepsilon ijt\text{-}1 - \varepsilon ijt\text{-}2) = -Cov(\varepsilon ijt\text{-}1, \varepsilon ijt\text{-}1) \neq 0$. Conversely, $\Delta\varepsilon ijt$ will not be correlated with $\Delta\varepsilon ijt\text{-}k$ for all $k \geq 2$. A test of whether $\Delta\varepsilon ijt$ are correlated with $\Delta\varepsilon ijt\text{-}k$ for $k \geq 2$ can be performed by using the Arellano-Bond tests for serial correlation (Roodman, 2006). Accordingly, the test results (Annex D-2.1 and D-2.2) of our model indicate the presence of no serial correlation in the first-differenced errors as desired.

3.3.4 Overidentifying Restrictions

The moment conditions implied by dynamic panel data (DPD) models often employ several instruments to estimate a small number of parameters. The joint validity of these overidentifying restrictions needs to be tested therefore. The conventional GMM test or

the so called Sargan (1958) test of overidentifying restrictions performs that operation (Bowsher, 2002).

Based on this test Annex D-3.1 and D-3.2, we found that overidentifying conditions are valid in both equations.

Chapter Four

4. Results and Discussion

4.1 Descriptive Analysis

As shown in table 4.1, there has been a notable increase in Ethio-Sudan bilateral trade following 2002 when the FTA came into effect. Between 2002 and 2011, total merchandise trade (exports + import) between Ethiopia and Sudan increased from US$ 3.07 million to US$ 324.03 million at an annual rate of 230.5 percent. In contrast, Ethiopia's total world merchandise trade increased only by 26.0 percent (ITC on UNCOMTRADE).

Table 4-1: Bilateral Trade Flows between Ethiopia and Sudan (2002 – 2011)

Year	Exports (USD in Millions)	Imports (USD in Millions)	Total Trade (USD in Millions)	(Exports-Imports) / Export
2002	2.26	0.81	3.07	64
2003	7.50	5.97	13.47	20
2004	12.24	9.57	21.82	22
2005	21.58	49.27	70.85	-128
2006	34.56	75.61	110.17	-119
2007	49.49	27.14	76.62	45
2008	74.10	153.38	227.48	-107
2009	76.91	71.53	148.44	7
2010	151.31	109.30	260.62	28
2011	178.37	145.63	324.03	18

Sources: ITC on UNCOMTRADE Statistics

The share of imports from Sudan increased (more than double) in year 2005, 2006 and 2008 (128, 119 and 107 percent). This can be due to the fact that Ethiopia started importing (mineral fuels, oils, etc.) in large amounts. But in other FTA years, Ethiopia exported more than imported. Especially when we compare the last three years, Ethiopia exported more. So, Ethiopia benefited from this free trade agreement FTA).

Comparison of pre- and post-FTA trade performance is of course very difficult because of the incomparable figure – take 2001, Ethiopia exported 382 and imported 880 thousands US dollar only.

Interestingly, under the free trade agreement initially Ethiopia exported not more than 10 different products but these days exported about 40 different types, which therefore seems to have strengthened the movement towards export diversification.

4.2 Estimation Results

Table 4.2 – 4.5 shows Regression results of the model using STATA version 10 computer packages. Our estimation consists of Ethiopia and the three border countries-Sudan, Kenya and Djibouti, and the time span covers the period from 2002 to 2011. There is therefore, a cross section of 3 bilateral trade flows or country pair (1×3), with annual data coverage 10 years for each trade flow, generating a balanced panel of 30 observations (3×10).

4.2.1 Static Gravity model

Regressing the static gravity model (equations 4 and 5) yields the results reported in Table 4.2 and 4.3 According to Table 4.2 regression results, coefficients of economic size (lngdpijt), population (lnpopijt) and distance (lnrdisijt) are statistically significant at the 1 percent level. The coefficient of economic size variable has a positive sign while the coefficients on the population and relative distance variables bear a negative sign. In other words, the economic size has a positive effect on the Ethiopian trade flows. However, an increase in transport costs worsens Ethiopian trade performance. A negative relationship is what we expect about the effect of transport costs. The estimated coefficient on log distance has the anticipated negative sign and is about -7, indicating

that trade between a pair of countries falls by seven percent for every 1 percent increase in the distance between them.

Table 4-2: Random Effect model results of the total trade equation.

Dependent Variable: Natural Logarithm of Total Trade

lntijt	Coef.	Std. Err.	z	P>|z|
lngdpijt	5.360329*	.7476921	7.17	0.000
lnpopijt	-3.214477*	.3883196	-8.28	0.000
lnrdisijt	-7.016502*	1.103472	-6.36	0.000
ftaijt	3.435**	1.124292	3.06	0.020
lnexchrate~t	.8129029	.747897	1.09	0.277
_cons	5.251288	5.369163	0.98	0.328

Note: * and ** represents significance at the 1% and 5% levels respectively.

