An Empirical Analysis of The Gambia's Bilateral Trade Flows: A Gravity Model Approach

By

Ousman Gaye

ABSTRACT

This paper applies the gravity model of trade to investigate The Gambia's bilateral trade flows with major trading partners. The model is tested over a period of 20 years between The Gambia and 24 of its major trading partners from the year 2000 to 2019. A panel data framework is being implemented to control for unobservable heterogeneity and to capture the relevant relationships among the variables over time. We find that the Hausman test strongly reject the null hypothesis that there is no correlation between the explanatory variables and the country specific effects. Therefore, the fixed effect model is to be preferred to the random effects model. The empirical results show that GDP and population of partner countries as well as dummy for EU membership positively and significantly impact The Gambia's bilateral trade flows. Per capita GDP differential and geographical distance are found to have significantly negative impact on The Gambia's bilateral total trade flows. Finally, the study found out that there is strong evidence that the gravity model significantly explains the pattern of The Gambia's bilateral trade flows as most variables present their theoretical expected sign.

Keywords*: gravity model, panel data, fixed effect model, bilateral trade flows*

Contents ..... Page

Title Page i

ABSTRACT ii

CHAPTER ONE 1

INTRODUCTION 1

1.1 Background of Study 1

1.2 The Gambia's Foreign Trade overview 5

1.3 Statement of Research Problem 8

1.4 The Objective of the study 10

1.5 Research Questions 11

1.6 Research Hypothesis 12

1.7 Significance of the study 13

1.8 Limitation of the study 15

CHAPTER TWO 16

LITERATURE REVIEW 16

2.0 Introduction 16

2.1 Theoretical Literature 16

2.1.1 Mercantilism 17

2.1.2 Classical Theories (Absolute and Comparative Advantage) 19

2.1.3 Heckscher-Ohlin Theory 22

2.1.4 The New Trade Theory 23

2.1.5 The Gravity Model of Bilateral Trade 24

2.2 Empirical Literature 27

CHAPTER THREE 34

RESEARCH METHODOLOGY 34

3.1 Introduction 34

3.2 Data Source 34

3.3 Model Specification and Methodology 35

3.3.1 Specification of the Gravity Model 35

3.3.2 Explanation of Explanatory Variables 37

3.3 Econometric Methodology 40

3.4 Panel Unit Root Test 43

3.5 Econometric Issues 44
3.5.1 Unobserved Heterogeneity 44
3.5.2 Endogeneity 44
3.5.3 Multicollinearity 45
CHAPTER FOUR 47
RESULTS PRESENTATION AND ANALYSIS 47
4.1 Introduction 47
4.2 Results of Panel Unit Root Tests 47
4.3 Results of Multicollinearity Test 49
4.4 Empirical Results of the Estimated Pooled OLS, Fixed Effects and Random Effects Models 50
CHAPTER FIVE 56
CONCLUSION, SUMMARY AND POLICY RECOMMENDATIONS 56
5.1 Introduction 56
5.2 Summary and Conclusion 56
5.3 Policy Recommendations 58
REFERENCES 59
APPENDICES 64

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

International trade is the life blood of a global economy. It is the exchange of goods, services, and capital across international territories or borders. international trade continues to play a vital role in the process of economic development in all countries. When a product is produced and transferred or sold from a party in one country to a party in another country, it serves as an export from the originating country and an import to the country receiving that country. Imports and Exports are accounted for in a country's current account in the balance of payments with both equally important. Combined, they make up a country's trade balance. Countries trade with each other when, on their own, do not have the resources, or capacity to satisfy their own needs and wants. By exploiting their domestic scarce resources, countries can produce a surplus, and trade this for the resources they need.

Countries are likely to import Goods and services from abroad for several reasons. Imports may be of better quality, or cheaper. So, by importing the required raw materials, intermediate and capital goods and services, a country can enlarge its productivity capacity, improve economic growth, and meet the growing domestic demand and raise the living standards and economic well-being of its populace. Also, they may be more easily available or simply more appealing than locally produced goods. In many instances, local alternatives might not exist, and importing becomes essential. This is highlighted today in a country like Japan, with no oil reserves of its own, yet it is the world's fourth-largest consumer of oil and must import all it requires. Export on the other hand can allow countries to gain exposure to new ideas, marketing techniques, and ways

of competing with overseas markets to increase competitiveness. More importantly, exports also increase the foreign exchange reserves held in a nation's central bank. Foreigner's pay for exports either in their own currency or mostly in U.S dollar. A country with large reserves can use it to manage their own currency's value and thus use it to flood the market with their own currency. This lowers the cost of their exports in other countries, boosts its industrialization and overall economic activities.

The study of international trade dates back during the classical period in the 18th century when David Ricardo and Adam Smith asserted that trade had a general influence on the positive growth of the economy. According to Adam Smith (in the wealth of nations, 1776), the production of goods and services in countries that need to trade is based on two fundamental principles, these being the *division of labour* and *specialization*. The notion of positive growth of economy as a result of trade is because they believe that trade brought about a higher accumulation of capital and technical progress that eventually leads to the improvement of productivity.

World trade has grown considerably over the years as a result of concerted efforts by the World Trade Organization and other regional trading organizations in reducing trade barriers. Despite numerous challenges in eliminating trade barriers, some progress is being made both through the multilateral trading system and other initiatives, including those taken by the World Trade Organization (WTO) and its member countries. The multilateral trading system plays an important role in ensuring transparency and predictability in the global trading system. World merchandise imports grew from US$62 billion to US$13.94 trillion between the period of 1948 to 2007, and during the same period exports grew from US$59 billion to US$13.57 trillion. However, the exports of services compared to merchandise exports grew faster from US$390.8 billion in 1980 to US$3.26 trillion in 2007, whereas imports rose from US$431.8 billion US$3.06 trillion during

the same period.[1] After experiencing a steady growth in almost four decades, world trade has shown some sign of unusual persistency in some few years as recent as 2014. The economic downturn came after a long period of high growth that was halted due to the global economic crisis of 2008-2009. The world economy in 2008 experienced its most severe financial shock since the Great Depression of the 1930s and the biggest economic slowdown since the second world war. This has affected most countries around the world and for that reason the crisis was widely described as a global crisis. During the crisis, however, GDP declines were some of the largest in the world and the global prices of one of the most exported products like Oil and Gas collapsed. As a result, the decline in trade were quite large and certainly above the world average. While attempts were made to recover from one of the world's most discombobulated period, the speed of recovery from the 2008 global financial crisis has been unusually slow. The slow recovery is due to the permanent decline in GDP, since the world economy never fully recovered from the initial shock. However, due to different policy interventions in reducing the immediate losses in major financial institutions and large corporation, Real GDP regained its pre-recission peak and the global economy gradually recovered.

