FACTORS AFFECTING UGANDA'S BILATERAL TRADE FLOWS: AN APPLICATION OF THE GRAVITY FLOW MODEL

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DECLARATION

I herby declare that this report is my own work and has never been submitted to any University for the award of a MSc. Degree in Agricultural and Applied Economics.

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DEDICATION

This thesis is dedicated to my parents; Eng. Cedric Mutyaba and Ms. Harriet Nansubuga (RIP) and Mrs. Semakula Imelda Nalukenge (RIP).

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LIST OF TABLE OF CONTENTS

DECLARATION i

DEDICATION ii

ACKNOWLEDGEMENTS iii

LIST OF TABLE OF CONTENTS iv

LIST OF TABLES vi

LIST OF APPENDICES vii

LIST OF ACRONYMS viii

ABSTRACT ix

CHAPTER ONE 1

INTRODUCTION 1

1.1 Background to the study 1

1.2 A review of Uganda's exports 2

1.3 Trend of expenditure on Ugandan imports 6

1.4 Uganda's trade partners 7

1.5 Problem Statement 8

1.6 Objectives of the study 10

1.7 Hypotheses 10

CHAPTER TWO 11

LITERATURE REVIEW 11

2.1 Determinants of Bilateral Trade Flows 11

2.2 Determination of Bilateral Trade Potential 15

2.3 Analysis of Trade Performance and Degree of Trade Integration 17

CHAPTER THREE 19

METHODOLGY 19
3.1 Study area 19
3.2 Data description and data analysis 19
3.3 Analytical methods 21
3.3.1 Model Specification for the Augmented-Gravity Flow Model 21
3.3.2 Variables and Expected signs of the coefficients 23
3.3.3 Predicting Bilateral Trade Potential and Performance 27
3.3.4 Determining Uganda's Degree of Trade Integration with her Partners 29
CHAPTER FOUR 31
RESULTS AND DISCUSSION 31
4.1 Socio-economic characteristics of the trading partners 31
4.2 Factors affecting Bilateral Trade Flows between Uganda and her partners 33
4.3 Prediction of Uganda's Potential bilateral flows and analysis of Bilateral Trade performance 43
4.4 Uganda's Degree of Trade integration with her trade partners 50
CHAPTER FIVE 55
SUMMARY, CONCLUSIONS AND RECOMMENDATIONS 55
5.1 Summary 55
5.2 Conclusions 58
5.3 Recommendations 58
5.3 Areas for further research 60
REFERENCES 60

LIST OF TABLES

Table 1.1 Uganda's export trends by destination ('000 US Dollars) (1981 – 2006)..... 3

Table 1.2: Percentage contribution of traditional and non-traditional exports to Uganda's total export, 2000 – 2006..... 5

Table 4.1: Socio-economic characteristics of the trading partners 31

Table 4.2: Socio-economic characteristics of Uganda and her trading partners..... 32

Table 4.3: Regression results of the Augmented Gravity model 34

Table 4.4: Comparison of Uganda's imports from study trade partners as per region between 2002 and 2006..... 41

Table 4.5: Uganda's mean Actual (A_{ij}) and Potential (T_{ij}) trade for the entire period under study (1970 – 2006). 44

Table 4.6: Uganda's trade potential with country specific trade partners (US$ billion) 45

Table 4.7: Uganda's trade performance by *Relative difference* index 46

Table 4.8: Trade performance by *Absolute difference* (Ad_{ijt}) index by country..... 49

Table 4.9: Uganda's degree of trade integration by country 51

Table 4.10: Uganda's degree of trade integration based on COMESA and EAC on dummy variables..... 53

LIST OF APPENDICES

Appendix A: FGLS estimation output 65

Appendix B: Distance between Kampala and the economic centres of the trading partners 66

Appendix C: Descriptive statistic of Uganda's potential trade (T_{ij}) and Actual trade (A_{ij}) between 1970 and 2006..... 67

Appendix D: Summary statistics of Uganda's unexhausted potential trade (1970-2006) 68

Appendix E: Uganda's mean Actual trade (A_{ijt}), Potential trade (T_{ijt}), unexhausted trade and Degree of integration by country (1970 - 2006)..... 69

Appendix F: Uganda's trade performance (1970-2006; 1990 -2006; 1995 – 2006; 2000 – 2006)..... 71

Appendix H: Country descriptive statistics by variable..... 73

Appendix I: Uganda's total bilateral trade with the respective trading partners ('000 US$) (1970 -2006)..... 75

LIST OF ACRONYMS

APEC	Asian – Pacific region
COMESA	Common Market for East and Southern Africa
DRC	Democratic Republic of Congo
EAC	East African Community
EPAU	Export Policy Analysis Unit
EUREPGAP	European Good Agricultural Practices
GAP	Good Agricultural Practices
GDP	Gross Domestic Product
IMF	International Monetary Fund
ITC	International Trade Centre
MPRA	Munich Personal RePEc Archive
UBOS	Uganda Bureau of Statistics
UNCTAD	United Nations Conference on Trade and Development
URA	Uganda Revenue Authority
WTO	World Trade Organization

ABSTRACT

Uganda is a fast growing economy with many sources of foreign exchange most especially from agricultural trade exports. However, no information about Uganda's bilateral trade flows has been documented using the gravity flow model yet this model lies at the centre of explaining any country's bilateral trade flows. Identification of Uganda's bilateral trade flows can suggest a desirable free-trading partner and conjecture the volume of a missing trade or unrealized bilateral trade flows. Although Muhammed and Andrews (2008) have employed the gravity flow model in Uganda, no work has been done to assess the determinants of Uganda's bilateral trade flows and potential. However, a detailed understanding of Uganda's bilateral trade flows would provide an additional practical framework for derivation of informed trade policy decisions to improve the country's trade regime. It is against this background that the *Augmented-gravity flow* model was employed to study Uganda's total bilateral trade flows and her trade potential. The main objective of this study was to explore the determinants of Uganda's total bilateral trade flows and her predicted trade potential. Specifically,(i) to determine the factors that influence total bilateral trade flows between Uganda and her trade partners, (ii) to predict Uganda's bilateral trade potential and performance and iii) to determine Uganda's degree of trade integration with her major trade partners.

Time series data of Uganda and her major trading partners (Switzerland, Netherlands, Belgium, UK, France, South Africa and Kenya) were used for the period 1970 -2006. The study employed real GDP, Distance, real exchange rate volatility, real exchange misalignment, membership to COMESA, membership to the East African Community (EAC) and having had a common colonial master as the explanatory variables with 259 observations. Feasible Generalised Least Squares (FGLS) estimation, Relative difference

(Rd) and Absolute difference (Ad) indices, as well as the ratio of actual to potential total bilateral trade flows were the analytical tools employed to achieve the set objectives.

Empirical findings reveal that Uganda's total bilateral trade flow is positively influenced by Uganda's real GDP, real GDP of her trading partners, membership to COMESA, membership to the EAC and having had similar colonial masters. On the other hand, distance, population of Uganda and that of her trade partners, real exchange rate volatility and misalignment showed a negative influence on Uganda's total bilateral trade flows. Generally, Uganda has a good trade performance and can easily be integrated in trade. However, there is still need to promote export trade and invest generously in public infrastructure among others in order to improve her trade performance. Results also reveal that Uganda has a high degree of trade integration (111.09 percent) with most of her trading partners but she cannot easily integrate with UK and France markets specifically. The lower level of trade integration with UK and France is associated with the high non-tariff trade barriers as well as large distance between Kampala and the respective capital cities.

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Uganda, once a British colony is a land locked country situated in eastern part of Africa. Geographically, Uganda extends 787 km NNE–SSW and 486 km ESE–WNW. It is bordered by Sudan in the North, Kenya in the East, Tanzania in the South and Democratic Republic of the Congo. Its economy largely depends on agriculture although the trade sector also plays a significant role. Over the past two decades, the Ugandan economy has been transformed. For instance, dramatic progress in 'market-oriented' policy reforms has occurred since 1987 (Morrissey and Rudaheranwa, 1998), especially by liberalizing the foreign exchange market and attaining macroeconomic stabilization, notably tight fiscal and monetary policies which help maintain low inflation.

The macroeconomic stability of recent years has contributed to business confidence and a favorable trade environment in Uganda (EPAU, 1995). The Export Policy Analysis Unit (EPAU) (1995), further notes that the private sector has been revived by encouraging both domestic and foreign investors through provision of various incentives such as the enactment of the Investment Code in 1991, and provision of fiscal incentives. According to Morrissey and Rudaheranwa (1998), returning of Asians confiscated properties in the early 1990s, under the Custodian Board significantly encouraged investors and traders to have confidence that property rights are secure. Although exporters in Uganda appreciate the extent of macroeconomic stability (EPAU, 1995), they identify high freight rates, paperwork and slow clearing procedures for exporting as some of the key setbacks in trade. This leads to high transaction costs thereby making

exporters less competitive in export markets. Also to note is the exporters' perception that tariff reforms and incentives provided by the government to reduce anti-export bias are inadequate.

1.2 A review of Uganda's exports

Uganda is an agricultural country characterised with much of her exports being agricultural produce (UBOS, 2007). However, other sectors of the economy like mineral resources and tourism, among others, also contribute to the country's exports. Generally, over the past 2-3 decades, Uganda's total exports have been changing from time to time as revealed in Table 1.1. For instance, between 1981 and 1989, exports gradually increased from about US$ 93 million to approximately US$ 105 million, followed by a sharp fall to as low as US$ 68.8 million through the next five years. During the early 1980's, much of the exports were destined for the United Kingdom (UK), France, Belgium and Netherlands. From the late 1980s until mid 1990s, Uganda's' exports to Netherlands, Belgium South Africa and France in particular declined while trade with Kenya was beginning to boom. This flourishing trade with Kenya greatly boosted Uganda's total exports to over 400 million US dollars worth of exports in 1994 alone. Since then, total exports have been fetching Uganda between 250 and 400 million US dollars annually, as many other trading partners gradually got involved in trading with Uganda. For instance, export trade with Switzerland only started booming during the early 1990s.

Table 1.1 Uganda's export trends by destination ('000 US Dollars) (1981 – 2006)

Year	Switzer-land	Nether-lands	Belgium	United Kingdom	Kenya	South Africa	France	Uganda's total exports
1981	-	19,034	758	48,263	1,339	2,054	21,637	93,085
1982	-	42,676	3,259	51,811	1,925	5,183	32,537	137,391
1983	-	42,227	6,855	53,203	2,496	50	32,218	137,049
1984	-	48,368	5,728	62,876	3,339	393	50,779	171,483
1985	-	52,629	15,974	68,449	1,423	118	31,003	169,596
1986	-	72,197	21,448	61,689	3,088	797	29,480	188,699
1987	-	58,504	24,148	45,253	1,804	5,105	24,812	159,626
1988	-	37,009	25,349	44,145	1,590	5,035	26,803	139,931
1989	-	26,539	23,636	22,335	3,374	5,443	23,638	104,965
1990	-	14,943	16,906	14,545	6,241	1,210	23,229	77,074
1991	-	9,122	11,392	30,767	12,354	2,334	24,643	90,612
1992	-	8,914	21,139	35,557	16,035	2,854	10,912	95,411
1993	-	7,569	8,563	24,908	17,064	1,005	9,678	68,787
1994	2,843	6,986	5,110	15,014	376,546	694	69	407,262
1995	182,511	22,400	28,582	122,459	24,769	359	16,588	397,668
1996	196,451	21,703	19,485	165,963	60,945	1,314	14,698	480,559
1997	193,400	7,387	16,944	122,879	42,172	2,492	32,139	417,413
1998	130,748	29,024	7,020	146,189	38,944	9,683	6,782	368,390
1999	122,381	14,636	4,314	133,575	49,927	25,586	5,488	355,906
2000	99,118	34,705	1,783	38,694	63,022	28,897	2,665	268,885
2001	70,673	52,803	16,085	28,806	59,063	24,076	4,057	255,563
2002	69,011	56,000	21,902	30,015	61,504	42,997	6,844	288,273
2003	72,993	48,955	12,899	33,883	78,432	29,632	5,116	281,910
2004	108,779	61,227	34,277	29,438	76,903	9,250	22,702	342,575
2005	74,857	85,413	33,660	26,831	72,437	9,796	39,581	342,576
2006	45,432	61,889	39,592	29,959	88,002	10,852	38,322	314,048

Source: UBOS, IMF, and United Nations Statistics Division Common Database

- Denotes data not available

Uganda's exports are broadly categorized into two: Traditional Exports (TEs) and Non-Traditional Exports (NTEs). Traditional exports are those agricultural produce which have been grown with a purpose earning an income. Such traditional cash crops include coffee, tea, cotton and tobacco. On other hand, NTEs are all those agricultural goods that were originally produced for the purpose of providing food although of late, such produce is also exported to generate foreign currency. NTEs include flowers, fish and fish products, fruits and vegetables, among others (UBOS, 2007). Unlike in the past few years, there has been a tremendous decline in the overall contribution of TEs to the

overall exports earnings for the period 2002 - 2006 (UBOS, 2007). In 2002 for instance, Traditional exports constituted 39.1 percent of the total export earnings but by 2006, earnings had dropped by approximately 10 percent. This fall was attributed to the little volumes of traditional exports made in 2006 compared to volumes exported during early 2000s. For example, unlike in 2005 when 30,403 tones of cotton were exported, only 18,480 tones were exported in 2006.