The population variable carries a negative sign with statistically significant effect on trade. Intuitively, it would mean that Ethiopia has the tendency to trade less with populous countries. An increase in population size of trading-pairs might be associated with an excess demand effect in Ethiopia and economies of scale effect in the partner country. The dummy variable, FTA with a positive coefficient 3 is also considered to be statistically significant at 5 percent. The implication is that, two countries that are FTA members estimated to engage in 3.44 times more trade than two otherwise similar countries. Although, the coefficient for exchange rate has a positive value of 0.8, the p-value indicates no significant effect on the trade flow.

Table 4-3: Random Effect model results of the export trade equation.

Dependent Variable: Natural Logarithm of Exports

lnxijt	Coef.	Std. Err.	z	P>|z|
lngdpit	71.32129*	19.4953	3.66	0.000
lngdpjt	2.988406*	1.085957	2.75	0.006
lnpopit	10.08784	9.624699	1.05	0.295
lnpopjt	11.35816*	3.978498	2.85	0.004
lnrdisijt	-73.90706*	19.41865	-3.81	0.000
ftaijt	15.40432*	4.275142	3.60	0.000
lnexchrate~t	3.636568**	1.69811	2.14	0.032
cons	-615.8433*	154.6592	-3.98	0.000

Note: * and ** represents significance at the 1% and 5% levels respectively.

The results in Table 4.3 indicate that there is a statistically significant positive relationship between Ethiopia's GDP with a coefficient of 71.32 at 1%, coefficient of partner's GDP 2.99 at 1%, the population of partner countries coefficient of 11.36 indicates positive effects. Similarly the dummy variable, free trade agreement (FTA) with a coefficient of 15.4 is also considered to be statistically significant at 1%. The coefficient for the variable, distance, as can be expected has a negative value of -73.91 and is significant at 1%; the exchange rate coefficient has a positive value 3.64 and significant at 5%. Although the coefficient of Ethiopia's population has a positive value of 10.09, the p-value indicates no significant effect on the export trade.

4.2.2 Dynamic gravity model

The regression results for the dynamic model (6 and 7) are presented in Table 4.4 and 4.5. From Table 4.4 like the static model, the coefficients of economic size (lngdpijt), population (lnpopijt) and distance (lnrdisijt) yielded are statistically significant at the 1 percent level of significance. They have the same signs as before. However, their values change considerably. Moreover, FTA is also significant and has the same sign as before but here significant at 10%. The coefficient of lagged trade is positive and statistically significant at the 10% level, indicating an autoregressive nature of bilateral trade flows. Based on the one-step results, a one percent increase in economic size (GDP) boosts current trade by about 3.38 percent, ceteris paribus. The concept behind demonstrates that Ethiopia's border countries trade relationship is stronger with Sudan (FTA member) than Kenya and Djibouti (nonmembers). The other basic variable in the trade model is population. The population variable has an inverse sign (negative) with statistically significant effect on trade. Intuitively, it would mean that for population increase there is

a tendency to trade less. An increase in population size of trading-pairs might be associated with an excess demand effect in Ethiopia and economies of scale effect in the partner country. Likewise, distance of trading pairs is found to have a negative significant effect on the pattern of trade. For every one percent increase in the distance between a pair of countries, merchandise trade tends to fall by 4.5 percent, ceteris paribus.

Table 4-4: Regression results of the total trade equation.

Dependent Variable: Natural Logarithm of Total Trade

One-step results

lntijt	Coef.	Std. Err.	z	P>|z|
L1.	.1304536***	.0920376	1.92	0.078
lnexchrate~t	-.0396161	.4493369	-0.09	0.930
lnpopijt	-2.359694*	.038598	-61.14	0.000
lngdpijt	3.381993*	.2802917	12.07	0.000
lnrdisijt	-4.467974*	.5371044	-8.32	0.000
ftaijt	.8363231***	.9262437	-1.97	0.067
_cons	13.99334	4.402658	3.18	0.001

Sargan Test of Overid. Restrictions: Chi2 (14) = 15.25 Prob > Chi2 = 0.3616

Arellano-Bond Test for Autocorrelation

AR(1): Z = -1.1503 Prob > Z = 0.2500

AR(2): Z = -1.525 Prob > Z = 0.1273

No. of Observations 3 Countries x 10 years = 30 Observation

Note: * and *** represents significance at the 1% and 10% levels respectively.