After bouncing back from the global financial crisis of 2008-2009, the outbreak of the COVID-19 pandemic represents an unprecedented disruption to the global economy and world trade, as production and consumption are scaled back across the globe. Initially, the pandemic was a health crisis, but its ramification extends to many aspects of international trade through reduction in both supply and demand. Although, there has since been a partial rebound as lockdowns eased in most countries across the world, world output has plummeted, while job losses pile up. And trade has

[1] See https://www.economicsdiscussion.net/essays/world-trade-essays/essay-on-world-trade/17925 for the direction on world trade.

since been disrupted by demand and supply shocks which is expected to have a persistent repercussion through regional and global value chains. In response to the decline in world GDP, a growing number of governments have adopted policies aimed at boosting growth through innovation and technological upgrading with open trading mechanism. This shows that there is a significant role for international cooperation to make countries devote their attention in pursuing such goals, while minimizing negative spillovers from national policies.

While the United States remain the world's largest trading nation with over US$5.6 trillion in export and import of goods and services in 2019, and having trade relationship with more than 200 countries,[2] global trade pattern witnessed a dramatic shift since the beginning of early 1990s as developing countries such as China moved from being a periphery of global trade to being the export powerhouse of the world. Though the rise in China as an export powerhouse became clear in the 1990s, however the story began earlier. After Mao's death, then President Deng Xiaoping began a set of reforms to upgrade China's economy and open to the world. Foreign trade became a major part of this policy and policymakers became more receptive to the idea of international specialization and determined to strengthen China's comparative advantage in the world. Today China is the world's largest export nation in the world with 14.7% share of global exports of goods, lifting more people out of poverty than anywhere else in the world.[3] While global trading landscape had become more diversified to include several developing and emerging economies, Africa's participation in world trade remains relatively low. The continent's low participation in world trade is due to the result of export taxes, import duties, and high administrative costs particularly compliance and documentary costs at border level. However, with the establishment of the Africa

[2] See https://ustr.gov/countries-regions
[3] See https://unctad.org/topic/trade-analysis/chart-10-may-2021 on the evolution of the world's 25 top trading nations.

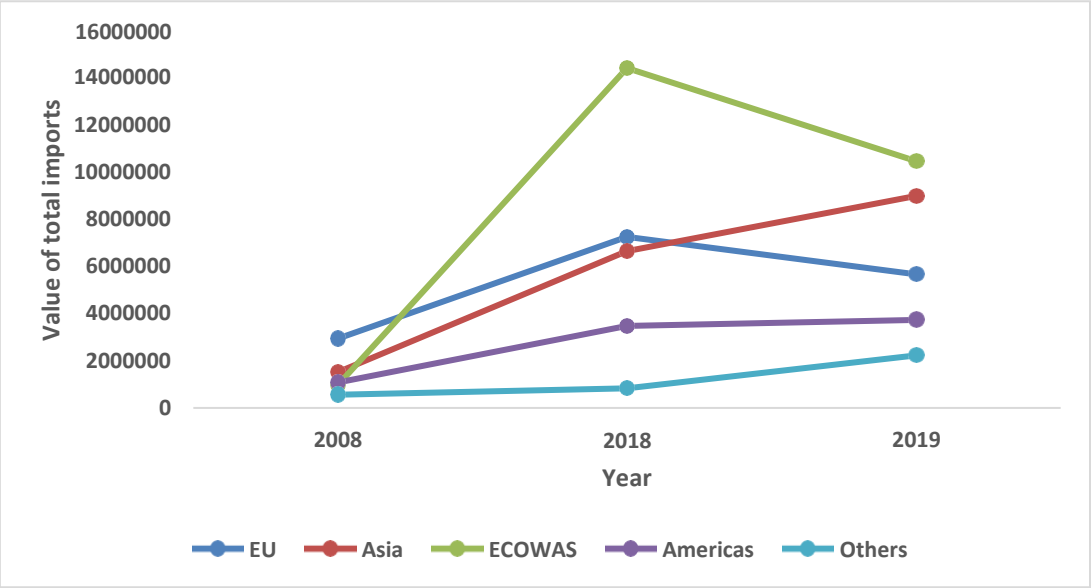
Continental Free Trade Area (AFCFTA) in 2018, Africa's hope is on the rise with an estimated $3 trillion dollars expected in combined GDP and the potential to increase intra-African trade by over 50 percent. According to the World Bank, the agreement could lift millions out of extreme poverty and add $76 billion in income to the rest of the world.

1.2 The Gambia's Foreign Trade overview

Being the smallest country on mainland Africa, The Gambia maintains a liberal trade regime and continues to pursue development policy objectives of oriented strategy to improve trade performance for poverty reduction. There are no barriers to capital movement. Due to the country's efficient customs clearing system and ease of transportation to land-locked neighboring countries provided by the river Gambia, the country is indeed suited as a regional trade and transit hub (MOTIE, 2011).