Although there has been a varying trend of coffee's share to total export earnings, it has maintained the lead as the main foreign exchange earner to the economy. In 2006, for instance, probably due to improvement in international coffee prices, coffee earnings increased from US$ 172.9 million to US$ 189.8 million although the coffee export volumes had reduced (UBOS, 2007). The other TEs also contribute to economic growth but a significant reduction in tobacco's share to export earnings was noted falling from 9.7 percent in 2002 to 2.8 percent in 2006. According to UBOS (2007), the NTEs have of late continuously increased their share to total export earnings especially during the mid 2000s.

From 2002, the share of NTEs to total export earnings increased by about 10 percent making it to a staggering 70.1 percent in 2006. This was attributed to frantic effort by government in boosting non-traditional exports especially cocoa beans, maize, vanilla, roses and cut flowers, fish and fish products. Fish and fish products are the main foreign exchange earner after coffee followed by maize, cut flowers and roses. Illustration in table 1.2 reveals that there has been a decreasing trend of share of contribution to total exports of the various goods and services under this category. Fish exports, for example, declined to 15.2 percent from 18.8 percent over period of four years since 2002, while

contribution of share from electricity exports also dropped due to the reduced water levels at the source of the Nile from 2.6 percent in 2003 to 0.5 percent in 2006.

Table 1.2: Percentage contribution of traditional and non-traditional exports to Uganda's total export, 2000 – 2006

Export category	**Item**	**2002**	**2003**	**2004**	**2005**	**2006**
Traditional	Coffee	20.7	18.8	18.7	21.3	19.7
Exports	Cotton	2.0	3.3	6.4	3.5	2.1
	Tea	6.7	7.2	5.6	4.2	5.3
	Tobacco	9.7	8.1	6.1	3.9	2.8
Total		**39.1**	**37.3**	**36.8**	**32.9**	**29.9**
Non-Traditional	Fish and fish products	18.8	16.5	15.5	17.6	15.2
Exports	Maize	2.3	2.6	2.7	2.6	2.5
	Roses and cut flowers	3.8	4.1	4.0	3.0	2.2
	Gold and Gold compounds	12.9	7.2	9.2	9.0	12.7
	Others	22.9	32.3	31.8	34.9	37.5
Total		**60.9**	**62.7**	**63.2**	**67.1**	**70.1**

Source: UBOS, URA

1.3 Trend of expenditure on Ugandan imports

Over the years, Uganda's expenditure on imports has continued to increase at a higher rate than proceeds from exports (UBOS, 2007). During 2006, expenditure on imports amounted to US$ 2,557.3 million, which was about US$ 831,000 more of what was spent in 2004. The continuous expenditure on imports is attributed to the desire to satisfy the domestic market, which has a high demand of both capital and manufactured goods. For the past decade, petroleum and its products, road vehicles, cereals, iron and steel among others have been the key imports of Uganda. Petroleum products have continued to take the highest expenditure over the years, followed by vehicles and cereals in that order. By 2006, the import expenditure shares for petroleum and its products, road vehicles and cereals were estimated at 20.6, 8.5 and 6.1 percent, respectively.

Other imports include telecommunications, medical and pharmaceutical products. UBOS (2006) asserts that Asia was the largest source of Uganda's imports. Uganda's expenditure on Asian imports between 2005 and 2006 increased by 38.7 percent was attributed to China's entry in the import market. Unlike Asia's increased share of import expenditure, import expenditure share for the African continent significantly reduced from 36.2 percent in 2005 to 25 percent in 2006. Of Uganda's import expenditure on African imports, the Common Market for East and Southern Africa (COMESA) assumed 70.5 percent of the market share. During the past ten years, Kenya has been the major source of imports both on the African continent and COMESA region (62.7 percent and 89 percent respectively). Other African trade partners were Republic of South Africa, Egypt, DRC, to name but a few.

1.4 Uganda's trade partners

COMESA member states and European Union (EU) countries have been the Uganda's leading trading partners over the years. During 2006, COMESA's trade market share was at 29.5 percent followed by the European Union (27.4 percent) and the Middle East with 20.6 percent. Of recent, the Middle East has emerged as a potential market given that its market share has considerably increased by about 10 percent from 10.8 percent in 2005. According to UBOS (2007), Kenya, Rwanda, Sudan and DRC are the major trading partners amongst the COMESA states. From 2005, the value of exports to COMESA region rose by 13.8 percent. Within the European Union region, Netherlands, France, Belgium and Germany are the major trading partners. North America and Asia are other trade partners although their overall export shares are still low staggering at 1.7 percent and 7.8 percent, respectively. Eighty six percent of exports to North America were destined for the USA although export values to USA decreased from US$ 15.9 million in 2005 to US$ 14.2 million in 2006.

Generally, Uganda's bilateral trade flows have been varying from time to time as portrayed in Appendix I. For over ten years, trade remained stagnant between the years of 1970 and 1981, and picked up for the following ten years until the early 1990s when there was rapid growth in trade flows. Since then, Uganda's bilateral trade flow has rapidly developed until to date. Uganda trades with many countries into the world but for the 37 years considered in this study, significant trade was observed with Kenya followed by South Africa and the Netherlands. During the late 1990s, trade with the UK and Switzerland had begun to pick up.

1.5 Problem Statement

Trade is a crucial instrument for industrialization and sustainable economic development. Traditional trade theories are mainly concerned with identifying what goods a country trades, while ignoring the trade volumes. Understanding the factors determining bilateral trade volumes of a country or a region widens the horizons of a country or region's trade policies. The gravity flow model helps to understand the factors that determine a country's bilateral trade volumes from a practical or empirical point of view. It broadens the horizons of a country's trade policies (Deardorff, 1998; Eichengrean and Irwin, 1997; Luca and Vicarelli, 2004). Various gravity analyses are performed to evaluate various trade policy issues, such as the effects of openness of an economy or protectionist policies and the merits of proposed regional trade arrangements (such as COMESA and East African Community in the case of Uganda) and the effects of national borders. Recent empirical studies have employed the gravity model in determining patterns of tourism flows, migration flows, bilateral equity flows and foreign direct investment flows.

Successfully identifying the bilateral trade flows can suggest a desirable free-trading partner and conjecture the volume of a missing trade or unrealized bilateral trade flows. In the case of Uganda, the trade gravity model is a powerful tool for explaining the bilateral trade flows and volumes. The trade flows and volumes can then be widely applied to analyze the inter-national bilateral trade volumes and to estimate trade potentials. Additionally, the model can be employed to identify the effects of trade groups, explain the trade patterns and to assess the cost of a border trade. In trade policy analysis, the model can widely be used as a baseline to estimate the impact of a variety of policy issues with respect to currency unions, regional trading groups and various

trade distortions (Anderson, 1979; Bergstrad, 1985, 1989; Bougheas *et al.*, 1999; Lin and Wang, 2004; Liu and Jiang, 2002; Lin, *et al.*, 2002; De Sousa and Disdier, 2002; Sheng and Liao, 2004).

In Uganda, the gravity flow model has evidently been employed by Muhammad and Andrews (2008) to investigate the determinants of tourist arrivals in Uganda. No scholarly work has been done to assess the determinants of Uganda's bilateral trade flows and potential. A deeper understanding of Uganda's bilateral trade flows would provide an additional practical framework for making informed trade policy decisions to improve the country's trade regime. For transitional countries like Uganda, UNCTAD (1999) notes that the gravity flow model is very relevant while making informed policy decisions especially when modelling potential trade flows and examining changes among international trading partners of transitional economies. The International Trade Centre (ITC) (2003) reported a new modification of the ordinary Gravity flow model called *TradeSim* developed purposely to estimate bilateral trade flows of developing countries with any of their trading partner countries.

Although a lot of empirical work on bilateral trade flows has been done in developed countries (Martinez-Zarzoso, 2003; Chen *et al.*, 2007; Luca and Vicarelli, 2004; Sokchea, 2006; Sheng and Liao, 2004), there is very little work in this area in Africa, and Uganda specifically. Thus, it is against this background that this study employs the *Augmented-gravity flow* model to determine factors affecting Uganda's total bilateral trade flows and her trade potential.

1.6 Objectives of the study

The main objective of this study was to determine factors affecting Uganda's bilateral trade flows and her trade potential. The specific objectives were:

1. To determine the factors that influence bilateral trade flows between Uganda and her major trade partners.
2. To predict Uganda's bilateral trade potential and performance.
3. To determine Uganda's degree of trade integration with her major trade partners.

1.7 Hypotheses

1. Growth of real GDPs of Uganda and her major trade partners positively influence the level of bilateral trade flows.
2. The longer the distance between Kampala city and a capital city of a major trade partner, the lower the level of bilateral trade flow.
3. Exchange Rate Volatility and Misalignment lower the level of bilateral trade flows.
4. Uganda has a good level of trade performance with her major trade partners.

CHAPTER TWO

LITERATURE REVIEW

2.1 Determinants of Bilateral Trade Flows

Various studies related to international trade flows have been carried out using the Gravity flow model approach in a number of countries. For example, Muhammad and Andrews (2008) applied the gravity flow model and panel data for a period of five years (2000 – 2004) to investigate the impact of origin-specific factors across countries on tourist arrivals in Uganda. Generally, Ordinary Least Squares (OLS) results of the study suggest that over 70 percent of the variation in Ugandan tourist inflows could be explained by real GDP, distance, Ugandan exports by country destination, Ugandan imports by country of origin and exchange rates. Distance was identified as the greatest factor negatively affecting Uganda's tourist arrivals given that for a unit percent increase in distance from Uganda would lead to a 70 percent decrease in tourist arrivals.

Achay (2006) investigated the determinants of trade flows between various countries. The author applied the augmented gravity flow model on a sample of 146 countries for the five-year sub-periods between 1970 and 2000. The augmented gravity model included the basic factors of the model, which are GDP and distance as well as other variables which included per capita GDP, common official language, common frontier and common currency. Results of the study indicated that GDP, GDP per capita, common frontier, common official language, and common currency have a positive impact on the volume of bilateral trade. On the other hand, the geographical distance factor had a negative effect on the volume of trade.

According to Geda (2002) who analyzed the determinants of trade using COMESA as a case study, documented that, with the exception of distance, all the standard gravity model variables had plausible and statistically significant coefficients. It was noted that good macroeconomic policies (such as financial deepening and infrastructure development) were important determinants of bilateral trade in Africa. All proxies used to measure political instability with the exclusion of war had the expected signs. Regional integration arrangements were negatively influencing intra-regional trade. COMESA intra-trade partners were found not significantly different from non COMESA countries.

Martinez-Zarzoso (2003) applied the gravity model to assess Mercusor countries and the European Union trade and trade potential following the trade agreements that had been reached. The model was used to test annual bilateral trade flows on a sample of 19 countries, that is, the formal four members of Mercosur plus Chile and the fifteen members of the European Union over a period of eight years (1988 – 1996). The basic model variables satisfied the gravity flow model hypothesis which states that, "Economic sizes of trading partners positively influenced bilateral trade flows while distance between the economic trading centres of any two trading partners negatively affected bilateral trade flows". However, population of importing trade partners was found to positively influence bilateral trade flows, implying that bigger countries import more than their smaller counterparts. Also the population of the exporting country had a large and positive impact on volume of exports. According to the author, it implies that the larger the population, the cheaper the available labour. This boosts production of exportable goods and services. Exporter and importer incomes also indicated a positive

influence in bilateral trade flows but the author's major observation was that transport infrastructure greatly fosters trade.

Chen *et al.* (2007) studied determinants of Xinjiang's bilateral trade flows using an extended gravity flow model. The variables "GDP product", "the product derived from per capita GDP of Xinjiang and that of her trade partners", and distance among other variables were found to be significantly consistent with the then prevailing trade situation at the time of study. The authors noted that Xinjiang's neighbouring trade partners like Russia, the Republic of Kyrgyzstan and Pakistan, which have a direct land corridor, were always Xijiang's main trade partners unlike distant trading partners like Hong Kong among others.

The distance variable has remained one of the most interesting simply because, different authors give quite differing views about this variable. For instance, Buch *et al.* (2003), put it that, distance coefficients do not carry much information on changes in distance costs over time because changes in distance costs are largely picked up solely in the constant term of the gravity model. Therefore, the distance coefficient only measures the relative difference between economic centres. Chan-Hyun (2005) clarifies that the distance coefficient does not only reflect elasticity of absolute distance on trade, but also shows the effect of both absolute and relative distances.