A positive sign with statistically significant effect on lagged trade at the 10% level indicates that the growth in Ethiopian exports in the previous year has a positive effect on the current year's export performance. This result appears to be acceptable in the real world for the fact that the achievements achieved in the previous year such as newly established business relationships with foreign traders provide a basis for Ethiopian companies to expand their trade activities in the subsequent year. Since the lagged variable has a considerable impact on the dependent variable, we suspect that dynamic specification of the gravity model overwhelms the static counterparts. The result shows

when the lagged trade increases by one percent, other things remain unchanged; the flow of trade between a pair of countries grows by some 0.13 percent. Free trade agreement (FTA) is also an important factor that determines the flow of trade. FTA of trading pairs is found similar with static to have a positive significant effect on the pattern of trade. The coefficient on the dummy variable for free trade agreements (FTA) is .84, implying that the free trading agreements can lead to nearly twice as much trade as is otherwise possible for a country pair. The coefficient of exchange rate is not statistically significant at all level of significance like the static model.

The presence of dynamics in the free trade agreement (FTA), one important investigation of the study, appears to be consistent with previous findings in the literature (Gonuguntla (2011), Athukorala and Kohpaiboon (2011), Francois (2007), Martincus and Gómez (2009), Yeboah, Shaik, Allen and Ofori-Boadu (2007), Rajan and Sen (2002)). Indeed, the result seems adequate in the real world because a business relationship established with foreign traders in the current year provides a basis for Ethiopian traders to expand their activities in the successive year. Our findings related to income and distance variables are also in line with previous empirical studies. Among those studies of particular interest include Gonuguntla (2011), Yeboah, Shaik, Allen and Ofori-Boadu (2007). In spite of the same sign, the exchange rate variable was found significant in Yeboah, Shaik, Allen and Ofori-Boadu (2007).

Having discussed the pattern of total trade, we now proceed to deal with the pattern of exports alone. The estimation results obtained from the export equation are presented in table 4.5. The table indicates that Free trade agreement (FTA), lagged export, GDP of Ethiopia, GDP of Partners and relative distance are significant at 5 percent. Once again,

the positive sign of lagged export indicates that the country's exports in the previous year have an encouraging effect on the current year's export performance. Though an impressive result, the persistence of exports as compared to Ethiopia's total trade looks greater. Ceteris paribus, a one percent shock in exports of the current year causes exports of the next year to change by only 0.19 percent.

Table 4-5: Regression results of the export trade equation.

Dependent Variable: Natural Logarithm of Exports

One-step results

lnxijt	Coef.	Std. Err.	z	P>|z|
L1.	.1907664**	.0806092	2.37	0.018
lngdpit	30.64517**	14.14548	2.17	0.030
lngdpjt	1.450542**	.587812	2.47	0.014
lnpopit	-.5772538	3.455763	-0.17	0.867
lnpopjt	3.971588	3.068964	1.29	0.196
lnrdisijt	-31.19128**	13.96866	-2.23	0.026
ftaijt	3.321825**	2.595659	-1.28	0.028
lnexchrate~t	.0687815	.3737699	0.18	0.854
cons	-198.0642*	72.26655	-2.74	0.006
Sargan Test of Overid. Restrictions	Chi2 (14) = 8.57 Prob > Chi2 = 0.8579			
Arellano-Bond Test for Autocorrelation				
	AR(1): Z = -1.5099			Prob > Z = 0.1311
	AR(2): Z = 1.0969			Prob > Z = 0.2727
No. of Observations 3 Countries x 10 years = 30 Observation				

Note: * and ** represents significance at the 1% and 5% levels respectively.

Like the static model, the dummy variable, FTA with a positive coefficient 3.322 is also considered to be statistically significant at 5 percent. The implication is that, two countries that are FTA members estimated to engage in 3 times more trade than two otherwise similar countries. Although, the coefficient for exchange rate has a positive value of 0.069, the p-value indicates no significant effect on the exports. A one percent increase in the GDP of Ethiopia, holding others fixed, boosts exports more than proportionately-about 30.65 percent. The distance variable is again statistically significant with expected sign. If the country's relative distance with its export destinations increases by one percent, the flow of exports decline by about 31.19 percent.

Our findings related to income and distance are consistent with the findings of previous studies (Gonuguntla (2011), Athukorala and Kohpaiboon (2011), Francois (2007), Martincus and Gómez (2009). Domestic population (partner's population) has a negative sign (positive sign) in the export model respectively. Nonetheless, its impact is not statistically significant even at the 10% level.