The government of The Gambia, through the ministry of trade, Industry, regional integration and Employment (MOTIE) continues to commit itself to policies aimed at improving the competitiveness of The Gambia's Trade. The government currently has several trade policies in place to attain its goal of boosting exports, job creation, economic development and increasing the country's market share in an increasingly globalized world (WTO, Trade policy Review, The Gambia, 2017). In line with this, a National Trade Policy (NTP) was formulated and adopted in 2011. The broad objective of the policy is to maintain an open and liberal trading environment and to better integrate the Gambia to the global economy. The policy also provides clear guidelines for the implementation of the government's domestic and international agendas as well as trade facilitation, market access, quality and regional integration issues (WTO, Trade policy Review, The Gambia, 2017).

Figure 1: Direction of Gambia's Import by Region (Dalasis'000)



Source: Authors construction using data from MOTIE

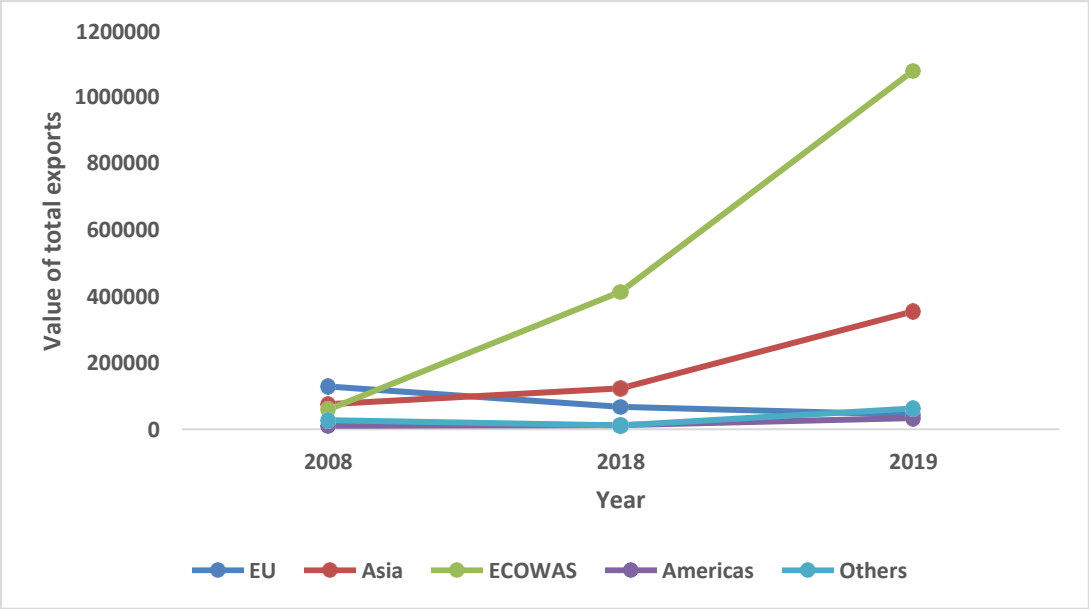
According to the observatory of Economic complexity (OEC), The Gambia is the 177th largest export economy in the world in 2017. Being an import dominant country, the Gambia exported USD$174 million and imported USD$1.16 billion resulting in a negative trade balance of USD$987 million in 2017. Merchandize exports are made up only of groundnut and groundnut products. Other products include fruits and vegetables, Fish and Fish products, cashew nuts, rough woods, Coconuts and as well as Scrap Iron and Tropical Fruits[4]. The EU has been the Gambia's main market for its domestic export accounting for 43% of domestic export in 2008 (GBOS). Other important markets include West Africa, Asia and Latin America. Imports on the other hand, are dominated by Petroleum products, Food items (mainly rice), Light Pure Woven Cotton and manufactured goods (textiles, electronics, and Pharmaceuticals etc.). The main trading partner outside EU is Asia (mainly China, Malaysia, Thailand, India, and Singapore) constituting 25% of total external trade in 2008 and ECOWAS (mainly Senegal, Cote d'Ivoire, Guinea and Guinea

[4] See https://www.uk-cpa.org/media/2990/gambia-trade-note.pdf for trade summary of The Gambia

Bissau) accounting 20% to total external trade (GBOS). Other export destinations include America's accounting for 3% of total export trade in 2009.[5] Tourism also plays an important role in the country's export and is the highest foreign exchange earner in the Gambia.

Along with an increase in overall trade volume due to trade liberalization and trade promotion, the direction of Gambia's trading has change to other regions over the years. Whilst the EU has been Gambia's main market for its Export in 2009, ECOWAS and Asia represent The Gambia's main export region accounting for 91% of the Gambia total exports in 2019 with the share of the exports to the EU decreased to 3% in 2019. The main products exported in 2019 were Soap and detergents, Fish and Fishery products, Wood, and articles of wood (mainly logs) and Fish and fishery products.

Figure 2: Direction of Gambia's Export by Region (Dalasis'000)



Source: Authors construction using data from MOTIE

Other Products like Groundnut, Fruits and nuts, Natural sand etc. still constitutes among the main products exported though slight decreasing. ECOWAS, America, Asia, and the EU continued to

[5] See http://www.gambiatradeinfo.org/ for the data source

be the main sources of Gambian imports. The main products imported in 2019 are: petroleum products, steel, rice, sugar, spare parts, cements, cooking oil, electrical machinery and equipment parts, machinery and mechanical appliance and flour. The value of the Gambia's total imports decreased from D 32, 6 billion in 2018 to D 31 billion in 2019 representing a drop by 4.7%. This is due to the drop in imports of petroleum products and steel (MOTIE 2019, Gambia External Trade Statistics).

Despite government's massive effort to promote export over the years, the Gambia still maintains a negative trade deficit; with Imports far outweigh Exports and a negative trade balance of -29,503,066 Dalasis. The share of total export only accounts for 4.8% as a percentage of total trade in 2019 whilst Imports accounts for a staggering level of 95% of total trade in 2019 (MOTIE 2019). This analysis shows the governments' indispensable need to expand the volume of Gambia's trade with the rest of the world and to explore its trade potential with its partners to maximize its gains from trade and boost the pace of the nation's economic growth.