Empirically, real exchange rate volatility can have both negative and positive effects on trade depending risk aversion and costly adjustment of production factors. For instance, De Grauwe, (1988) notes that risky aversion and costly adjustment of production factors may lead to a negative impact of exchange rate volatility on exports, while convexity of

the profit function with respect to export prices may lead to a positive impact. However, most studies (Thursby and Thursby, 1987; Frankel, 1997; Frankel and Wei, 1993; Eichengreen and Irwin, 1995) have found exchange rate volatility to negatively influence trade flows although Klein (1990) observed a positive effect. While assessing the effects of exchange rate uncertainity on agricultural trade among the G-10 countries (Belgium, Canada, France, Germany, Italy, Japan, the Netherlands, Switzerland, the United Kingdom and the United States), Cho *et al*., (2002) concluded that exchange rate volatility had a large negative impact on trade flows. Related work by Kandilov (2008), who employed data for developed, emerging and developing countries between 1975 and 1997, also registered a negative effect of exchange rate volatility on export trade most profoundly among the developing economies. According to Kandilov (2008), most existing studies that evaluate the impact of increased exchange rate volatility on trade flows are for developed economies, yet many developing economies in Asia, South America and Africa in particular, pursue GDP growth policies based on trade orientation. Thus, the question of real exchange rate volatility on bilateral trade flows specifically in Uganda is the information gap of importance as per this variable.

Gue *et al.,* (2003) who used the gravity flow model following Bergstrand (1985, 1989) and Feenstra et al. (2001) puts it that, over-valuation (under-valuation) of the nominal exchange rate negatively (positively) affects export performance, particularly to the agricultural sector. The study sought to address the effect of exchange rate misalignment on agricultural trade in comparison with its impact on other sectors. It was based on panel data for 10 developed economies compiled over a period of 25 years (1974-1999). Findings of the study show that exchange rate misalignment greatly decreases (- 1.116) agricultural trade flows unlike the case with the other sectors. This implied that a unit

change in nominal exchange rate misalignment (over- or under-) valuation of a currency compared to the long-run equilibrium level influences (reduces or increases) agricultural trade flows by about 1.1 percent although other sectors like the large-scale manufacturing were not significantly affected. Despite the fact that previous studies have assessed the impact of exchange rates on trade, many (Gue *et al*., 2003; Gardner, 1981; and Tweeten, 1989) have used nominal exchange rate instead of using real exchange rates; hence real exchange rate misalignment is a key research concern in this study.

Most of the literature reviewed shows that GDP coefficient lies between 0.75 and 1.2, which is consistent with the theoretical foundation (Grossman, 1998; Deardorff, 1998). Many scholars (Frankel, 1997; Chen *et al.*, 2007; Chan-Hyun, 2005) also proved this assertion by carrying out a number of gravity equations and the results showed that coefficient for real GDP ranged between 0.75 and 0.95. However, contrary to the theoretical expectations, Sokchea (2006) obtained statistically significant GDP coefficients even when random effects were catered for in the estimator. When the OLS estimator was used, coefficients ranged between 2.188 and 3.178 across the study periods, which is more than the theoretical value of 1.2. Use of the Simple pooled OLS estimator also gave a wide range of coefficients lying between 2.585 and 5.851. With respect to GDP variable, this study seeks to validate whether GDP of Uganda and her trade partner's lies within the expectations of the theoretical foundation.

2.2 Determination of Bilateral Trade Potential

Studies by Luca and Vicarelli (2004), Martinez-Zarzoso (2003) and Kalbasi (2004) carried out basing on the gravity flow model framework have tried to predict bilateral trade potentials. In essence, these studies seek to acquire evidence of effects that arise when countries have been integrated in trade so that they can predict the additional

bilateral trade flows that might accrue if there is any kind of fostering trade integration between two or more countries (Luca and Vicarelli, 2004). Martinez-Zarzoso (2003) used the estimated coefficients obtained from the gravity flow model to predict Mercosur's export potential to the European Union (EU). Results from the study show that teaming up of Mercosur and Chile provided the highest export potential (approx. 22.6 million) to the EU while Paraguay registered the least export potential (approx. 231,000) to the EU for the entire study period (1988-1996). This implies that Mercosur and Chile have more room to expand their trade to the EU unlike Paraguay.

Kalbasi (2004) also used a similar approach to predict Iran's total export trade flow potential to the 76 trade partner countries in 1998. In the analysis, the author categorized the export trade flows into two categories, that is, the developing – industrial countries (DI) and the Intra-developing countries (DD) export trade flows. Findings of the study reveal that of the DI countries export trade flows, United States of America (USA) and Japan had the highest export trade flow potential while Greece, New Zealand and Ireland trailed at the bottom. Among the DD countries export trade flows, Turkey and Pakistan registered the highest export trade flow potential while Argentina, Venezuela, Tunisia among others had very low export trade flow potentials. Most of the countries in this category actually registered zero export trade flow potential. While comparing results of the different gravity flow model estimators (the traditional static OLS, fixed effects regression and the dynamic specification), Luca and Vicarelli (2004) also predicted trade potentials. Results indicated that predicted trade potentials vary when one uses the different gravity flow model estimators. Authors further noted that the predicted trade potentials decrease as one uses the traditional static OLS, followed by the fixed effects regression and then the dynamic specification in that order.

2.3 Analysis of Trade Performance and Degree of Trade Integration

Although many gravity flow model empirical studies have been conducted on determinants of bilateral trade flows, not much literature review related to analysis of trade performance and Degree of trade integration has been come across. According to Chen *et al.* (2007) who used 34 countries to quantitatively analyze Xiniang's trade performance in 2004, there are two indices, which can appropriately be used to as good measures of trade performance. These are Relative difference (*Rd*) and Absolute difference (*Ad*). Their results revealed that Xinjiang had good trading terms with most of her trading partners given that the *Rd* was above zero. Kazakhstan, Pakistan, Germany, Russia and France, among others, were particularly good trading partners with Xinjiang given that their respective *Rd* indices ranged between 0.35 and 0.60. However, some trading partners like Greece, Iran and Norway had *Rd* indices far below zero (between -0.79 and -0.10) which implied that those partners were not by then cooperating with Xinjiang.

As per the Absolute difference (*Ad*) index, Chen *et al.* (2007) based their analysis on geographical regions. Results of the study showed that, Xinjiang had already established strong trade ties with Central Asia, Central and Eastern Europe, and Western Europe. She had gained from her trade with Central Asia (US$ 900 million), Central and Eastern Europe (US$ 100million) and Western Europe (US$ 80 million) unlike with other regions like West and South Asia which had had trade volume gains worth less than US$ 30 million only. Xinjiang's good regional trade performance with Central Asia, Central and Eastern Europe, and Western Europe was attributed to the existence of a number of common aspects like culture, customs and religious beliefs, and the having of traditional economic exchanges. In particular, authors noted that central Asia has the new Eurasian

continental bridge and many land ports, which made the study country the “bridgehead” in opening up westwards.

To measure a Korea’s degree of trade integration, Chan-Hyun (2005) used the ratio of actual trade to potential trade and empirical results from Korea and her 30 major trading partners revealed that China, Japan and Mexico had significant trade barriers. These barriers could have led to the great levels of unexhausted trade potential of about 3,178 (China); 23,163 (Japan) and 2,840 (Mexico) billion US dollars. This assertion was attributed to relatively lower ratios 0.85 (China), 0.67 (Japan) and 0.29 (Mexico) obtained. Sandra (2006) used dummy variables with the gravity flow model of trade to investigate the evolution of Yunnan’s international trade integration between 1988 and 1999 with a sample of 230 observations. The study focused on assessing the impact of membership to the Great Mekong Sub-region (GMS). Results showed that a large degree of trade integration existed between Yunnan and Myanmar for both imports and exports. However, Yunnan depicted a negative degree of trade integration with Thailand and Vietnam implying no existence of good trading terms.

CHAPTER THREE

METHODOLGY

3.1 Study area

The study focuses on Uganda's seven main trade partners (Switzerland, Belgium, Netherlands, Kenya, South Africa, United Kingdom and France). They were selected basing on the fact that they have been consistent trading partners over the past ten years and have high percentage contribution to total bilateral trade flow with Uganda. Two market integration systems were considered, that is, membership to COMESA and the East African Community (EAC). Kenya and South Africa are members to COMESA, and Kenya also belongs to the East African Community (EAC). The market integration systems represent the dummy variables in the specified augmented gravity model.

3.2 Data description and data analysis

This study concentrates on panel data collected over a period of 37 years (1970 – 2006). This period was selected because the study intends to track the evolution of Uganda's trade partners and to maintain the comparability of the estimated coefficients. The study uses International Financial Statistics (IFS) database of 1998 and 2007 developed by International Monetary Fund (IMF). The IFS provides yearly statistical data classified according to international standards. Other data sources include the annual Statistical Abstract publications (since the 1980s) by the Uganda Bureau of Statistics and the United Nations Statistics Division Common Database for the 37 years covered by this study.

Bilateral trade by value (imports and exports) by trade partner countries, Nominal GDP at current market prices, Real GDP at constant prices of 1990, United states producer prices, Uganda's consumer price index, Population of Uganda and her trading partners were taken from the IFS (IMF, 1998; 2007) and from the United Nations Statistics Division Common Database. United Nations' GDP estimates were used because the figures were given in a uniform and an internationally recognised dollar currency unlike the IMF figures that were reported in the respective national currencies. Distance data are the air distances between the capital cities (Economic centres) of selected trade partners with reference from Kampala, Uganda. These data were taken from www.mapcrow.info/distance and www.worldatlas.com

The data were entered, coded and cleaned in Statistical Package for Social Scientists (SPSS) computer program. A summary of descriptive statistics such as percentages, means, standard deviations and t-statistics were generated. The data were then transferred to STATA version 9.0 in which empirical analysis was carried out. Total bilateral trade variable was obtained as a summation of Uganda's exports and imports to (from) each of the trading partners. With the exception of the dummy variables, the natural logarithms of the other variables, that is, total bilateral trade, real GDP, population and distance were also generated. In the econometric analysis, nine variables were examined for eight trading partners, Uganda inclusive. This gave a panel of 259 observations.

3.3 Analytical methods

3.3.1 Model Specification for the Augmented-Gravity Flow Model

Over the last four decades, the gravity flow model has become a popular formulation for statistical analysis used to predict bilateral trade flows between different geographical entities basing on the economic sizes of the different locations or countries, specifically using GDP measurements (Bergstrand, 1985, 1989; Deardorff, 1998; Eichengrean and Irwin, 1997; Luca and Vicarelli, 2004). The model originates from Newton's "Law of Universal Gravitation" proposed in 1687 (Keith, 2003). It holds that the attractive force between two objects *i* and *j* is a positive function of their respective masses (M_i and M_j) and a negative function of the distance (D_{ij}) between them. This attraction is given by:

$$(1)\quad F_{ij} = G\left[M_i M_j \Big/ D^2_{ij} \right]$$

Where F_{ij} is the attractive force, M_i and M_j are the masses, D_{ij} is the distance between the two objects and G is a gravitational constant depending on the units of measurement for mass and force.

In international economics, the basic gravity flow model states that the size of trade flows between two countries is determined by supply conditions at the origin, demand conditions at the destination and stimulating or restraining forces related to the trade flows between the two countries (Keith, 2003). This can be shown as

$$(2)\quad F_{ij} = R * \frac{M_i^{\alpha} M_j^{\beta}}{D_{ij}^{\theta}}$$

Where F_{ij} is the trade flow from origin *i* to destination *j*, M_i is the economic mass (GDP) of exporting country, M_j is the economic mass (GDP) of the other trading partner. D is

the distance between the commercial centers of the two countries and R (Remoteness) replaces the gravitational constant G. Given the multiplicative nature of the model, natural logarithms can be taken to obtain the linear relationship as stated in equation (3).

$$(3)\ \ln F_{ij} = \alpha \ln M_i + \beta \ln M_j - \theta \ln D_{ij} + \rho \ln R_j + \varepsilon_{ij}$$

The augmented-gravity flow model can be expressed as specified below (Foldvari, 2000):

$$(4)\ \ln F_{ij} = \alpha \ln M_i + \beta \ln M_j - \theta \ln D_{ij} + \delta \ln P_j + \gamma \ln P_j + \rho \ln R_j + \varepsilon_{ij}$$

Where P_i and P_j are the populations of country i and j, respectively.

Chen *et al.* (2007) and Keith (2003) assert that many other factors also influence the trade flows among trade partners, such as the exchange rate, export tax and tariffs, which are controlled by governments and their agencies among others. Other factors include membership in trade arrangements, such as the European Union, COMESA and the NAFTA, EAC, PTA, etc. Whalley (1998) puts it that member states get more economic benefits from guaranteed markets within trade groups than in others. In order to analyse the effects of regional integration on trade volumes, dummy variables are used to capture such trading blocs. In addition, cultural ties such as colonial relationship between Uganda and United Kingdom can be captured using a dummy variable. Thus, Uganda's determinants of bilateral trade flows were obtained by running an augmented-gravity flow model while using the Feasible Generalised Least Squares (FGLS).