Chapter Five

5. Conclusion and Policy Implications

5.1 Conclusion

The purpose of this study has been to examine Ethiopia's trade with border countries (Sudan, Kenya and Djibouti) in light of the recent acceleration of the bilateral trade. The research questions were: What are the factors that affect Ethiopian trade? Does FTA have impact on Ethio-Sudan trade? Which country benefited from this agreement? In providing answers to these questions, the existing empirical literature showed gaps, particularly in making quantitative analysis. This study hoped to fill the gap by making analyses using the gravity model, different extensions have been suggested to the basic model to obtain more reliable estimates of trade flows and export trade. This paper takes into account the recent developments in the gravity estimation technique to investigate the determinants of Ethiopian trade and export performance in a panel data framework. Estimation is performed with system GMM based on annual bilateral trade flows and export between Ethiopia and border partners over the period 2002-2011. From the above estimation results and discussion, we also obtained strong evidence that Ethiopian trades and exports are autoregressive. By adding the lagged endogenous variable as a regressor in a dynamic model, the regression results improve greatly. Accordingly, the application of a simple gravity model to Ethiopian trades and exports may produce inconsistent and biased coefficients by omitting the lagged regressand as an important explanatory variable.

Our results demonstrate that the gravitational attraction between the local and destination economies, population, transport costs and free trade agreement (FTA) are the important factors which affect the Ethiopian trades. Current trade has a positive and statistically significant effect on trade flows of the next time. As regards to magnitude of the dynamics, we conclude that transitory shocks to current trade persist for a long time, with an estimated persistence parameter of about 0.13. Meanwhile, a one percent positive shock in current exports leads to 0.19 percent increments of exports in the subsequent year. The dummy variable, FTA, indicates a positive impact 0.84 (3.32) on bilateral trade (export) flows, which seems also to have been linked to Ethiopia's trade (export) flows, especially since it started to deepen its integration into the border countries economy in recent years. So Ethiopia benefited from this FTA.

Ethiopia and partners GDP has a positive effect on trade (export). Overall, an increase in income means an increase in bilateral trade (export). Populations of both have a negative influence on trade, this show increase in population mean increase of the demand (consumption) of their product. Therefore, Ethiopia and partners should increase their productivity for trade. Whereas, Ethiopia and partners population indicate negative and positive effect on export but found to be statistically not significant. The variable, distance, a proxy for transaction costs, as can be expected has a negative influence on bilateral trade (export) flows. However, the effect of transport costs on the Ethiopian exports tends to decrease over time. So, the government needs also to pay adequate attention to destination markets with cheaper transport costs.

Given the above empirical results, the conclusion is that Ethiopia and Sudan free trade agreement has contributed to the growth in the bilateral trade (export), by enhancing trade

facilities like infrastructure, communication, etc. This conclusion supports the majority of predictions in the literature (Gonuguntla (2011), Athukorala and Kohpaiboon (2011), Francois (2007), Martincus and Gómez (2009), Yeboah, Shaik, Allen and Ofori-Boadu (2007), Rajan and Sen (2002)).

5.2 Policy implications

The overall implication of the above conclusion is that measures to promote further free trade agreement between Ethiopia and Sudan (other partners) are justified. Specifically, the following implications seem relevant to the findings of this study.

The empirical results show that FTAs among these countries foster trade (export). Ethiopia should strengthen the level of bilateral free trade agreement. Reforms in trade policy alone are not adequate but efforts should also be directed against country specific constraints: domestic business environment, competitiveness of market structures, quality of market institutions, and supply constraints like poor infrastructure, and undeveloped human capital and skills. Moreover, Ethiopia should negotiate new FTA with different countries to increase trade (export) flows.

The effect of transport costs on the Ethiopian trades (exports) tends to decrease over time. So the government needs also to pay adequate attention to destination markets with cheaper transport costs. Access to such markets should be facilitated by relevant policies to take advantage of the geographical location in strengthening Ethiopian trade (exports') competitiveness.

REFERENCES

Alemayehu Geda and Haile Kibret (2007), ―Regional Economic Integration in Africa: A Review of Problems and Prospects with a Case Study of COMESA, *Journal of African Economies*, 1-38.

Alemayehu Geda, Daniel Zerfu and Getachew Yirga (2010),―Export Supply Response Capacity Constraints in Ethiopia‖, African Economic Research Consortium, Nairobi, Kenya.

Anderson, J.E. (1979), ―A Theoretical Foundation for the Gravity Equation‖, *The American Economic Review*, 69(1): 106-116.

Anderson, J.E. and van Wincoop, E. (2003), ―Gravity with Gravitas: A Solution to the Border Puzzle, *The American Economic Review*, 93(1): 170-192.

Arellano, M. and Bond, S. (1991), ―Some Tests of Specification for Panel Data: Monte Carlo Evidence and Application to Employment Equations, The *Review* of Economic Studies, 58(2): 277-297.

Armstrong, S. (2007), ―Measuring Trade and Trade Potential: A Survey‖, Asia Pacific Economic Papers No. 368/2007, Australia-Japan Research Centre.

Athukorala P.C. and Kohpaiboon (2011), Australia-Thailand Trade: Has the FTA Made a Difference? Working Paper No. 2011/12, August 2011 .