1.3 Statement of Research Problem

Since attaining independence in 1965, The Gambia has had a slow but steady rate of growth. However, growth in the economy has not translated into a significant improvement in the economic well-being of its populace. According to the WTO, the country is ranked among the poorest in the world with a per capita income of US$487 in 2016 and approximately half of its population of 2 million living below the poverty line of US$1.25 per day. In 2015, the country was ranked 173rd out of 188 countries on the Human Development Index. The long economic turmoil could be attributed to various factors. Key among them is the country's underperformance in its trading

activities after having a negative trade balance with almost all partner countries. This is evident from the statistics presented in the earlier section that the Gambia is an import-based country, and its exports remain highly undiversified with groundnut accounting for 60% of domestically produced exports. The EU and the ECOWAS has been Gambia's main trading partners since early independence. However, this pattern has been shifting towards emerging economies, with China being the country's largest importing partner since the early 2000s. After versed research in determining what might cause a change in pattern of a country's direction of trade, several models were formulated by economists. One influential trade theory that explained The Gambia's trade pattern has been the Hecksher-Ohlin model which had extended the Ricardian model and added one more factor of production, capital, beside labor. The model assumes that differences in the relative endowments of factors of production explain differences between countries and The Gambia lags both in endowments of labor and capital with its trading partners which explains the occurrence of negative trade balance.

Being a member of the ECOWAS, The Gambia is expected to have a significant value of trade flows with ECOWAS member countries. However, trade volumes with the ECOWAS community remains to fully exploit its potential as the EU and some Asian countries remain the major players in The Gambia trading pattern. The crucial challenge facing The Gambia is to increase trade flows with partner countries in the ECOWAS and other regions. Recent studies argued that long term economic growth can only be achieved through a significant trade investment to tackle the growing concern of high poverty rate and economic hardship. However, trade volume is not significant enough to defeat the pervasive poverty level in the economy. Additionally, the economic and social condition remains fragile and vulnerable to external shocks, and the country has a long way to go in order to boost exports to partner countries and become an active player in the global trade

market. Therefore, the core problem which this study intends to investigate is what determines the direction of Gambia's trading pattern?

The gravity model has acquired a great reputation in explaining the direction of a country's trading pattern which the earlier models of international trade fail to accomplished. It is one of the most robust empirical findings in international trade in the field of economics. Traditionally, the model has been based largely as to which variables are likely to influence trade. More recently, however, several studies have emerged which uses variables far beyond those initially used by Tinbergen (1962) to model international trade. The model relies on the assumption that bilateral trade between two countries is proportional to the product of the country's GDP and is inversely proportional to their distance. Now the question remains what accounts for bilateral trade between countries when other variables are included in the gravity model. Finding answers to these problems are what drive the purpose of this study.

There has been several applicability of the gravity model in explaining the trade pattern of developing countries, mostly in Asia, Latin America, and Africa. Some Empirical studies in the EU and North America have also used the framework of the gravity model to analyze the effects of being a member of the EU or NAFTA have on a country's bilateral trade. Unfortunately, this model has not been used by most empirical studies in explaining The Gambia's trade pattern. Therefore, this provides justification for the purpose of this study.

1.4 The Objective of the study

Generally, the overriding objective of this study is to empirically analyze trading activities of The Gambia using the gravity model. This is motivated by the significance of the role of international

trade in achieving economic growth of a country. To achieve the broad objective of this study additional variables that are of relevance in explaining the direction of The Gambia's trading pattern will be included to the basic gravity model to have a more dynamic assessment in analyzing trading activities of The Gambia. Furthermore, the gravity model is not only limited in achieving the broad of objective of this study. In assessing the statistical significance of the explanatory variables, the study aims to achieve the following specific objectives:

- The determinants of The Gambia's trading pattern.
- Identify the role of ECOWAS as regional trade agreement between The Gambia and member countries.
- Identify which explanatory variables have significant effects in explaining bilateral trade flows between The Gambia and partner countries.
- To offer policy recommendations based on the research findings.

Following the application of the gravity model, the relevant estimation techniques will be utilized together with the accompanying tests to validate our findings.

1.5 Research Questions

Even though trade pattern of The Gambia has been shifting towards emerging and developing countries with similar characteristics as those of The Gambia (i.e., ECOWAS countries), however, as mentioned in the previous section, trade volume with such countries remains relatively low which could be attributed to the evils of protectionism and isolationism. As The Gambia strives to position itself in the global economy, its trade strategy with develop and emerging countries is still unclear. The country does not have a formal trade strategy but still have a reminiscence of the

colonial piece as trade relationships in some ways are still defined by historical relationship. This is evident from the fact that The Gambia is a member of the commonwealth of Nations and have a bilateral trade agreement with commonwealth member countries. Therefore, trade volumes are expected to be higher among Anglophone countries than non-anglophone countries. So, to move away from the haphazard trade strategy that the country is experiencing up to date, bilateral trade agreements need to be form with partners in Asia, Latin America and other regions around the world to boost the country's trade.

Therefore, the following research questions respond to the problems outlined above and seek to address existing research gaps.

- Why does The Gambia trade more with one country and less with another country?
- Does distance play any role in determining The Gambia's trade flows?
- Do common language play any role in determining The Gambia's bilateral trade flows?

1.6 Research Hypothesis

So far, since our study mainly focus on trade patterns, or who trades with whom. The main tool to help us explain this is the gravity model which is a useful tool being used to estimate or to explain the trade relationship between countries. The gravity model further explains that the value of trade between two countries depends on the economic size and distance between the two countries with the former having a positive value of trade and the latter having a negative value. In line with the objective of the study, the following hypothesis are advanced:

- $\boldsymbol{H_0}$: The longer the distance between The Gambia and a trading partner country, the smaller the value of trade between the two countries.