The FGLS estimator assumes that heteroscedasticity to be panel as expressed as in (5).

$$(5)\ \begin{aligned}\ln TradeUg_{ijt} = {} & \alpha_{ij} + \beta_1 \ln Uggdp_{it} + \beta_2 \ln Othergdp_{jt} + \beta_3 \ln Ugpop_{it} + \beta_4 Otherpop_{jt} \\ & + \beta_5 \ln Dist_{ij} + \beta_6 \ln Vol_{it} + \beta_7 Misalign_{it} + \beta_8 DCOMESA + \beta_9 DEAC + \beta_{10} DUK + \varepsilon_{ij}\end{aligned}$$

where $lnTtradeUg_{ijt}$ is total bilateral trade (sum of exports and imports) between Uganda and her *j* th trading partner in year t in Billions of US Dollars; $lnUggdp_{it}$ is real GDP of Uganda in year t in Billions of US Dollars; $lnOthergdp_{jt}$ is real GDP of the *j* th trading partner in year t in Billions of US Dollars; $lnUgpop_{it}$ is Uganda's population in year t in millions; $lnOtherpop_{jt}$ is j^{th} trading partners' population in year t in millions; $lnDist_{ij}$ is distance between Kampala and her j^{th} trading partner's commercial centre in Miles, $lnvol_{it}$ is real exchange rate volatility, $Misalign_{it}$ is the real exchange rate misalignment, DCOMESA is a dummy variable representing the influence of membership in COMESA (= 1, if country was in COMESA and at a given year t and = 0, if otherwise); DEAC is a dummy variable representing the effect of membership in East African Community (=1 if country was in EAC in a given year and = 0 otherwise); DUK is a dummy variable representing the effect of colonial ties to Britain (=1 for UK as trade partner and = 0 otherwise). The set hypotheses were tested using the t-statistic in comparison with the significance levels.

3.3.2 Variables and Expected signs of the coefficients

Real Gross Domestic Product (GDP): GDP of the trading countries represents both the productive and consumption capacity that determines largely the trade flow among them. The Real GDPs are used to proxy for the economic sizes of the countries and it is expected that an importing country's GDP plays a significant role in determining the trade flow originating from exporting countries. This is because the importing country's GDP, like the income of the consumer, determines the demand for the goods originating from exporting countries. An exporting country's real GDP also helps in ascertaining productive capacity of the exporting country, that is, the amount of the goods that could be supplied. In the gravity model, it is expected that an exporting country's GDP influences the trade flow of goods and services originating from the exporting country.

Thus, as real GDP of any two or more trading countries increases, trade flows also increase. Therefore, the coefficients of Real GDPs are expected to be positive.

Distance ($dist_{ij}$) is another important variable, which is used to capture the proxy for the trade cost between countries. Distance is a trading resistance factor that represents trade barriers such as transportation costs, delivery time, cultural unfamiliarity and market access barriers. Among other factors, higher transportation costs reduce the volume of trade and increase information costs. Countries with short distance between each other are expected to trade more than those who are wide apart because of reduced transaction costs. Distance can also be used as a proxy for the risks associated with the quality of some of the goods and the cost of the personal contact between managers and customers. Despite the cardinal "great circle" formula which approximates the earth's shape as a sphere and calculates the minimum distance along the surface, distance were obtained using the geographical distance. Following Giorgio (2004) and Keith (2003), this was intended to avoid the short comings associated with the "great circle" formula. Generally, the coefficient of distance is expected to negatively influence the flow of trade between countries.

Population: The impact of Uganda's population and that of her trading partners were the other factors considered. Population is used as measure of country size, and since larger countries have more diversified production and tend to be more self sufficient, it is normally expected to be negatively related to trade.

Real exchange rate volatility: Among other variables considered in this study, was Real Exchange rate volatility given that it can affect trade both directly and indirectly. Direct effects are can be through uncertainty and adjustment costs, while indirect effects can be through its influence on the structure of output and investment and on government policy

(Cote, 1994). The consequences of exchange rate volatility on trade have long been at the centre of the debate on the optimality of alternative exchange rate regimes. Proponents of fixed rates argue that since the advent of the floating regime, exchange rates have been subject to excessive volatility and deviations from equilibrium values have persisted over sustained periods of time. In their view, exchange rate volatility deters industries from engaging in international trade and compromises progress in trade negotiations.

In contrast, proponents of flexible rates argue that exchange rates are mainly driven by fundamentals, and that changes in fundamentals would require similar, but more abrupt, movements in fixed parities. Real exchange rate volatility was measured using the standard deviation (or variance) approach as expressed in equation (6) below.

(6) $$Vol_{it} = \left(R_{it} - \Re\right)^{\wedge}2$$

Where Vol_{it} denotes Uganda's real exchange rate volatility, R_{it} represents real equilibrium exchange rate and $\Re$ denotes mean annual exchange rate. The coefficient of Real exchange rate volatility is expected to have a negative sign.

Real exchange rate misalignment: Generally, the term misalignment refers to the departure of nominal exchange rates from long-run equilibrium level or market fundamentals such as relative prices and interest rate differentials between countries (Gue *et al*., 2003). It can be characterized as either over- or under-valuation of the currency relative to fundamentals. According to it is difficult and inherently imprecise to measure misalignment, given that it requires estimation of what is termed as the fundamental equilibrium exchange rate. The variable was calculated basing on the

Purchasing Power Parity following Gue *et al*., (2003) as the percentage deviation of real exchange rates from their sample as expressed below.

$$(7) \qquad Misalign_{it} = \left(\frac{\ln R_{it} - \ln Av.R_{it}}{\ln Av.R_{it}}\right) * 100$$

Where $Misalign_{it}$ is Uganda's real exchange misalignment, R_{it} is the equilibrium real exchange rate while $Av.R_{it}$ average annual exchange rate across the study period. By using percentage deviations from the equilibrium exchange rates, it is possible to normalize the different currency units and compare movements of relative misalignments with a unified measurement. Given that positive (negative) values mean over-valuation (undervaluation) of an economy's currency by data construction, the expected sign is negative

The Dummy variables were added to capture the influence of membership to COMESA and EAC on bilateral trade flows between Uganda and her trading partners. As a free trade area (FTA), COMESA was established in October 2000 while the East African Community (EAC) agreement took effect on 30th November 1999. Addition of these dummy variables in the econometric estimations would generate information about the effects of signing up such agreements on bilateral trade within the region. The estimated coefficients of the dummy variables indicate the degree to which membership in COMESA and the East African Community influence total bilateral trade flows between the trade partners. Dummy for common colonial master (DUK) was also added to capture the influence of colonial masters on bilateral trade flows among the trading partners. Given that countries having common trade agreements may have more trading opportunities, the expected sign of the estimated coefficients is positive.

3.3.3 Predicting Bilateral Trade Potential and Performance

Over the years, two main approaches have been used to calculate bilateral trade potential, that is, the *out of sample* approach and the *in-sample* approach. However, this particular study employs the *out of sample* approach to predict Uganda's potential bilateral trade flows as specified in (8).

$$\ln TradeUg_{ijt} = \alpha_{ij} + \beta_1 \ln Uggdp_{it} + \beta_2 \ln Othergdp_{jt} + \beta_3 \ln Ugpop_{it} + \beta_4 Otherpop_{jt} + \beta_5 \ln Dist_{ij} + \beta_6 \ln Vol_{it} + \beta_7 Misalign_{it} + \beta_8 DCOMESA + \beta_9 DEAC + \beta_{10} DUK + \varepsilon_{ij} \quad (8)$$

Where β_0 denotes the constant and β_1- β_8 represent coefficients of the variables earlier defined.

With this approach the exact parameters estimated by the gravity flow model were used to project the "natural" trade relations between the trading partners such that the difference between the actual and predicted trade flows represent the un-exhausted trade potential (Wang and Winters, 1992; Hamilton and Winters, 1992; and Brulhart and Kelly, 1999). According to Baldwin (1994) and Nilsson (2000), the second approach (*in-sample* approach) derives trade potential estimates from within the sample. This means that residuals of the estimated regression are taken to represent the difference between potential and actual trade relations. Notably, Egger (2000) and Luca and Vicarelli (2004) argue that both approaches can not be considered immune from eventuality of serious bias, especially if there is model misspecification. However, ITC (2003) confidently notes what matters most is the sign of the difference between potential and actual trade flows.

Following Lie *et al.,* (2002), Amita (2004) and Jiang *et al.,* (2003) bilateral trade performance was analysed using two indices, that is, the *Relative difference* (*Rd*) and *Absolute difference* (*Ad*) following. To obtain the *Relative difference* (*Rd*) index expressed in equation (9), the mean simulated (potential) trade value together with the mean actual trade value was used as;

$$(9)\quad Rd_{ijt} = \frac{\left(A_{ijt} - T_{ijt}\right)}{\left(A_{ijt} + T_{ijt}\right)} * 100$$

Where Rd_{ijt} denotes relative difference in Uganda's with trade partner j. A_{ijt} denotes mean actual trade and T_{ijt} is the mean simulated trade. Lie *et al.,* (2002) and Jiang *et al.,* (2003) assert that *Rd* is inspired by the Normalized Difference Vegetation Index (NDVI) and it varies between -1 and 1. That is, $-1.0 \leq Rd \geq 1.0$. *Rd* is used to measure the good or bad trade performance between trade partners and to analyse exporter's future trade direction given the present circumstances (Chen *et al.,* 2007). The larger the Rd_{ijt} is, the more successful the bilateral trade cooperation is although (Amita, 2004; Helmers and Pasteels, 2003) note that bilateral trade should be enhanced in advance. With this index, trade performance was analysed at four stages, that is, i) while considering the entire study period of 37 years, ii) when considering the period between 1990 and 2006, iii) for the period from 1995 to 2006, and iv) between 2000 and 2006.

The *Absolute difference* (Ad_{ijt}) Index as expressed in (9) was also used to analyze trade performance.

$$(10)\quad Adijt = Aijt - Tijt$$

Where A_{ijt} denotes actual trade, T_{ijt} is the simulated trade and Ad_{ijt} is the absolute difference between Uganda and her trade partner j. Some scholars however interpret Ad_{ijt} as a "un exhausted" trade potential. The *Absolute difference* index can also be used to analyse the good or bad trade performance between trade partners on top of analysing the future direction of trade of the exporting country. Although *Rd* can be a convenient index to describe the relative relation of actual and simulated trade volume, it does not explain the deviation volumes between them. This implies that when $0 < Rd < 1$, it is hard to know how much more than simulated trade volume Uganda actually gains from her trade partner. Also, when $-1<Rd<0$, hardly will one know the trade potential of Uganda and her potential trade partner. However, by use of *Ad* it is possible to calculate the gain or owned trade potential value to identify the future trade partner of the exporting country (Chen *et al.*, 2007). This study thus employs *Absolute difference* index to cross check results obtained but the *Relative difference* index.

3.3.4 Determining Uganda's Degree of Trade Integration with her Partners

Uganda's degree of trade integration with her trading partners was determined following Baldwin (1994) and Nilsson (2000). The degree of trade integration was estimated as the ratio of potential to actual trade values as shown in equation (11).

$$(11)\quad UTPijt = \frac{Aijt}{Tijt} * 100$$

Where, UTP_{ijt} is Uganda's un-exhausted trade potential and the other variables remain as earlier defined. According to Chan-Hyun (2005) who used the ratio of actual to potential

trade to estimate the un-exhausted trade potential, trading partners with relatively lower ratios can not easily be integrated in trade hence causing a considerable level of un-exhausted trade potentials.

The degree of trade integration was also analysed while using the coefficients on Dummy variables (*dcomesa* and *deac*) as specified in equation (12).

(12) Degree of trade integration = [(exponent (dummy coefficient)) – 1] * 100

= [(2.718281828^ (dummy coefficient))-1)*100

This approach is based on assessing the effectiveness COMESA and the East African Community (EAC) on Uganda's trade flows. The method follows CPD (2006) and Sandra (2006) who note that a positive and statistically significant coefficient on the dummy variables implies that trade flows exceed the normal level, meaning that there is greater economic trade integration. However, when the coefficient is statistically negative, it means that the trade flows fall short of the predicted volume, thereby signifying a low degree of trade integration.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.1 Characteristics of the trading partners

Descriptive statistics of model variables presented in table 4.1 reveal that from 1970 through 2006, the overall mean bilateral trade flow of Uganda was approximately worth 76 million US Dollars.

Table 4.1: Characteristics of the trading partners

Variable	Mean	Standard Error	Minimum	Maximum
Total bilateral trade ('000 US$)	75,775.58	92,990.57	89.00	593,124.10
Distance (Miles)	3,052.03	1,262.71	313.57	4,012.36
Real GDP of trading partners (Billion US$)	426.15	442.69	11.23	1673.65
Population of trading partners (Millions)	29.14	20.11	6.19	61.33
Uganda's population (Millions)	17.50	5.12	10.13	28.00
Uganda's real GDP (Billion US$)	4.52	2.24	2.44	9.97

Source: IMF, UBOS and United Nations Statistics Common Database

For the entire study period, Uganda's mean population was only 17.5 million people as compared to about 30 million people (mean) from her trading partners (Table 4.1). However, of all the trading partners, United Kingdom and France registered the largest populations estimated at 57.5 and 56.1 million people respectively as shown in table 4.2. Switzerland was also noted to having had the smallest population of about six million people as compared to 61 million people, the largest population from France. Finally, results from table 4.1 show that the mean distance of all trading partners was about 3,052

miles away from Kampala, Uganda's capital city. Nairobi (Kenya) is the closest trading partner at 313.57 miles away from Kampala while London (UK) and Amsterdam (Netherlands) are the most distant trading centres at approximately 4,012 and 3,932 miles away from Kampala respectively.