Baldwin, R. and Taglioni, D. (2006), ―Gravity for Dummies and Dummies for Gravity Equations, Working Paper No. 12516, National Bureau of Economic Research, Cambridge.

Batra, A. (2004), ―India's Global Trade Potential: The Gravity Model Approach‖, Working Paper No.151, Indian Council for Research on International Economic Relations, New Delhi.

Benedictis, L.D. and Vicarelli, C. (2004), ―Trade Potentials in Gravity Panel Data Models, Topics in Economic Analysis and Policy, Article 20, 5(1): 1-31.

Bergstrand, J.H. (1989), ―The Generalized Gravity Equation, Monopolistic Competition and the Factor Proportions Theory in International Trade, The *Review* of Economics and *Statistics*, 71(1): 143-153.

Bowsher, C.G. (2002), ―On Testing Overidentifying Restrictions in Dynamic Panel Data Models, Economics Letters, 77: 211-220.

Breuss F., Egger P. (1999) "How reliable are estimations of East-West Trade potentials based on Cross-Section Gravity Analyses?" *Empirica*, 26, pp. 81-94.

Bun, M.J. and Klaassen, F.M. (2002), ―The Importance of Dynamics in Panel Gravity Models of Trade, Discussion Paper 2002/18, University of Amsterdam, Netherlands.

Cameron, A.C. and Trivedi, P.K. (2009), ―Micro econometrics Using Stata‖, StataCorp LP, USA.

Cardamone P. (2009), A survey of the assessments of the effectiveness of Preferential Trade Agreements using gravity models (University of Calabria, Italy), Working Paper 07/09.

Cheng. I.H., & Wall (2005). Controlling for heterogeneity in gravity models of trade integration, Federal Reserve Bank of St. Louis Review, 87(1), 49-63

Deardorff, A.V. (1995), ―Determinants of Bilateral Trade: Does Gravity Work in a Neo-classical World? NBER Working Paper No. 5377, Cambridge.

Deardorff, A.V. (1998), ―Determinants of Bilateral Trade: Does Gravity Work in a Neo-classical World? In Frankel, J. (Ed.), *The Regionalization of the World Economy, University of Chicago Press.*

Egger, P. (2002), ―An Econometric View on the Estimation of Gravity Models and Calculation of Trade Potentials, The World Economy, 25(2): 297-312.

Feenstra, R.C. (2002), ―Advanced International Trade: Theory and Evidence‖, University of California, Davis and NBER.

Feenstra, R.C. and Taylor, A.M. (2008),―International Economics, Worth Publishers, New York.

Francois J.F (2007), - Economic Impact of a Potential Free Trade Agreement (FTA) Between the European Union and South Korea, Short study, March 2007.

Gebreyesus Gebrehiwot (2011),―Explaining Ethiopia's Foreign Trade Potential: A Dynamic Gravity Approach, MSc Thesis, Addis Ababa University.

Gonuguntla S. (2011),-An Evaluation of the New Zealand-Singapore Closer Economic Partnership Agreement, International Review of Business Research Papers 7(5):119-127

Greene, W.H. (2003), ―Econometric Analysis, Fifth Edition, Pearson Education, Inc., USA.

Harris, M.N. and Mátyás, L. (1998), ―The Econometrics of Gravity Models‖, Working Paper No. 5/98, Melbourne Institute of Applied Economic and Social Research.

Hausman, J.A. (1978), ―Specification Tests in Econometrics, *Econometrica*, 46(6): 1251-1271.

Head, K. (2003), ―Gravity for Beginners‖, Lecture Note, University of British Columbia, Vancouver.

Helmers, C. and Pasteels, J.M. (2005), ―TradeSim (third version): A Gravity Model for the Calculation of Trade Potentials for Developing Countries and Economies in Transition, ITC Working Paper, Geneva, Switzerland.

Helmers, C. and Pasteels, J.M. (2006), ―Assessing Bilateral Trade Potential at the Commodity Level: An Operational Approach, ITC Working Paper, Geneva, Switzerland.

IMF (2010), Direction of Trade Statistics and World Economic Outlook Databases, International Monetary Fund, Washington, DC.

Karagöz, K. and Saray, M.O. (2008), ―Trade Potential of Turkey with Asia Pacific Countries: Evidence from Panel Gravity Model, Seventh APEF International Conference on East and West Asia Economic Relations, University of Esfahan, Iran. 68.

KHOR M. (2005), Bilateral/Regional Free Trade Agreements: An Outline of Elements, Nature and Development Implications, September 2005.

Martincus C.V., and Gómez S.M. (2009), Trade Policy and Export Diversification: What Should Colombia Expect from the FTA with the United States, IDB Working Paper, IDB WP-136.

Matias Assefa (2010), ―An Empirical Study of China's Trade Potential with Africa‖, MSc Thesis, Addis Ababa University.