- $\boldsymbol{H_0}$: The bigger the economic size between The Gambia and a partner country, the larger the value of trade between the two countries.
- $\boldsymbol{H_0}$: Common language positively impacts The Gambia's bilateral trade flows.
- $\boldsymbol{H_0}$: Regional Trade Agreement (ECOWAS) exert positive impact on The Gambia bilateral trade flows. Result might be unexpected because of the presence of non-tariff barriers among ECOWAS countries.
- $\boldsymbol{H_0}$: Higher population has a positive significant effect on trade values between The Gambia and a partner country.

1.7 Significance of the study

The increased threat of trade protectionism should draw the attention of policy makers to formulate effective trade policies that are open, inclusive, and ruled based. Since the early 1950s global trade had played and it is still playing a significant role in boosting economic growth and sustainable development among countries. A prime example of countries with this successful story of growth is China, where through the initiation of economic reforms and trade liberalization policies, China was able to move away from being a poor and isolated economy to becoming one of the global superpowers today. Unlike China, The Gambia still lags in its quest to becoming a major trade hub although much progress has been made so far.

In line with this, the primary concern of policy makers and global trade analysts is what factors encourage or hinder the value of Gambia's trade flows. The gravity model of trade is used in this study to provide an insight on this issue by providing an outstanding empirical performance in analyzing the bilateral trade of The Gambia which the early classical trade theories fail to explain.

Several studies have been conducted using the gravity model, however, the empirical findings on these studies have produced mixed results due to different approaches in modelling the fundamental variables. This underscores the importance of a clear understanding of the drivers of trade flows in The Gambia. More particularly, the study is both theoretically and empirically significant in many respects.

- The results from the study can be used as a policy guidance by policy makers in the formulation of Gambia's trade policy framework since they give a direct measure of responsiveness of the value of Gambia's bilateral trade flows among partner countries.
- The study provides a better picture of The Gambia trade pattern and facilitate in the understanding of those countries that are of major trading partners to The Gambia.
- Results from the study can be used as a source of reference by researchers in the field of international trade in future studies. Not much study has been carried out in The Gambia using the gravity model to analyze the countries trading pattern. This will add to the literature on gravity model of international trade and broaden opportunities for further research.
- Results from the study will also benefit investors as they will be able to estimate the value of trade flows in respect to relevant variables before they make an investment decision by analyzing how trade flows in The Gambia are affected by fundamental determinants of trade such as Distance, GDP and colonial ties.

1.8 Limitation of the study

The study focuses on gravity model to analyze trading activities of The Gambia which is largely dependent on the bilateral trade flows among countries. Data dependent are secondary mainly from World Development Indicator and variables used might not be adequate for proper analysis of the study. The study restricts itself to the relevance of partner countries and availability of data to the period within which such data are available.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter utilizes the theory of the gravity model of trade to highlight a review of theoretical and empirical literatures on international trade. The chapter is divided in two sections. The first section is devoted to the review of theoretical literature on international trade while the second section focuses on the empirical literature. Under theoretical literature, theories touching on different models of international trade starting from the classical models of absolute and comparative advantage to the new trade theories are discussed. Under empirical literature, studies on the recent applications of the gravity model are discussed.

2.1 Theoretical Literature

The question on why countries trade has been answered in many ways. For example, according to Adam Smith, countries trade with each other due to difference in factor endowments or difference in technology. Others explain it different ways. Therefore, one can say that there exists no unique theory that explains why countries trade with each other. Modern trade theories of international trade have evolved significantly over the years. The theory of international trade is one of the oldest branches in the study of economics. From the ancient Greeks to present, policy makers have pondered the determinants of international trade between countries and tried to establish what trade policy is best for any particular country. In addition, there has been a dual view of trade since the time of the ancient Greek philosophers. A recognition of the benefits of international exchange of goods and services and a concern that domestic industries would be harm by foreign countries.

Depending upon the weights put on the overall gains or losses from trade, different theories have arrived at different conclusions about the desirability of having free trade. But economists have matched free trade to technological progress, even though some narrow interests may be harmed, the overall benefits to society are substantial.

The theory of international trade went through many developments from classical to new classical trade theory. Classical trade theories were initially viewed as country-based theories until the mid of the 20th century, when the theories began to explain trade from a firm perspective rather than a country. Until now, these trade theories were developed and stated as modern and firm-based theories to explain the basics and benefits of international trade of countries in different periods of time. The gravity model explains the trade flows between countries and considers more traditional economic reasons for international trade.

The main aim of this section is to give emphasis to the different theories of international trade and how they evolve over the past century to explain the trade pattern of The Gambia. Furthermore, the section focuses on the gravity model to analyze trading activities of The Gambia and its main trading partners.

2.1.1 Mercantilism

The first body of thought devoted to the study of international trade is called “Mercantilism” which emerged in the seventeenth and eighteenth century in Europe. It is one of the early classical trade theories developed by European countries against the background of intense national rivalries among European countries to enhance state power. Although, many different viewpoints are

expressed in this literature by scholars from different fields of research, its precise theoretical meaning has varied throughout the last 150 years or so.

The idea of Mercantilism began with the emergence of the Nation-state. During that time, wealth was measured by a country's quantity of silver and gold, and it was in the nation's best interest to accumulate as much as possible. To accumulate more of it, countries should focus on maximizing their exports and minimizing their imports. The nation with the most gold was the richest. They could hire mercenaries to expand their empires and fund wars against other nations that wanted to exploit them. For a country without gold or silver mines, advocates of the Mercantilist theory argued that foreign trade was the only way to acquire treasure (Gomes, 1987) The Mercantilist emphasized international trade as a means of increasing the wealth and power of a nation. They believed that the key objective of trade was to maintain a favorable balance of trade where the value of exports exceeds the value of imports. By encouraging exports and discouraging imports, Mercantilism is also viewed as a form of trade protectionism. (Salvatore, 2013).