Table 4.2 shows that over the years, Kenya had the greatest bilateral trade with Uganda worth more than 200 million US Dollars while Belgium registered the lowest bilateral trade worth about 28 million US Dollars only.

Table 4.2: Characteristics of Uganda and her trading partners

Variable/ Country	Uganda	Switzer-land	Nether-lands	Belgium	UK	Kenya	South Africa	France
Real GDP (US$ billion)	4.5	220.8	300.8	194.1	962.3	9.8	109.5	1,172.1
Population (millions)	17.5	6.7	14.8	10.0	57.5	23.4	35.4	56.1

Source: IMF, UBOS and United Nations Statistics Common Database

Uganda had the least real GDP of about 4.5 billion US Dollars while France and the United Kingdom had the largest real GDP of over 1,000 and 900 billion US Dollars respectively. Overall, the mean real GDP for Uganda's trade partners was 426 billion US Dollars with the highest from France (1,674 billion US$).

4.2 Factors affecting Bilateral Trade Flows between Uganda and her partners

According to the Feasible Generalised Least Squares (FGLS) regression results for the augmented gravity model presented in Table 4.3, the overall model specification is highly significant at all levels. This may be attributable to the fact that the FGLS estimator employed assumed panel heteroscedasticity of the error terms, but with no autocorrelation among the variables. With the exception of membership to East African Community (*DEAC*), all other explanatory variables were found to be significant. Uganda's real GDP ($lnUggdp_{it}$), trade partners' real GDP ($lnOthergdp_{jt}$), population of Uganda's trade partners ($Otherpop_{jt}$), distance ($lnDist_{ij}$), real exchange rate volatility ($lnVol_{it}$), real exchange rate misalignment ($Misalign_{it}$), membership to COMESA (*DCOMESA*) and having similar colonial ties (*DUK*) were identified as the major factors influencing Uganda's total bilateral trade. Although membership to East African Community (*DEAC*) is not significant at any level, one can appropriately conclude that the augmented gravity flow model is appropriate in explaining Uganda's total bilateral trade. This means that this study stands to accept the hypothesis that growth of real GDP of Uganda and that of her major trade partners positively influence the level of bilateral trade flows. As hypothesized, the distance between Kampala city and any city of a major trade partner significantly reduce Uganda's bilateral trade flows. The current results indicate that at nearer distances, for instance Kenya, there is more bilateral trade flows as compared with very distant partners from Kampala. This may be attributed to fewer barriers to trade like higher transport costs associated with larger distances, communication costs, reduced transportation risks especially with fragile and highly perishable products like fruits and vegetables. Such perishable products exported to Kenya include water melons, apple banana, cabbages, to mention but a few. This result

generally concurs with findings of many other countries (Chan-Hyun, 2005; Kalbasi, 2004; Sokchea, 2006; Inmaculada and Felicitas, 1998; and Giorgio, 2004).

Table 4.3: Regression results of the Augmented Gravity model

Explanatory variables	**FGLS coefficient**	**Standard error**	**t-Value**	**P-Value**
Constant	20.91	1.499	13.95	0.000
Real GDP of Uganda (Billions US$) ($lnUggdp_{it}$)	0.736	0.228	3.22	0.001
Real GDP of the j^{th} trading partner(Billions US$) ($lnOthergdp_{jt}$)	0.643	0.163	3.93	0.000
Uganda's population in year t (Millions) ($lnUgpop_{it}$)	-0.603	0.323	-1.87	0.062
Population of j^{th} trading partner in year t (Millions) ($lnOtherpop_{jt}$)	-0.443	0.166	-2.71	0.007
Distance between Kampala and her j^{th} trading partner's commercial centre (Miles) ($lnDist_{ij}$)	-1.439	0.193	-7.47	0.000
Real exchange rate volatility ($lnVol_{it)}$)	-0.071	0.025	-2.87	0.004
Real exchange rate misalignment ($Misalign_{it}$)	-0.003	0.001	-2.39	0.017
Dummy for membership to COMESA (*DCOMESA*)	0.834	0.330	2.52	0.012
Dummy for membership to East African Community (*DEAC*)	0.002	0.309	0.01	0.995
Dummy for colonial ties to Britain (*DUK*)	1.508	0.137	11.04	0.000
No. of observations	259			
Wald Chi^2	659.63			
Log likelihood	-262.25			
McFadden's Adjusted R^2	0.442			

The coefficient on Uganda's real GDP has a positive value (0.736) with a very high statistical significance at all levels. This result is consistent with the basic hypothesis of

the gravity flow model that trade volumes increase with an increase in a country's economic size. The coefficient shows that holding other variables constant, a unit increase in Uganda's GDP will result in 0.74 percentage increase in Uganda's bilateral trade flows. Results suggest that if Uganda's economy is to develop through bilateral trade, more investment in a number of sectors like tourism, and infrastructure development, still remains desired to cause fast growth in the country's GDP.

As hypothesised, the coefficient on the trading partner's real GDP shows a highly significant positive value of 0.643 which suggests that a unit increase in trading partner's real GDP leads to a 0.64 percentage increase in Uganda's bilateral trade flows. This may be attributed to the fact that Uganda is still one of those countries known for organically produced foodstuffs. So, as the trading partners' real GDPs increase, more imports in form of agricultural foodstuffs and raw materials are obtained from Uganda. The empirical results imply that Uganda's bilateral trade flows approximately increase proportionally with an increase in real GDP. These empirical findings closely concur with Chan-Hyun (2005), Kalbasi (2004), Sokchea (2006), Inmaculada and Felicitas (1998) and Giorgio (2004) who found out that increase in GDP of trading partner positively influences trade flows in a domestic country.

Empirical results of this study show that the growth of Uganda's population has a negative effect on the bilateral trade flow. Population growth by one million people would lead to a 0.60 percentage fall in trade flows with her major trade partners. This reduction in the trade flows can be explained by the fact that the population of Uganda is still in a dynamic stage of growth, that is, she is an emerging or developing country with a continuously changing population. This means that the population is not yet stable as

compared to that of developed countries. Therefore, although population growth can be associated with provision of cheaper labour force to the economy for the production of goods and services that could be traded, the nation may not be in position to cater for the large population size.

Uganda's failure to cater for the large population size in the long-run leads to a minimum efficient scale of production and less motivation in international trade as compared to a developed country with a small population size that is well facilitated. In this context, inefficiency and lack of motivation may be due to the fact that the large population size may have abundant human resource and capital that may only be adequate to produce enough products to sustain the economy without necessarily indulging in international trade. Implicitly, results suggest that for Uganda to boost her bilateral trade flows, birth rates should be controlled so that the country can have a small but well motivated population that can enhance her bilateral trade. Motivation may be in form of provision of good public infrastructure, education and credit schemes among others. These empirical findings were however found not to be statistically significant, thus implying that an increase in Uganda's population may necessarily not deter growth in Uganda's bilateral trade flows. Study findings concur with results of Bergstrand (1989), who noted that a negative influence a country's population on bilateral trade flows might be due to the labor (capital) intensive nature of goods and services, thereby discouraging citizens from investing in trade.

Results on the influence of the population of Uganda's trade partners reveal that an increase in the partners' population by one unit leads to 0.44 percent decline in the trend of flow of goods and services with other countries. This finding is significant at all levels

and it is in line with the theoretical expectation. Ideally, one would argue that population growth in an importing country creates more market for the exporting country but in the case of Uganda, it is the contrary. The negative relationship between trade flow and trade partners' population can be attributed to a condition referred to as exporter substitution effect. That is, as the population of trade partner countries grows bigger, people work harder to provide for their own domestic market demands.

Inevitably, people's hard work to provide for their domestic market requirements compromises with the quantities goods and services that such a trading partner would have other wise imported from other trading partners. If in any case, Uganda's trading partner were also a developing country like Kenya, then the decrease in bilateral trade flows with such a partner would be attributed to the increased population, which makes the then available resources scarcer such that people can no longer afford to trade with Uganda. This would obviously lead to a fall in the overall trade volumes. No literature has been come across trying to argue it this way; therefore, more research may be required to qualify this argument. These empirical findings identify with findings of Giorgio (2004) among other scholars that the bigger the population of the trading partner, the larger the production for the domestic market.

Distance has a negative influence on Uganda's total bilateral trade flows. A unit increase in distance between any two economic centres was found to lead to a 1.37 decrease in total bilateral trade flows. The negative relationship between trade and distance may be attributed to the trade barriers, which arise as the trading partners become more dispersed thus limiting bilateral trade. Such barriers to trade include high transport costs and Uganda being a landlocked country. For Uganda's case, this can be attributed to one or

two pertinent issues. Firstly, Uganda is a landlocked country only limited to Mombasa port through which she can reach the rest of the world. Although there are other ports (like Dar es Salaam in Tanzania and Boma in the Democratic Republic of Congo) through which trade could be conducted, Uganda has over the years relied on trading through Mombasa in Kenya. So this big disincentive to Uganda's economy as this aggravates the problem of landlocked ness if we cannot maximally utilize trade through the different port outlets.

Given the other means of transport (Air and Railway), one would probably argue that distance should not affect our trade but in the actual sense, air and railway means of transport are either too costly to sustain profitable trade flows, particularly air transport or defunct. Having only one small international airport (Entebbe International airport) through which cargo planes could ease the difficulty encountered while undertaking cross boarder distant trade is another factor that magnifies and qualifies distance to be a negatively significant factor in Uganda's trade flows. Given the small size of the only international airport, fewer flights are registered per day and mostly passengers' instead of cargo flights. The cheap railway network through which much of the bulky tradable goods could be transported is not solely reliable given that it does not reach many areas in the country, particularly, agriculture production areas. However, it should be noted that the estimated coefficients turned out to be similar to those estimated in other previous studies of Wall, (1999); Buch *et al.*, (2003) and Fankel, (1997) among others even when those studies used cross sectional data unlike this particular study.

As hypothesised, real exchange rate volatility has negative influence on Uganda's bilateral trade flows. Findings reveal that a unit change in real exchange rate uncertainty

leads to a 71 percent drop in bilateral trade flows between Uganda and her trade partners. Empirical results may be attributed to the fact that Uganda's trade, especially exports are dominated by agricultural commodities, which Kandilov (2008) notes to be very sensitive to exchange rate volatility. Notably, over the years, agricultural contribution to total exports has been high, varying between 70.4 and 48 percent since 2001. For example, during 2002, traditional exports (Coffee, Tea and Tobacco) alone accounted for 39.1 percent of total exports with coffee contributing about 21 percent to total exports.

During 2006 and 2007, the share of traditional exports stagnated at 29.9 percent compared to 37.3 percent recorded in 2003. Among the non traditional exports, fish has the highest contribution to total exports, estimated at 18 percent by 2005 (UBOS, 2006; 2008). Kandilov (2008) puts it that exchange rate volatility has a small negative effect on non-agricultural trade flows yet its impact on agricultural trade flows is about ten times relative to trade in other commodities. Study findings relate with results obtained by Kandilov (2008); Cho *et al*., (2002); Frankel and Wei, (1993); and Eichengreen and Irwin (1995), among others who note that exchange rate volatility negatively influences trade flows.

Real exchange rate misalignment measure was statistically significant at 5 percent level. The estimated coefficient (- 0.00339) implies that a one-percent over – (under-) valuation of Ugandan currency compared to the long-run equilibrium level reduces (increases) bilateral trade flows by about 0.003 percent. However, given the fact that Uganda's trade is agricultural based, interpretation of result is based on the negative impact of misalignment on trade flows. This follows Gue *et al.*, (2003) who notes that exchange rate misalignment negatively affects agricultural trade compared to other sectors. Study

findings are attributable to the natural barriers to trade Uganda encounters, particularly due to landlocked ness of the country. When there is over valuation of Uganda's currency, high costs are incurred during exportation of the agricultural produce, which are bulky and highly perishable. This reduces Uganda's competitiveness on the international markets, hence discouraging those involved in agricultural produce export trade. Study findings concur with results of Gue *et al.,* (2003) who noted that a unit change in exchange rate misalignment would cause a 1.1 percent reduction or increase in agricultural exports depending on whether a currency was either over- or under- valued.

The significantly positive coefficient (0.83) on the dummy variable (*DCOMESA*) suggest that membership of Uganda's trade partners into COMESA have deep influence on the mutual trade between member countries. This result may be due to the many countries comprising the COMESA, which provide a trade opportunity with Uganda. These COMESA member states provide ready import and export market for Uganda, hence boosting her trade. Therefore, if Uganda's trade partners belong to COMESA, Uganda's bilateral trade flows with those countries would be about three times as great as trade partners with a non-COMESA country. This can be evidenced by the case of Kenya and South Africa who are members to COMESA with Uganda. Between 2005 and 2006, Uganda's imports from Kenya were worth more than three times as great as those from the European Union while for South Africa, imports were more than double those from the European Union (UBOS, 2007).