Mátyás, L. (1997), ―Proper Econometric Specification of the Gravity Model‖, The World Economy, 20(3): 363-368.

Mikic, M. and Gilbert, J. (2007),―Trade Statistics in Policymaking-A Handbook of Commonly used Trade Indices and Indicators, Economic and Social Commission for Asia and the Pacific.

Mileva, E. (2007), ―Using Arellano-Bond Dynamic Panel GMM Estimators in Stata‖, Lecture Note, Fordham University.

Musila J.W. (2004), The common market for Eastern and Southern Africa and Kenya's export trade *International Journal of Social Economics* 31(1/2):67-77

NBE (2009/2010),―Annual Report 2009/10‖, Economic Research and Monetary Policy Directorate, Addis Ababa.

Nguyen, B.X. (2010), ―The determinants of Vietnamese exports: Static and Dynamic panel Gravity Approaches, *International Journal of Economics and Finance*, 2 (4): 112-129. 69

Oguledo V.I. and MacPhee C.R. (1994) "Gravity Models: a reformulation and an application to discriminatory trade arrangements", *Applied Economics,* 26: 107-120.

Piermartini, R. and Teh, R. (2005), ―Demystifying Modeling Methods for Trade Policy, WTO Discussion Paper No.10, Geneva, Switzerland.

Pusterla F. (2007) "Regional Integration Agreements: impact, Geography and Efficiency".*IDB-SOE Working Paper,* January 2007.

Rahman, M.M. (2009), ―Australia's Global Trade Potential: Evidence from the Gravity Model Analysis, Oxford University, UK.

Rajan R.S. and Sen R. (2002), The Japan-Singapore "New Age" Economic Partnership Agreement: Background, Motivation and Implications, IPS Working Paper, April 2002.

Ram, Y. and Prasad, B. (2007),―Assessing Fiji's Global Trade Potential Using Gravity Model Approach‖, Working Paper No. 2007/05, University of the South Pacific.

Roodman, D. (2006), ―How to do Xtabond2: An Introduction to Difference'and System'GMM in Stata, Working Paper No. 103, Center for Global Development.

Rose A. K. (2004a) "Do We Really Know that the WTO Increases Trade?"*American Economic Review 94: 98-114.*

Rose A. K. (2004b) "Does the WTO Make Trade More Stable?" *NBER Working Paper* N.10207.

Seid H.M. (2008), "The Impact of Trade Liberalization on Ethiopian Export, Import and GDP" University of Osio, Norway, Master's Thesis.

StataCorp (2009), ―Longitudinal Data/Panel Data Reference Manual Release 11‖, StataCorp LP, USA.

Tinbergen, J. (1962). Shaping the world economy: Suggestions for an international economic policy. New York: The Twentieth Century Fund.

Verbeek, M. (2004), ―A Guide to Modern Econometrics‖, Second Edition, John Wiley and Sons, Ltd., England.

Verbeek, M. (2008), ―A Guide to Modern Econometrics‖, Third Edition, John Wiley and Sons, Ltd., England.

Wooldridge J. M. (2006) *Introductory Econometrics: A Modern Approach*. Thomson South-Western College Publishing.

World Bank (2010), World Development Indicators Database, the World Bank, Washington, DC.

WTO (2008), ―Gravity Models: Theoretical Foundations and Related Estimation Issues‖, ARTNet Capacity Building Workshop for Trade Research, Phnom Penh, Cambodia.

Yeboah O.A., Shaik S., Allen A. and Ofori-Boadu V. (2007),- Trade Effects of the Central American Free Trade Agreement, *Portland, Oregon, July 29-August 1, 2007.*

APPENDICES

Appendix A: Summary Statistics of Variables

Table A-1: Summary of Trade Model Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
lntijt	30	10.94398	.9947899	8.027802	12.68851
lntijt1	30	10.73478	1.187842	7.140453	12.4708
lngdpijt	30	18.81533	1.929652	15.36	21.39
lnpopijt	30	20.49596	1.925487	17.68091	22.13271
ftaijt	30	.3333333	.4794633	0	1
lnrdisijt	30	4.318608	.6252337	3.097957	5.264936
lnexchrate~t	30	2.665319	.5347949	1.560458	3.38517
code	30	2	.8304548	1	3
year	30	2006.5	2.921384	2002	2011

Table A-2: Summary of Export Model Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
lnxijt	30	9.642667	1.95927	3.14	12.09
lngdpit	30	9.737	.5332731	8.96	10.38
lngdpjt	30	9.078667	1.747034	6.4	11.09
lnpopit	30	11.273	.0947648	11.13	11.42
lnpopjt	30	9.222333	1.919965	6.49	10.72
lnrdisijt	30	4.318	.6238225	3.1	5.26
ftaijt	30	.3333333	.4794633	0	1
lnexchrate~t	30	2.666333	.5360101	1.56	3.39
code	30	2	.8304548	1	3
year	30	2006.5	2.921384	2002	2011