However, a favorable trade balance for the maximum accumulation of gold and silver is not the only element of the Mercantilist doctrine. According to Leonard Gomes (1987), other aims of the Mercantilist doctrine include rapid population growth and a large labor force to keep wages and prices low and thus encourage exports, promotion of industry through domestic subsidies to manufacturers, the development of cheap raw materials and low interest rates to increase investment and employment. In addition, the assessment of economic policy for a favorable trade balance and the achievement of net inflow of specie through the promotion of exports and restriction of imports are other significant objectives of the Mercantilist doctrine.

Mercantilists argued that even if trade balance was not a specific source of concern, the commodity composition of trade was. With exports of manufactured goods and imports of raw materials considered beneficial, exports of raw materials and imports of manufactured goods were viewed as damaging, Mercantilists advocated that government policies to be directed to conform to these beliefs. They sought the idea of trade protectionism using taxes on trade to manipulate the balance of trade or commodity composition of trade in favor of the home country. But the mercantilism view of trade was a dim one and even if the theory of Mercantilism were correct, the idea could never work if all nations tried to follow it simultaneously. Not every country can achieve a balance of trade surplus because one nation's exports are other nation's imports, and not every country can export manufactured goods and import raw materials (Raymond 2009). Although some nations will gain from trade, defined by Mercantilists as accumulation of bullion, the remaining nations, as a group, must lose an equal amount. Therefore, according to the Mercantilist view of world trade then, the net world gain from trade is always zero as one nation's gain comes only at the expense of other nations.

2.1.2 Classical Theories (Absolute and Comparative Advantage)

In reaction to the mercantilist view on trade, Adam Smith in his book "An Inquiry into the Nature and Causes of the Wealth of Nations" in 1776, argued that when nations fully trade according to their potential then both nations will gain. According to Smith, trade between nations should not be regulated by government policy or interventions. He stated that trade should flow equally according to market forces of Demand and Supply. For Smith, the gains from international trade are similar to the gains from exchange between two individuals or regions. If one can obtain goods at a lower price than it costs to make them, then welfare is enhanced by allowing for such exchange.

This means that countries should focus on exporting those goods in which it is more productive to produce home than abroad and import those goods that can be produced more productive abroad. This according to Smith is the concept of absolute advantage. In other words, a country that has an absolute advantage can produce a good with a lower marginal cost than other countries. Thus, allowing for efficient allocation of resources and achievement of material well-being at a lower cost (Murphy, 2013).

The concept of absolute advantage fundamentally changed economic thinking about international trade. Smith argued that economic growth can only be achieved through specialization and division of labor. Specialization helped promote greater productivity by producing more goods from the same resources to achieve higher economic growth. However, division of labor was limited by the extend of the market. In other words, only large markets can support a great deal of specialization. In addition, Smith assumed that differences in natural environment such as climate and soil are the reasons a country will have an absolute advantage in the production of some good.

While his advocacy in favor of free trade is acknowledge by many, Smith does not distinguish between domestic and international trade on the basis of differences in resources domestically and internationally. In addition, he fails to see that countries may sometimes pay for the importation of a certain good, even though they have absolute advantage, when it comes to the production of those goods. For this reason, Adam Smith contributions to the theory of international trade is viewed by many as limited in explaining pattern of world trade today, because it does not explain why nations with absolute disadvantage still trade with other nations (Murphy, 2013).

Dissatisfied with the concept of absolute advantage, David Riccardo (1772-1823) answered the questions left by Adam Smith and established a fundamental trade theory known as the theory of comparative advantage.

In 1817, David Riccardo established a fundamental trade theory known as the theory of comparative advantage to answer the questions left by Adam Smith's theory of absolute advantage. The theory states that a country gains from trade by exporting goods and services that it can produce at a lower opportunity cost and import the goods and services that it would produce at a higher opportunity cost. This concept is explained by the Ricardian model meaning that the opportunity cost of producing a good is higher or lower in one country than in another. In a simplified world with two countries and two goods, Ricardo shows that comparative advantage holds even if one nation can produce both goods more cheaply than the other nation, both nations can still trade as long as there is mutually beneficial trade (Thai, 2006). The only thing that matters under this theory is relative efficiency.

Just as in the theory of absolute advantage, the main mechanism in the theory of comparative advantage is the difference in production technology between countries. The technology of an economy where labor is the only factor of production, differences in technology are represented by differences in labor productivity and therefore comparative advantage is the result of international differences in labor productivity (Berkum and Meijl 1998)

Although the theory of comparative advantage is hailed by many as the single most important contribution in the analysis of international trade, however it is without its limitations. First, the model's assumption of having only two commodities and countries is unrealistic, as international trade takes place among countries trading numerous commodities. Another issue of the Ricardian

model is that it fails to consider capital cash flows between countries which is a common mistake in the classical theory of international trade.

2.1.3 Heckscher-Ohlin Theory

The early classical theories of Adam Smith and David Ricardo did not help in determining which product would give a country a competitive advantage. Both the theories of absolute and competitive advantage considered only labor as a factor of production. Two Swedish economists Bertil Heckscher and Eli Ohlin, in the early 1900 reformulated the Ricardian model by considering several factors of production known as the Heckscher-Ohlin model. The H-O model was considered as the backbone and one of the most influential trade theories in the last many decades. The H-O model postulates that countries will export those goods that are produced by the factor that it has in relative abundance and import those goods whose production it has in relatively less abundance. In a simplify way, capital-abundant countries like the U.S.A and other developed countries would export capital-intensive products such as Airlines and import labor-intensive products like Textiles from The Gambia and other developing countries (Hill, 2009; Salvatore, 1998). This will maximize efficiency, resulting in more total products of Airlines and Textiles and cheaper prices for consumers. The H-O model is also called the factor proportions theory, meaning that countries would produce and export goods that required resources that were great in supply, and therefore cheaper in production factors and import goods that required resources that were in short supply, but higher demand (Berkum and Meijl, 1998)

The H-O model, however, does not always hold. The is because a relatively labor abundant country will not always export the labor-intensive commodity. Also, in contrast to the specific factors

where an increase in the endowment of one of the specific factors reduces the real income of labor even if we keep the relative prices ratio unchanged. Whereas in the H-O model, endowment changes do not influence factor prices when the relative price ratio remain unchanged. The H-O model also differs from the Ricardian model by postulating that those owners of the country's abundant factors gain from trade while the owners of the scarce factors lose (Husted and Melvin, 2001).