This result is very similar to the results obtained by Frankel (1997) and Chan – Hyun (2005). Such findings imply that membership to regional trade blocs is a very important factor in boosting bilateral trade flows through favourable trade agreements among the

partnering economies. However, although the *DCOMESA* variable shows significant empirical evidence in explaining Uganda's bilateral trade flows, its inclusion in the gravity model calls for caution in interpretation. *DCOMESA* being a dummy variable, it reflects the increasing market integration or deepening of the trade network in the COMESA region. The significant and positive coefficient means that there exists a larger intra- COMESA bilateral trade flow, arising primarily from private business activities in the extended intra-regional production and from distribution networks, which would be independent from governments' efforts in institutionalising the integration. Thus, membership to COMESA acts as a market mechanism enhancing trade integration in the COMESA region. This assertion could be backed-up by the fact that in 2006, COMESA's market trade was estimated at about 30 percent much more than market regions like the European Union and the EAC (UBOS, 2007). Details are presented in Table 4.4.

Table 4.4: Comparison of Uganda's imports from study trade partners as per region between 2002 and 2006

Region	Country	2002	2003	2004	2005	2006
COMESA / EAC	Kenya	312,870	357,327	399,198	520,686	400,965
COMESA	South Africa	83,665	98,984	140,899	143,676	156,272
EU	Belgium	16,587	23,087	35,321	31,073	35,812
EU	France	11,693	15,596	35,525	35,317	37,155
EU	Netherlands	18,842	25,015	37,165	43,875	51,672
EU	United Kingdom	67,738	86,411	84,422	99,405	124,021
EU	Switzerland	8,922	7,056	6,711	7,555	29,272

Source: UBOS (2007)

The coefficient (0.002) on the *DEAC* dummy variable shows that membership of Uganda's trade partners to the East African Community (EAC) has a positive influence on Uganda's bilateral trade flows although the result is insignificant. The relatively small effect of membership to the EAC may be attributed to the fact that of all the study trade partners, only one country (Kenya) belongs to this regional bloc. Kenya alone, couple with the fact that this regional bloc has not long been institutionalized as an FTA would not soundly influence the over all results. Results suggest that bilateral trade flows would only be about 0.01 times as great as bilateral trade flows with non-EAC trade partners. The empirical results of this study concur with findings of previous studies by Scollay and Gilbert (2001), Inmaculada and Felicitas (1998) and Chen *et al.*, (2007) who argue that membership to regional trade blocs has a significant positive influence on a country's bilateral trade flows.

The significant coefficient (1.51) on the dummy variable (*DUK*) for the same colonial masters suggests that Uganda has stronger trade ties with trade partners that were once Britain's colonies. The strong bilateral trade ties may be associated with closely related religious, cultural norms and probably trade agreements that could have been established by the colonial masters. Uganda's trade with countries that were once British colonies would be about 11 times as great as trade with partners that were not. This result is evidenced by the fact that Uganda trades much more with Kenya (Table 4.4), once a British protectorate than any other of the study countries, which were colonies of say the Dutch in the case of South Africa.

Generally, while concluding the discussion of dummy variable results, it is worth emphasizing that the bigger coefficient (0.834) on the dummy variable (*DCOMESA*) in comparison with the *DEAC* dummy variable coefficient (0.002) suggests that more economic integration effects would accrue to Uganda's bilateral trade flows if her trade partners become members to COMESA unlike if they ascribe to joining the East African Community. The magnitude of the dummy (*DCOMESA*) coefficient indeed speculates reality given that COMESA has more countries than the EAC. This provides a bigger trade network for Uganda, hence generating more economic integration effects.

Overall, the best fit of the model (Adjusted R^2) was estimated to be 0.442, thereby implying that the estimated variable in model explain 44.2 percent of Uganda's bilateral trade. The Adjusted McFadden's R^2 was computed as expressed in appendix J.

4.3 Prediction of Uganda's Potential bilateral flows and analysis of Bilateral Trade performance

Results in table 4.5 indicate that Uganda's mean trade potential was worth over 68,000 billion US Dollars compared to over 75, 000 billion US Dollar worth of mean actual trade during the entire study period. The maximum predicted trade potential was more than 520,000 billion US Dollars while 13,624 billion US Dollars was the least predicted trade potential. Given the despotic regimes and civil wars between 1970 and the 1980s, this general successful partnership can be attributed to recent years (1990 – 2006) when there has been economic and political reform. For instance, between 2000 and 2004, Uganda registered over 160 percent increase in the number of tourist arrivals for both business and vacation purposes UBOS (2005); Muhammed and Andrews (2008) partly attributed to the prevailing political stability and the unique natural resources in the country. Generally, across the study period, findings imply that Uganda established successful bilateral partnerships with all the trading countries.

Table 4.5: Uganda's mean Actual (A_{ijt}) and Potential (T_{ijt}) trade for the entire period under study (1970 – 2006).

	Mean (US$ Billion)	Standard error	Minimum	Maximum
Potential trade (T_{ijt})	68,210.76	83,934.39	13,624.37	528,002.4
Actual trade (A_{ijt})	75,775.58	92,990.57	89.0	593,124.1
Percentage difference	11.09	10.79	-99.35	12.33

Source: Author's calculations

However, when country specific trade potentials were simulated , results in table 4.6 reveal that Kenya had the highest potential trade worth US$ 199,345 billion followed by UK (US$ 128,855 billion), France (39,129), Switzerland (US$ 33,797 billion), South Africa (US$ 27,749 billion) and Netherlands (US$ 25,244billion). Uganda's high trade potential with Kenya may be attributed to the fact that Kenya is a member to both COMESA and EAC to which Uganda is also a member. Secondly, Kenya shares a common boarder with Uganda and both countries were British colonies. This implies that there have been strong trading ties between these two countries. The high potential trade flow may as well be due to the fact that Kenya is Uganda's main export and import route through Mombasa port. So, in any case of a trade opportunity, Kenya is in a better position to trade with Uganda than any other partner. However, Belgium had the least trade potential of about 23,357 billion US Dollars. Belgium's small potential trade can be associated with the large distance between Brussels (the economic centre) and Kampala given that it is the third furthest economic centre. Results mean that keeping all factors

constant, Kenya, UK and France can provide a big trade base for Uganda while Belgium has the least to offer.

Table 4.6: Uganda's trade potential with country specific trade partners (US$ billion)

Trade partner	Kenya	UK	Switzer-land	Nether-lands	Belgium	South Africa	France
Potential trade (T_{ijt})	199,345	128,855	33,797	25,244	23,357	27,749	39,129
Actual trade (A_{ijt})	210,735	127,709	43,604	46,277	28,440	35,230	38,434

Source: Author's calculations

According to table 4.7, the Rd_{ijt} index of 5.25 percent (0.0525) obtained between Uganda and her trade partners indicates that Uganda has a low but good trade performance with her trade partners over the entire 37 years' study period. The low level of good trade performance may be attributed to weak trade ties with her trade partners in terms of previous economic scale and development. To a large extent, low performance can be associated with existence of serious trade barriers between the trading partners. Such barriers may include; Uganda being a landlocked country. Land locked-ness very much limits trade flows with distant partners in that it leads to high transport costs, which is one of the key determinants to successful trade. Although there are other means of transport (Air and Railway), these can not sustain Uganda's trade flows. For instance, use of air transport is indeed very costly to sustain trade given that much of Uganda's exports are unprocessed raw materials which are bulky for this type of transport. The alternative would then be the railway means of transport but lately, the railway network system is not operational thereby greatly aggravating the land locked-ness issue.

Table 4.7: Uganda's trade performance by *Relative difference* index

Period	Mean actual trade (US$ Billion)	Mean Potential trade (US$ Billion)	Trade performance (Rd_{ijt}) (%)
1970 – 2006	75,775.58	68,210.76	5.25
1990 – 2006	109,392.3	95,688.81	6.68
1995 – 2006	131,286.3	111,842.70	8.00
2000 – 2006	136,249.9	125,824.40	3.98

Source: Author's calculations

Another barrier to Uganda's trade may be associated with the many civil wars that destabilized the economy during the 1970s until mid 1980s. Civil wars could have probably discouraged the many potential trade partners to commit themselves to transact with Uganda. Also, Uganda's failure to acquire membership to international trading blocs could be a big setback to her trade performance. Given the above mentioned barriers to Uganda's bilateral trade, one could argue that the very low *Relative difference* (Rd_{ijt}) of 5.25 percent is due to the large period which the study considers. However, during this period many policy changes like liberalization of the economy during the early 1990's as well as establishment of the EAC and COMESA have occurred.

Theoretically, such policy changes are bound to have a positive impact on Uganda's trade performance. Analytical results (Table 4.7) reveal that Uganda's trade performance increased from 6.68 percent between 1990 – 2006 to 8.00 percent (between 1995 and 2006) and there after drastically fell to approximately four percent between 2000 and 2006. The improvement in trade performance between 1990 and 2006 may be attributable to the liberalization of the economy, economic stability and the stable political environment which probably encouraged many investors to build confidence in

the Ugandan economy. However, the decline in trade performance between 2000 and 2006 can be attributed to lack of adequate promotion of export trade, despite the fact that bodies like the Uganda Export Promotion Board (UEPB) are trying to promote trade. Also, much of Uganda's trade has been focusing on only the major cash crops, that is to say, coffee, cotton and Tobacco not knowing that there is need to diversify into other goods and services with high market demand. For instance, UBOS (2007) puts it that since 2005, there is a tremendous international market demand for the non traditional cash crops like flowers, fruits and vegetables among others that Uganda could exploit but not many firms have involved themselves in this business.

The fall in trade performance can also be attributed to the now and then changing international market standards especially of agricultural produce where Uganda trades most. New export standards are being made stricter so often and this limits the country's export trade flows especially to the international markets like the European Union among others. For example, unlike the olden years, agricultural produce for export used not to be subjected to so much scrutiny like it is the case now days. To date, for agricultural produce to have good international market, it must meet Global GAP standards and EUREPGAP standards in case one is targeting the European market. So, given that much of Uganda's agriculture is still at peasantry level, coupled with little or no value addition to the produce, this has compromised on the Uganda's involvement in agricultural trade in international markets and so the poor trade performance. Similar results were obtained by Chen *et al.* (2007) who analysed Xinjiang's bilateral trade performance with her trade partners and noted that Xinjiang had excellent trade cooperation notably with Kazakhstan, Pakistan, Germany, Russia, Ukraine and France.

Findings of the *Absolute difference* index (Ad_{ijt}) often referred to as unexhausted trade potential reveal that quantitative deviations exist between Actual and Potential trade. Approximately, over US$ 7,500 billion worth of mean unexhausted trade potential existed between Uganda and her trade partners for the entire 37 year study period. This volume of unexhausted trade may be associated with both natural and artificial barriers to trade like land locked-ness, political instabilities during the 1970s, and new standards on the international market, among others. This result is in line with findings obtained when Rd_{ijt} index (5.25 percent) was used except that this particular index (Ad_{ijt}) gives that actual quantity by which actual trade exceeds the potential trade. Results therefore imply that Uganda's actual bilateral trade flow exceeded the anticipated trade potential by about 7,500 billion US dollars. This suggests that Uganda has successful partnership with her major trade partners. Uganda indeed traded by far more than what she ought to have done given that the large mean unexhausted trade potential bears a positive sign. The Ad_{ijt} index was used to cross check or validate results obtained by the former index.

However, when country specific unexhausted trade potentials were analysed, results in table 4.8 show that Uganda had been gaining from her bilateral trade flows with most of the trade partners most especially Netherlands from whom US$ 21,033 billion was realized followed by Kenya, Switzerland and South Africa.

Table 4.8: Trade performance by *Absolute difference* (Ad_{ijt}) index by country

Trade partner	Unexhausted trade Potential (US$ Billion)
Kenya	11,390.5
Switzerland	9,806.8
Netherlands	21,033.3
Belgium	5,083.1
United Kingdom	-1,145.6
South Africa	7,480.9
France	-695.4
Overall Unexhausted trade potential	7,564.8

Source: Author's calculations

The good trade performance may probably be attributed to the existence of good trade terms with such countries. To be particular, although Netherlands and Switzerland are distant from Uganda, this success story may be attributed to the fact that Uganda has concentrated on exporting less bulky but highly valuable goods such as organically grown fruits and vegetables among others to these countries. For example, UBOS (2007) notes that for the past 2 – 3 years, Netherlands and Switzerland have been some of Uganda's major destinations of horticultural produce (Flowers, Fruits and vegetables) and fresh fish. These commodities have earned Uganda a fortune of foreign exchange. From the horticulture sector, Roses and cut flowers among other products contributed about five percent of the total exports in 2003 (UBOS, 2007). So, with such successful trading partners, it means that bilateral trade has reached its potential level. At this level, little or no social cost should be expected from future partnerships unless when there is more product diversification e.g. exportation of dried fruits and vegetables instead of fresh produce.