Appendix B: Simple Correlation Matrix of Variables

Table B-1: Correlation Matrix of Trade Model Variables

	lntijt	lntijt1	lngdpijt	lnpopijt	ftaijt	lnrdis~t	lnexch~t
lntijt	1.0000						
lntijt1	0.8434	1.0000					
lngdpijt	0.0485	-0.0536	1.0000				
lnpopijt	-0.2261	-0.3383	0.9132	1.0000			
ftaijt	0.1094	-0.1176	0.5194	0.5139	1.0000		
lnrdisijt	0.2236	0.2174	0.8369	0.5770	0.1646	1.0000	
lnexchrate~t	0.1381	-0.0145	-0.2670	-0.2385	0.6571	-0.4719	1.0000

Table B-2: Correlation Matrix of Export Model Variables

	lnxijt	lngdpit	lngdpjt	lnpopit	lnpopjt	lnrdis~t	ftaijt	lnexch~t
lnxijt	1.0000							
lngdpit	0.4583	1.0000						
lngdpjt	-0.2878	0.2097	1.0000					
lnpopit	0.4754	0.7723	0.2102	1.0000				
lnpopjt	-0.4500	0.0326	0.7776	0.0335	1.0000			
lnrdisijt	0.0805	0.8518	0.6647	0.8277	0.5384	1.0000		
ftaijt	0.2696	0.0000	0.5740	-0.0000	0.5153	0.1649	1.0000	
lnexchrate~t	0.4686	-0.3069	-0.2015	-0.3452	-0.2227	-0.4714	0.6570	1.0000

Appendix C: System GMM Estimation Results

Table C-1: Estimation Results of Trade Model

System dynamic panel-data estimation — Number of obs = 27
Group variable: code — Number of groups = 3
Time variable: year — Obs per group: min = 9
Number of instruments = 21 — avg = 9
max = 9

Wald chi2(2) = 3.64
Prob > chi2 = 0.1624

Dynamic Panel-data estimation, One-step system GMM

	Robust				
lntijt	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
lntijt						
L1.	.1304536	.0920376	1.92	0.078	-.0499367	.310844
lnexchrate~t	-.0396161	.4493369	-0.09	0.930	-.9203003	.8410681
lnpopijt	-2.359694	.038598	-61.14	0.000	-2.435344	-2.284043
lngdpijt	3.381993	.2802917	12.07	0.000	2.832631	3.931354
lnrdisijt	-4.467974	.5371044	-8.32	0.000	-5.520679	-3.415269
ftaijt	.8363231	.9262437	-1.97	0.067	-1.651727	.9790812
cons	13.99334	4.402658	3.18	0.001	5.364289	22.62239

Instruments for differenced equation
GMM-type: L(2/2).lntijt
Standard: D.lnexchrateijt D.lnpopijt D.lngdpijt D.lnrdisijt
Instruments for level equation
GMM-type: LD.lntijt
Standard: _cons

Table C-2: Estimation Results of the Export Model

System dynamic panel-data estimation — Number of obs = 27
Group variable: code — Number of groups = 3
Time variable: year — Obs per group: min = 9
avg = 9
max = 9

Number of instruments = 23
Wald chi2(2) = 15.14
Prob > chi2 = 0.0005

Dynamic Panel-data estimation, One-step system GMM

	Robust				
lnxijt	Coef.	Std. Err.	z	P>|z|	[95% Conf. Interval]
lnxijt					
L1.	.1907664	.0806092	2.37	0.018	.0327753 .3487576
lngdpit	30.64517	14.14548	2.17	0.030	2.920529 58.36981
lngdpjt	1.450542	.587812	2.47	0.014	.298452 2.602633
lnpopit	-.5772538	3.455763	-0.17	0.867	-7.350425 6.195917
lnpopjt	3.971588	3.068964	1.29	0.196	-2.043471 9.986648
lnrdisijt	-31.19128	13.96866	-2.23	0.026	-58.56936 -3.813205
ftaijt	3.321825	2.595659	-1.28	0.028	-1.409224 8.765573
lnexchrate~t	.0687815	.3737699	0.18	0.854	-.6637941 .801357
_cons	-198.0642	72.26655	-2.74	0.006	-339.704 -56.42434

```
Instruments for differenced equation
        GMM-type: L(2/2).lnxijt
        Standard: D.lngdpit D.lngdpjt D.lnpopit D.lnpopjt D.lnrdisijt
D.lnexchrateijt
Instruments for level equation
        GMM-type: LD.lnxijt
        Standard: _cons
```

Appendix D: Specification Tests

Annex D-1: Hausman Test

D-1.1: Hausman Test for the Trade Model

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	.	Difference	S.E.
lngdpijt	5.046326	5.360329	-.314003	.
lnpopijt	4.447016	-3.214477	7.661494	2.940847
lnrdisijt	-8.098096	-7.016502	-1.081593	.
lnexchrate~t	2.704731	.8129029	1.891828	.6486784

```
           b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from xtreg
    Test:  Ho:  difference in coefficients not systematic
                chi2(4) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                        =      6.76
                Prob>chi2 =      0.1489
                (V_b-V_B is not positive definite)
```

Decision: We fail to reject the null hypothesis, meaning the Random Effect Model is more appropriate for the data.