2.1.4 The New Trade Theory

In the early 1950s, Russian-born American economists Wassily Leontief conducted the first empirical test of the H-O model using U.S data for the year 1947. He noted that since the United States was abundant in capital, and therefore should export more capital-intensive goods and import more labor-intensive goods (Salvatore, 2013). However, his study in direct opposite to the theory of the H-O model revealed the U.S importing more capital-intensive goods. Based on the H-O model discussed above, the U.S should be importing more labor-intensive goods instead of exporting them. Leontief's result became known as the Leontief paradox. Attempts to explain the H-O model therefore resulted in significant new research, the most important of which is the extension of the H-O model to include other inputs besides capital and labor, especially human capital, research and development, and natural resources.

Based on more recent research, the H-O theory based comparative advantage was question for failing to explain a significant portion of today's international trade. Therefore, new firm-based theories were put forward by researchers to explain the new pattern of global trade. Some of these trade theories explained with the concept of comparative advantage allow for increasing returns to

scale, differentiated products and the associated imperfectly competitive market structures. However, what remains clear is that trade cannot be explained nearly by one single theory, and more importantly, our understanding of international trade theories continues to evolve.

2.1.5 The Gravity Model of Bilateral Trade

The gravity model has been used intensively in analyzing bilateral trade flows between countries, which cannot be explained by the classical and new trade theory. The model originates from Newton's universal law of gravitation in physics. Newton's law of gravitation states that the gravitational attraction between two objects is proportional to their masses and inversely relate to square of their distance between their centers.

The gravity model is represented as follows:

$$GF_{ij} = \frac{G}{M_i M_j} D_{ij}^2 \quad \text{..... (1)}$$

Where:

GF_{ij} is the gravitational force

M_i, M_j are the mass of two objects

D_i is the distance between the two objects

G is the gravitational constant

Tinbergen (1962) and Pöyhönen (1963) were the first to develop the gravity model in analyzing the determinants of bilateral trade flows. Since then, the gravity model has become a key

instrument in empirical foreign trade analysis. The mode has successfully been used in the latter part of the 20th century to explain migration, foreign direct investment, and other social flows in terms of gravitational forces of human interaction. As a reminiscence of the Newtonian law, the gravity model of trade assumes that the trade flow between two countries is proportional to the product of each country's 'economic mass' measured by GDP and inversely proportional to the distance between the countries, with all things being equal (Rahman, 2009).

Krugman and Maurice (2009) defined the basic form of the gravity model as:

$$T_{ij} = \frac{A}{Y_i Y_j} \quad D_{ij} \qquad \text{..... (2)}$$

Where: A is the constant term, T_{ij} is the value of trade between country i and country j, Y_i, Y_j indicates the economic size of country i and country j respectively (measured by GDP) and D_{ij} is the bilateral distance between the two countries. This equation according to (Krugman and Maurice, 2009) explains that the three things that determine the volume of trade between two countries are the size of the two countries' GDPs and the distance between the two countries.

Following the study by (Rahman, 2009), the gravity model is often transformed to a log linear form so that it conforms to the usual regression analysis.

$$\log(Trade_{ij}) = a + Q_1 \log(Y_i Y_j) + Q_2 \log(D_{ij}) \qquad \text{..... (3)}$$

Where α, β_1 and β_2 are the coefficients to be estimated. In addition to the primary variables, other variables such as population and dummy variables such as common language can be included as proxies for economic size and cultural factors (Chan-Hyun, 2001).

Although the core gravity model by Tinbergen (1962) has been widely used because of its empirical success in analyzing bilateral trade flows, the theoretical foundation however was originally very poor. Therefore, in recent years several theoretical developments have appeared in providing a theoretical support for the gravity model.

Anderson (1979) made the first formal attempt to provide a theoretical explanation for the gravity equation applied to commodities. In his theory, Anderson starts out from a rearrangement of a Cobb-Douglas or constant elasticity of substitution (CES) expenditure system as well as separable utility function between traded and non- traded goods. In addition, he assumed that each country is completely specialized in the production of its own good (as in a Keynesian-type trade model), so there is only one good for each country. Tariffs and transport cost do not exist as well. Given a maximization of a homothetic utility function subject to a budget constraint involving the level of expenditure on traded goods, the author shows that individual traded goods that are functions of traded goods prices are determined. Prices according to Anderson are constant in cross-sections; so, using the share relationships along the trade balance or imbalance identity, country *j*'s imports of country *i*'s goods are obtained. With log-linear forms for income and population, the deterministic gravity equation for aggregate imports is obtained.

Bergstrand (1985, 1989) in a series of papers developed some microeconomic foundations to explain the gravity model. A general equilibrium world trade model was presented by Bergstrand (1985) from which a gravity equation was derived by making certain assumptions, including perfect international product substitutability. The gravity equation is mis specified, omitting certain price variables, if, trade flows are differentiated by origin as evidence suggests. He also states that a gravity model is a reduced form equation of a general equilibrium of demand and supply systems. In such a model, a country trade supply is derived from a firm's profit

maximization procedure in the exporting country. On the other hand, a country trade demand is derived by maximizing a constant elasticity of substitution (CES) utility function subject to income constraints in the importing countries (Rahman, 2015). The gravity equation is obtained by using market equilibrium clearance.

Many other theories have been developed since the second half of the 1980s in support of the gravity model. Krugman (1985) justified the gravity model using a differentiated product framework with increasing returns to scale. More recently Eaton and Kortum (1997) delivers an equation for the gravity equation from a Ricardian model, while Deardorff (1998) proved that the gravity equation could be derived from the Hecksher-Ohlin model with and without trade predicaments. Finally, Anderson and Wincoop (2001) derived the gravity equation using the properties of market clearance and the CES structure of Demand. The differences in these theories help to explain the various specifications and some diversity in the in the results of the empirical application of the gravity model.