On the contrary, UK and France registered large untapped trade potentials worth about US$ 1,200 and 700 billions respectively. Uganda's poor trade performance with UK and France may be attributed a number of factors. Firstly, there exists large distance between Kampala and the two economic centres, that is Paris (France) and London (UK). Secondly, the high non tariff barriers to trade like EUREPGAP certification, Global GAP certification and Food miles, among others put in place by such developed economies limit Uganda's trade to flourish on the international markets especially with agricultural produce. In the long-run, these none tariff trade barriers limit success of the partnership, thence causing the poor trade performance. Thirdly, it is also possibly true that there has not been much promotion of bilateral trade flows between Uganda and these countries (UK and France). Results signify that there is no successful partnership between Uganda and these two countries. This is because Uganda's actual bilateral trade flows are less than the predicted trade potential flows. Results obtained with *Absolute difference index* (Ad_{ijt}) are consistent with the earlier results obtained with the *relative difference index* (Rd_{ijt}). The Ad_{ijt} negative value means that Uganda actually traded less than her anticipated potential trade flow.

4.4 Uganda's Degree of Trade integration with her trade partners

Determination of Uganda's degree of trade integration was based on the actual trade (A_{ijt}) and potential trade (T_{ijt}) for the entire 37 years on which this research focuses. Therefore, by taking the ratio of mean actual trade to mean potential trade, Uganda's mean degree of trade integration was found to be 111.09 percent. This is a relatively high ratio, implying that Uganda can easily be integrated in trade. This high degree of trade integration can be associated with the fact that Uganda has many goods and services she

trades. Such goods and services include tourism attraction sites, minerals like copper and human resource, among others. Integration can as well be due to Uganda's inability to process and / or manufacture a number of basic goods require by her citizens. So, in a way to acquire these goods, she has to rely on her trading partners from whom to import the goods. Petroleum and its products and automobiles are of late Uganda's major imports (UBOS, 2007).

However, considering trade integration at country level, results in table 4.9 show that all Uganda's trading partners have high ratios although France and the United Kingdom have relatively lower ratios; that is, 98.22 and 99.11 percent respectively. The lower ratios can be as a result of existence of trade barriers which limit Uganda being fully integrated into trade with these particular countries. Such barriers include distance and non tariff trade barriers like GLOBALPGAP certification, among others.

Table 4.9: Uganda's degree of trade integration by country

Trade partner	**Degree of integration (A_{ijt}/T_{ijt})*100**
Kenya	105.71
Switzerland	129.02
Netherlands	183.32
Belgium	121.76
United Kingdom	99.11
South Africa	126.96
France	98.22
Overall degree of trade integration	111.09

Source: Author's calculations

Uganda's low degree of trade integration into trade with UK and France can also be attributable to the political insecurity Uganda faced during the 1970s until mid 1980s. This probably discouraged these trade partners from build confidence and trust in transacting with Uganda. Results strongly agree with earlier findings while using Rd_{ijt} and Ad_{ijt} trade performance indices because it is these very trade partners (UK and France) which were identified as Uganda having had unsuccessful trade partnerships with.

Findings further indicate that Netherlands (183.32), Switzerland (129.02), South Africa (126.96) and Belgium (121.76) have very high ratios, implying that Uganda has a high degree of trade integration with these trade partners. The high degree of trade integration can be attributed to the good cooperation between the trade partners. For instance, Uganda's high degree of trade integration with South Africa can be due to fact that both countries are members to COMESA, therefore compelling both parties to be in good trading terms following the signed Memorandum of understanding agreed upon at the inception of COMESA as a trade bloc. However, for the other countries (Netherlands, Switzerland and Belgium), the high degree of integration may be attributed to Uganda's being one of the few countries that can supply organically grown foodstuff and this renders her as an inevitable stakeholder in trade especially for the supply of horticultural products.

Results obtained by measuring Uganda's degree of trade integration based on the dummy variables (Table 4.10) indicate that having had similar colonial masters (DUK) has the highest trade integration effect (351.99) on Uganda's bilateral trade flows. The high integration effect can be attributed to the trade agreements that the colonial masters put

in place so as to foster trade collaboration among her territories. For instance, on behalf of Uganda, Britain had to ensure that Kenya (also once a British colony) granted Uganda access to the Western world through Mombasa Port which to date is the mostly used port for trade. Findings mean that Uganda's bilateral trade flow between partners once colonised by Britain is 352 percent as great as that with partners that were not British colonies. This is probably one of the reasons why Kenya is one of Uganda's leading trade partners.

Table 4.10: Uganda's degree of trade integration based on COMESA and EAC on dummy variables

Dummy Variable	FGLS Coefficient	Standard error	[(exp(dummy coefficient)-1)] * 100
DCOMESA	0.8339**	0.3304	130.23
DEAC	0.0019	0.3086	0.19
DUK	1.5085***	0.1367	351.99

**** and ** Denotes significant at 1% and 5 % level respectively*

Source: Author's calculations

Membership to COMESA (*DCOMESA*) also registered integration effects on Uganda's bilateral trade flows more than membership to the EAC (*DEAC*). Uganda's bilateral trade flows between COMESA member countries is 130.23percent more than bilateral trade flows between otherwise COMESA member countries. This effectiveness of membership to COMESA in boosting Uganda's bilateral trade can be as a result of the many countries in this trading bloc than they are in the East African Community. Results indicate that membership to EAC (*DEAC*) does not significantly influence Uganda's bilateral trade flow. Membership to EAC has the least degree of trade integration of 0.19

as compared to common colonial master and COMESA membership dummy results. The least degree of trade integration can be attributed to the fact that East Africa regional bloc has not been in existence as an FTA for long to count so much on Uganda's trade flows. Also, this region does not have many countries and of the few there are, much of the trade is with Kenya. CPD (2006) and Sandra (2006) obtained comparable results.

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The study aimed at determining factors affecting Uganda's total bilateral trade flows and her trade Potential. Specifically, the study predicted Uganda's bilateral trade flows and performance. The study also determined Uganda's degree of trade integration with her major trade partners. Descriptive statistics including means and standard deviations were computed using STATA software. The descriptive statistics were used to examine the socio-economic characteristics of Uganda and her various trade partners. Results showed that Uganda's average total bilateral trade was US$ 76 million while her average real GDP was valued at 4.52 billion US Dollars. The average real GDP of the trading partners was US$ 426.15 billion; mean population was at 17.5 and 29.1 million people for Uganda and her trading partners respectively. Average distance between Kampala and any other capital city of the trading partners was 3,052 mile.

It was hypothesized that there are various factors that determine total bilateral flows between Uganda and her major trade partners. An *Augmented-gravity flow model* was estimated using the Feasible Generalised Least Squares (FGLS) estimator to determine those factors that affect total bilateral flows. Estimates of this function showed that real GDPs, membership to COMESA, common colonial masters and membership to the East African Community (EAC) positively influenced Uganda's bilateral trade flows. Population of both Uganda and her trading partners, distance, real exchange rate volatility, and real exchange rate misalignment however indicated that they negatively influence bilateral trade flows. Overall, the hypotheses that Uganda's real GDP and real

GDP of her trading partners positively influence bilateral trade flows; and that the longer the distance from Kampala city to the capital city of a major trade partner would lower the level of bilateral trade flow were not rejected. Similarly, real exchange rate volatility and real exchange rate misalignment were found to negatively influence Uganda's bilateral trade flows as hypothesised.

In predicting Uganda's bilateral trade potential, an *out of sample* approach was employed and the simulated trade flows were used to analyse trade performance using two indices, that is, *Relative difference* (Rd_{ijt}) and *Absolute difference* (Ad_{ijt}). Uganda's mean potential trade was estimated at US$ 68,211billion with Kenya as the major trade partner followed by the United Kingdom. However, Belgium and Netherlands registered the lowest trade potentials estimated at US$ 23,357 and US$ 25,244 respectively. Trade performance results from the Rd_{ijt} index revealed that Uganda had good trade performance estimated at 5.25 percent over the entire study period (1970 – 2006). Analytical results of post economic liberalization revealed that trade performance improved gradually from 6.68 percent between 1990 and 2006 to 8.00 percent between1995 to 2006 and then drastically dropped to about 4.0 percent (3.98 %) between 2000 and 2006. Results from the *Absolute difference* (Ad_{ijt}) index showed that Uganda benefited from her bilateral trade by about US$ 7,972 billion, implying good trade performance.

In addition, a ratio of actual to potential bilateral trade flow was estimated to generate Uganda's degree of trade integration. Results revealed that Uganda had a high degree of trade integration (111.09 percent) with all her trading partners. However, at country level, Uganda cannot easily integrate with UK and France given the lower ratios of 0.99 and 0.98 respectively. Analysis of Uganda's degree of trade integration

measured basing on dummy variables showed that Uganda had a higher degree of trade integration with trade partners belonging to COMESA unlike with non-COMESA trade partners. Uganda's trade with COMESA countries was 130% as much as that with non-COMESA partners. A low degree of trade integration (0.19 %) was observed among EAC partners unlike among non-EAC partners.

5.2 Conclusions

Several conclusions can be drawn from this study. Uganda's real GDP, real GDP of her trade partners, trade partners' real GDP, distance between Uganda (Kampala) and the capital city of her trading partner, trading partners' population, real exchange rate volatility, real exchange rate misalignment, membership to COMESA and colonial ties have been found to be significant determinants of Uganda's bilateral trade flows. Therefore, any efforts to improve Uganda's bilateral trade flows should focus on activities like proper real exchange rate management. Uganda's GDP, colonial ties to Britain and membership to COMESA have the most influential effect on her bilateral trade flows.

Uganda has low but good trade performance. Thus, there are some barriers to trade that are still hindering the growth of bilateral trade flows in Uganda. Uganda had successful trade partnerships with Belgium, Netherlands, Kenya, Switzerland and South Africa. More fostering in trade cooperation between France and UK is still desirable to improve Uganda's trade integration with these economies. All in all, Uganda can easily be trade integrated with all her trade partners although not so easily with France and UK. Netherlands, Switzerland, South Africa and Kenya have good cooperation with Uganda in terms of trade.

5.3 Recommendations

It is recommended that policy makers should consider strengthening the EAC trade agreements and those with COMESA member countries as shown by the determinants of Uganda's bilateral trade flows. This will greatly reduce on the many non-tariff trade barriers that Uganda encounters in her bilateral trade and broaden her trading network.

Policies to minimize real exchange volatility and misalignment should be strengthened to improve trade flows.

To improve Uganda's trade performance with France and the UK, it is desirable for Ministry of Tourism and Trade together with government bodies like the Uganda Export Promotion Board (UEPB) to promote trade partnerships with such countries at government level rather than at private level. The government should also advocate and lobby for revisiting some the international market standards like GLOBALGAP certification requirements which have made Uganda retard in trade. However, given that it may not be feasible for a small economy like Uganda to influence the changing of such internationally set standards, the private and public sectors may team up and establish national GAP standards. This will then act as a benchmark to attain the international standards in the long-run.

Alternatively, Uganda should also think of diversification of her products so as to expand her bilateral trade flows. Diversification may for example be taken in form of value addition to agro-produce since this is one of Uganda's major exports. Value addition increases the shelf life of produce and reduces bulkiness of produce. Uganda should also put in place strategies and policies that can reduce the many trade barriers. For example, government should invest generously in public infrastructure like roads to link Uganda to major ports in Africa. The Ugandan government should subsidise freight costs in the interest of exporters since this is the surest and fastest means to deliver perishable agriculture produce to international markets.

5.3 Areas for further research

While this study attempted to ascertain determinants of Uganda's bilateral trade flows with her major trade partners since 1970 up to 2006, data employed was not disaggregated at sector level. Data was generally aggregated as exports and imports to and from trading partners. However, total bilateral trade can be decomposed on sector basis, that is, total agricultural imports and exports, total manufactured imports and exports or total livestock product imports and exports. Therefore, further research using disaggregated data at sector level is necessary to distinguish and identify the specific determinants of bilateral trade at sector level.