Table D-1.2: Hausman Test for the Export Model

	---- Coefficients ----			
	(b)	(B)	(b-B)	sqrt(diag(V_b-V_B))
	fixed	.	Difference	S.E.
lngdpit	8.052614	71.32129	-63.26867	16.8469
lngdpjt	2.743137	2.988406	-.245269	.
lnpopit	17.56176	10.08784	7.473919	.
lnpopjt	19.9438	11.35816	8.585637	1.624012
lnrdisijt	-11.97826	-73.90706	61.9288	16.37463
lnexchrate~t	5.476673	3.636568	1.840105	.

```
           b = consistent under Ho and Ha; obtained from xtreg
           B = inconsistent under Ha, efficient under Ho; obtained from
xtreg
    Test:  Ho:  difference in coefficients not systematic
```

```
chi2(6) = (b-B)'[(V_b-V_B)^(-1)](b-B)
        =     10.13
Prob>chi2 =      0.1194
(V_b-V_B is not positive definite)
```

Decision: We fail to reject the null hypothesis, meaning the Random Effect M0del is more appropriate for the data.

Annex D-2: Tests for Serial Correlation

Table D-2.1: Serial Correlation in the Trade Model

Arellano-Bond Test for zero Autocorrelation in First-Differenced Errors

```
--------------------------------------------------------------------------
--
Arellano-Bond test for AR(1) in first differences: Z=-1.1503 Pr.>Z=0.2500
Arellano-Bond test for AR(2) in first differences: Z=-1.525  Pr.>Z=0.1273
Arellano-Bond test for AR(3) in first differences: Z=1.4762  Pr.>Z=0.1399
Arellano-Bond test for AR(4) in first differences: Z=0.51187 Pr.>Z=0.6087

Decision: We cannot reject the null hypothesis at higher orders
```

H_0: No Autocorrelation.

Table D-2.2 Serial Correlation in the Export Model

Arellano-Bond Test for zero Autocorrelation in First-Differenced Errors

```
------------------------------------------------------------------------
Arellano-Bond test for zero autocorrelation in first-differenced errors
Arellano-Bond test for AR(1) in first differences: Z=-1.5099 Pr.>Z=0.1311
Arellano-Bond test for AR(2) in first differences: Z=1.0969  Pr.>Z=0.2727
Arellano-Bond test for AR(3) in first differences: Z=1.1843  Pr.>Z=0.2363
Arellano-Bond test for AR(4) in first differences: Z=1.2056  Pr.>Z=0.2280

Decision: The null hypothesis cannot be rejected at orders higher than one.
------------------------------------------------------------------------
```

H_0: No Autocorrelation.

Annex D-3: Tests of Overidentifying Restrictions

Table D-3.1 Overidentifying Restrictions – Trade Model

```
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid

        chi2(14)     =   15.24511
        Prob > chi2  =    0.3616
```

Decision: We fail to reject the null hypothesis, meaning we found that overidentifying conditions (instruments) are valid.

Table D-3.2: Overidentifying Restrictions – Export Model

```
Sargan test of overidentifying restrictions
        H0: overidentifying restrictions are valid
        chi2(14)     =    8.565127
        Prob > chi2  =    0.8579
```

Decision: We fail to reject the null hypothesis, meaning we found that overidentifying conditions (instruments) are valid.

Annex D-4: Tests for Heteroskedasticity

Breusch and Pagan Lagrangian multiplier test for random effects

lntijt[code,t] = Xb + u[code] + e[code,t]

Estimated results of Trade Model:

	Var	sd = sqrt(Var)
lntijt	.9896069	.9947899
e	.1891309	.4348919
u	0	0

Test: HO: Var(u) = 0 (homoskedastic)
chi2(1) = 1.66
Prob > chi2 = 0.1971

Estimated results of Export Model:

	Var	sd = sqrt(Var)
lnxijt	3.838738	1.95927
e	.3285996	.573236
u	0	0

Test: ho: Var(u) = 0 (homo)
chi2(1) = 1.67
Prob > chi2 = 0.1969

Decision: We fail to reject the null hypothesis, implying that Variances are homoscedastic in both models.