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Appendix A: FGLS estimation output

```
. xtgls lnbtrade lnug_gdp lnoth_gd lnug_pop lnoth_po lndist lnvol misalign dcomesa
      deac duk, panels (hetero)

Cross-sectional time-series FGLS regression

Coefficients:  generalized least squares
Panels:        heteroskedastic
Correlation:   no autocorrelation

Estimated covariances      =         7      Number of obs      =       259
Estimated autocorrelations =         0      Number of groups   =         7
Estimated coefficients     =        11      Time periods       =        37
                                            Wald chi2(10)      =    659.63
Log likelihood             =  -262.2464     Prob > chi2        =    0.0000

------------------------------------------------------------------------------
    lnbtrade |      Coef.   Std. Err.      z    P>|z|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
    lnug_gdp |   0.7357034   0.2283482     3.22   0.001     .2881491    1.183258
    lnoth_gd |   0.6426558   0.1633435     3.93   0.000     .3225083    .9628033
    lnug_pop |  - 0.6034084   0.3231401    -1.87   0.062    -1.236751    .0299345
    lnoth_po |  - 0.4431255   0.1633296    -2.71   0.007    -.7632457   -.1230053
      lndist |  - 1.439406    0.1926796    -7.47   0.000    -1.817051   -1.061761
       lnvol |  - 0.0709397   0.0246821    -2.87   0.004    -.1193157   -.0225636
    misalign |  - 0.0033926   0.001419     -2.39   0.017    -.0061737   -.0006114
    dcomesa  |   0.8339322   0.3303846     2.52   0.012     .1863903    1.481474
        deac |   0.001913    0.3086394     0.01   0.995    -.6030092    .6068351
         duk |   1.508453    0.1366942    11.04   0.000     1.240537    1.776368
       _cons |  20.91197     1.499226     13.95   0.000     17.97355    23.8504
------------------------------------------------------------------------------
```

Appendix B: Distance between Kampala and the economic centres of the trading partners

Country	*Economic Centre*	*Distance (Miles)*
Switzerland	Bern	3555.51
Netherland	Amsterdam	3931.82
Belgium	Brussels	3859.31
United Kingdom	London	4012.36
Kenya	Nairobi	313.57
South Africa	Pretoria	2163.06
France	Paris	3528.59

Source: www.macrow.info/distance & www.worldatlas.com

Appendix C: Descriptive statistic of Uganda's potential trade (T_{ij}) and Actual trade (A_{ij}) between 1970 and 2006

. sum btrade potrade

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	259	75775.58	92990.57	89	593124.1
potrade	259	68210.76	83934.39	13624.37	528002.4

Appendix D: Summary statistics of Uganda's unexhausted trade (1970-2006)

. sum unxehaustedpotrade

Variable	Obs	Mean	Std. Dev.	Min	Max
unxehauste~e	259	7564.82	42520.53	-86803.26	383430.4

Appendix E: Uganda's mean Actual trade (A_{ijt}), Potential trade (T_{ijt}), unexhausted trade potential and Degree of integration by country (1970 - 2006)

Trade Partner	Actual trade (A_{ij}) (US$ Billion)	Potential trade (T_{ij}) (US$ Billion)	Unexhausted trade potential (US$ Billion)	Degree of integration (A_{ijt}/T_{ijt})*100
Kenya	210,735.40	199,345	14,489.80	105.71
Switzerland	43,603.84	33,797	10,945.68	129.02
Netherlands	46,276.96	25,244	20,796.17	183.32
Belgium	28,440.25	23,357	26,084.71	121.76
United Kingdom	127,709.10	128,855	-859.70	99.11
South Africa	35,229.89	27,749	6,582.03	126.96
France	38,433.58	39,129	-1,036.18	98.22
Uganda's overall degree of trade integration	75,775.58	68,211	7,971.50	111.09

. sum btrade potrade(Switzerland)

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	37	43603.85	63009.23	3019	206714.6
potrade	37	33797.06	11259.65	20317.1	68621.37

. sum btrade potrade (Netherlands)

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	37	46276.96	27287.64	14049	129287.9
potrade	37	25243.62	9600.537	14470.14	51474.59

. sum btrade potrade (Belgium)

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	37	28440.25	15767.94	8984	75404.49
potrade	37	23357.11	8809.899	13624.37	46787

. sum btrade potrade (UK)

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	37	127709.1	52864.28	87743	285121.1
potrade	37	128854.7	50177.57	71605.79	259869.2

. sum btrade potrade (Kenya)

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	37	210735.4	149971.7	77374	593124.1
potrade	37	199344.9	133926	91150.48	528002.4

. sum btrade potrade (South Africa)

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	37	35229.88	51452.87	89	167123.9
potrade	37	27748.96	18427.16	13847.62	75942.73

. sum btrade potrade (France)

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	37	38433.58	14109.91	10963.75	75477.05
potrade	37	39128.97	14525.75	22608.76	78109.59

Appendix F: Uganda's trade performance (1970-2006; 1990 -2006; 1995 – 2006; 2000 – 2006)

A) Calculation of trade performance by *Relative difference* (Rd_{ijt}) index

i) For the period 1970 – 2006

. sum btrade potrade

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	259	75775.58	92990.57	89	593124.1
potrade	259	68210.76	83934.39	13624.37	528002.4

$$Rd_{ijt} = \frac{A_{ij} - T_{ij}}{A_{ij} + T_{ij}} * 100$$

$$= \frac{(75{,}775.58 - 68{,}210.76)}{(75{,}775.58 + 68{,}210.76)} * 100$$

= 5.25 %

ii) For the period 1990 – 2006

. sum btrade potrade if year >= 1990

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	119	109392.3	121039.9	4001	593124.1
potrade	119	94768.66	108313.8	20243.37	504551.3

$$Rd_{ijt} = \frac{A_{ijt} - T_{ijt}}{A_{ijt} + T_{ijt}} * 100$$

$$= \frac{(109{,}392.3 - 95{,}688.81)}{(109{,}392.3 + 95{,}688.81)} * 100$$

= 6.68%

iii) For the period 1995 – 2006

. sum btrade potrade if year >= 1995

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	84	131286.3	122833.6	16627.7	593124.1
potrade	84	111842.7	124174.6	26150.79	528002.4

$$Rd_{ijt} = \frac{A_{ijt} - T_{ijt}}{A_{ijt} + T_{ijt}} * 100$$

$$= \frac{(131{,}286.3 - 111{,}842.7)}{(131{,}286.3 + 111{,}842.7)} * 100$$

= 8.00 %

iv) For the period 2000 - 2006

. sum btrade potrade if year >= 2000

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	49	136249.9	133711.3	16627.7	593124.1
pottrade	49	125824.4	146639.3	30257.35	528002.4

$$Rd_{ijt} = \frac{A_{ijt} - T_{ijt}}{A_{ijt} + T_{ijt}} * 100$$

$$= \frac{(136{,}249.9 - 125{,}824.4)}{(136{,}249.9 + 125{,}824.4)} * 100$$

= 3.98%

B) Calculation of trade performance by *Absolute difference* (Ad_{ijt}) index (1970 – 2006)

. gen unxehaustedpotrade = btrade - potrade

. sum unxehaustedpotrade

Variable	Obs	Mean	Std. Dev.	Min	Max
unxehauste~e	259	7564.82	42520.53	-86803.26	383430.4

Appendix H: Country descriptive statistics by variable

i) Overall model descriptive statistics (1970 – 2006)

. sum btrade ug_gdp oth_gdp ug_pop oth_pop distance

Variable	Obs	Mean	Std. Dev.	Min	Max
btrade	259	75775.58	92990.57	89	593124.1
ug_gdp	259	4.520112	2.237383	2.440802	9.967544
oth_gdp	259	426.1492	442.6904	11.23	1673.651
ug_pop	259	17.50117	5.117687	10.13	28
oth_pop	259	29.13714	20.11389	6.19	61.33
distance	259	3052.031	1262.712	313.57	4012.36

ii) Total bilateral trade flows by country (1970 – 2006)

. sum ug_btrade Switzerland Netherlands Belgium UK Kenya South africa France (‘000 US Dollars)

Variable	Obs	Mean	Std. Dev.	Min	Max
ug_btrade	37	530429.1	294162	271298	1224834
switzerland	37	43603.86	63009.27	3019	206715
netherlands	37	46276.97	27287.69	14049	129288
belgium	37	28440.27	15767.92	8984	75404
uk	37	127709.1	52864.26	87743	285121
kenya	37	210735.5	149971.7	77374	593124
south_africa	37	35229.89	51452.89	89	167124
france	37	38433.62	14109.91	10964	75477

iii) GDP descriptive statistics by country (1970 – 2006)

.sum ug_gdp swit_gdp neth_gdp bel_gdp uk_gdp ke_gdp sa_gdp fra_gdp

(Billions US Dollars)

Variable	Obs	Mean	Std. Dev.	Min	Max
ug_gdp	37	4.520112	2.263862	2.440802	9.967544
swit_gdp	37	220.7999	38.06857	167.4857	275.02
neth_gdp	37	300.7973	77.86945	184.7666	429.2866
bel_gdp	37	194.1298	45.15174	119.2451	274.8976
uk_gdp	37	962.3035	243.0057	627.989	1429.29
ke_gdp	37	9.835425	3.484718	4.374603	16.02
sa_gdp	37	109.5408	24.80282	69.21922	164.2877
fra_gdp	37	1172.074	288.682	694.9222	1673.651

. exit, clear

iv) Population descriptive statistics by country (1970 – 2006)

. sum ug_pop swit_pop neth_pop bel_pop uk_pop ke_pop sa_pop fra_

pop (millions)

Variable	Obs	Mean	Std. Dev.	Min	Max
ug_pop	37	17.50117	5.178254	10.13	28
swit_pop	37	6.740541	.403629	6.19	7.45
neth_pop	37	14.83027	.992988	13.03	16.38
bel_pop	37	9.988378	.2153616	9.66	10.43
uk_pop	37	57.47649	1.514556	55.42	60.51
ke_pop	37	23.39892	8.216977	11.23	36.55
sa_pop	37	35.41838	8.318746	22.47	48.28
fra_pop	37	56.10703	3.004314	50.77	61.33

. exit, clear

Appendix I: Uganda's total bilateral trade with the respective trading partners ('000 US$) (1970 -2006)

Year	Switzer-land	Nether-lands	Belgium	UK	Kenya	South Africa	France	Total bilateral trade
1970	5,223	42,088	24,519	104,770	109,945	6,695	37,778	331,018
1971	5,076	40,312	23,107	104,760	111,557	6,274	38,292	329,378
1972	4,930	38,536	21,694	104,750	113,170	5,853	38,805	327,738
1973	4,783	36,760	20,282	104,740	114,782	5,432	39,319	326,098
1974	4,636	34,984	18,870	104,729	116,394	5,011	39,833	324,458
1975	4,489	33,208	17,458	104,719	118,006	4,590	40,346	322,818
1976	4,343	31,433	16,045	104,709	119,619	4,170	40,860	321,177
1977	4,196	29,657	14,633	104,699	121,231	3,749	41,373	319,537
1978	4,049	27,881	13,221	104,689	122,843	3,328	41,887	317,897
1979	3,902	26,105	11,809	104,678	124,456	2,907	42,401	316,257
1980	3,756	24,329	10,396	104,668	126,068	2,486	42,914	314,617
1981	3,609	22,553	8,984	104,658	127,680	2,065	43,428	312,977
1982	9,458	50,872	12,128	113,867	111,420	5,293	43,532	346,570
1983	4,037	48,076	21,802	89,113	114,667	89	42,666	320,450
1984	3,019	53,902	19,218	107,202	106,165	545	65,166	355,217
1985	4,212	62,284	26,377	127,273	90,503	180	35,889	346,718
1986	3,413	86,580	26,792	105,159	100,663	1,918	35,689	360,214
1987	7,209	66,902	28,824	117,818	94,127	11,615	33,457	359,952
1988	4,623	48,909	34,516	112,846	104,397	9,354	32,604	347,249
1989	3,388	34,981	34,232	96,066	96,361	8,041	34,779	307,848
1990	4,341	23,762	26,906	95,857	77,374	6,150	36,908	271,298
1991	5,489	14,049	24,954	103,339	95,105	5,328	41,454	289,718
1992	7,890	17,712	32,353	87,743	134,392	4,001	24,575	308,666
1993	7,209	16,563	21,665	101,073	176,428	32,462	20,961	376,361
1994	9,471	16,569	20,464	106,130	573,429	6,567	10,964	743,594
1995	190,153	42,243	56,057	249,380	238,211	28,034	41,964	846,042
1996	206,715	34,348	37,266	285,121	260,056	24,527	38,897	886,930
1997	202,799	17,075	36,850	221,714	292,170	35,157	51,810	857,575
1998	138,112	43,722	30,873	279,588	324,701	78,841	27,311	923,148
1999	132,161	34,940	22,903	236,573	313,640	75,082	22,813	838,112
2000	108,767	53,217	20,773	119,625	358,778	94,813	16,628	772,601
2001	77,297	67,643	31,821	101,057	340,550	96,926	28,507	743,801
2002	77,933	74,842	38,489	97,753	374,374	126,662	18,537	808,590
2003	80,049	73,970	35,986	120,294	435,759	128,616	20,712	895,386
2004	115,490	98,392	69,598	113,860	476,101	150,149	58,227	1,081,817
2005	82,412	129,288	65,021	126,236	593,124	153,472	75,281	1,224,834
2006	74,704	113,561	75,404	153,980	488,967	167,124	75,477	1,149,217

Source: UBOS, IMF, and United Nations Statistics Division Common Database

APPENDIX J: COMPUTATION OF McFEDDEN'S ADJUSTED R^2

. xtgls lnbtrade

Cross-sectional time-series FGLS regression

Coefficients: generalized least squares
Panels: heteroskedastic
Correlation: no autocorrelation

Estimated covariances	=	1	Number of obs	=	259
Estimated autocorrelations	=	0	Number of groups	=	7
Estimated coefficients	=	1	Time periods	=	37
			Wald chi2(0)	=	.
Log likelihood	=	-452.3	Prob > chi2	=	.

lnbtrade	Coef.	Std. Err.	z	P>z	[95% Conf.	Interval]
_cons	10.52203	0.862056	122.06	0.000	10.35307	10.69099

McFADDEN'S R^2 = (1-