2.2 Empirical Literature

In view of the extensive use of the gravity model as an instrument in analyzing bilateral trade flows between countries, the objective of this section is to examine some of these studies as a guide in analyzing the determinants of The Gambia's bilateral trade flows.

Jan Tinbergen (1962) was the first to develop the econometric study of the gravity model of bilateral trade flows. In his first study, elasticities were estimated by means of an Ordinary Lease Squares (OLS) cross country regression on 1958 trade flows data for 18 countries, as a first trial, and for 42 countries, as a robustness check. According to Tinbergen, the size of trade flow between

any pair of countries is stochastically determined by the economic size and the geographical distance between the two countries. Dummy variables for common land border and British Commonwealth membership were also included by Tinbergen as key determinants of trade flow between any two countries. In the original estimation results found by Tinbergen (1962), the coefficients of income and distance had their expected sign and resulted relevant and significant. On the other hand, the coefficient for adjacency was never significant and the one for preference was borderline. Moreover, Tinbergen found that the fit of the estimation increases when the data sample was increased from 18 to 42 countries.

Bergstrand (1985), used a microeconomic foundation to explain the gravity model of bilateral trade flows for 15 OECD countries. In addition to income and distance variables used by Tinbergen, Bergstrand included GDP deflator, dummies for Adjacency, European Economic Community (EEC) and European Free Trade Area (EFTA) memberships among others as explanatory variables. Results from the study shows that economic size, distance, EFTA membership, import price index and adjacency were found to have significant effects on trade flow, whilst the remaining variables were found to be statistically insignificant.

In analyzing Ghana's bilateral trade flows, Bonuedi (2013) utilized a panel data covering 25 major trading partners of Ghana from 1995 to 2011. Using data from the United Nations Conference on Trade and Development Statistics and other database, the study employs panel cointegration analysis, aside from the conventional fixed effects and random effects estimators to analyze the long run relationship among Ghana's bilateral total trade and exports and their respective determinants. Results from the study indicated that, Ghana's population and GDP as well as real bilateral exchange rate have significant effects on Ghana's total bilateral trade flows. In addition to these variables, time invariant variables such as distance and ECOWAS membership were also

found to have significant effects on both Ghana's export and total bilateral trade flows. Other variables were found to be statistically insignificant. However, the estimated results were based on the fixed effect regression model.

In a recent study, El-Sayed (2012) examined the economic effects of trade flows between Egypt and some economic blocks. Within the framework of the gravity model, El-Sayed postulated that Egypt's bilateral trade flows with some economic blogs are determined by GDP, GDP per capita, distance and border with neighboring countries. Empirical results from the study shows that GDP and distance were statistically significant and corresponding with economic logic in influencing the volume of Egyptian trade bilateral in the framework of ASEAN Free Trade Area (AFTA). But distance was not significant in the case of the agreement with Common Market for Eastern and Southern Africa (COMESA) and EU. However, GDP per capita and border variables were not statistically significant in the determinants of Egypt bilateral trade flows.

In research conducted by Aliyu and Bawa (2015) to assess the determinants of flow of Nigeria's export using longitudinal data from 1999 to 2012. The study constructs Nigeria's gravity trade model comprising of 9 EU countries, BRICS countries, Canada, Japan and the US. Results from Pooled and panel regressions show that price index of destination countries and market size positively drive trade flows in Nigeria, while economic similarities, geographical distance and relative factor endowment negatively affect Nigeria's trade flows. Furthermore, Aliyu and Bawa found evidence in support of positive trade flows with the EU countries and negative trade flows with BRICS and on account of cultural difference.

Zarzoso et al (2003), explores the determinants of bilateral trade flows between European Union (EU) and Mercosur countries within the framework of panel data. The model is tested for a sample

of 20 countries, the four formal members of Mercosur plus Chile and the fifteen members of the European Union to investigate the relationship between the volume and direction of international trade and the formation of regional trade blocs where members are in different stages of development. Furthermore, the standard gravity model was augmented with a number of variables to test whether they are relevant in explaining trade. Results from the study shows that exporter and importer income as well as population have a significant effect on bilateral trade flows. In addition, infrastructure variables, income differences and exchange rates play an important role in explaining bilateral trade flows as well as both preferential dummy variables.

Cheng and Wall (2005) compare various specifications of the gravity model of trade as nested versions of a general specification that uses bilateral country-pair fixed effects to control for heterogeneity. The empirical analysis of the study shows that standard pooled cross section methods for estimating gravity models of trade suffer from estimation bias due to omitted or misspecified variables. The study also shows that the problem of misspecified variables is eliminated using the two-way fixed-effects model of Cheng (1999) and Wall (1999) in which country-pair and period dummies are used to reflect the bilateral relationship between trading partners. Therefore, the study concluded that country-pair fixed-effects model is preferred statistically to all other specifications as it eliminates all heterogeneity bias.

Rahman (2003) analyze the determinants of Bangladesh trade with its major trading partners using panel data estimation technique and generalized gravity model. The study covers data of 35 countries for 28 years between the period 1972-1999. Results from the study shows that Bangladesh's trade is positively determined by the size of the economies, per capita GNP differential of the countries involved, and openness of the countries involved. Transportation cost on the other hand, negatively affects the direction of Bangladesh's trade flows.

In another study, Rahman (2009) attempts to investigate trade potential for Australia using the augmented gravity models and cross section data of 50 countries. OLS has been used as an estimation technique for 2001 and 2005 data. The estimated coefficients from the gravity model are then used to predict Australia's trade potential with its partner countries. The OLS regression results reveal that Australia's bilateral trade is affected positively by economic size, per capita GDP, common language and openness, while it is affected negatively by the distance between the trading partners. Results from the study also reveals that Australia has expanding trade potential with some countries and declining trade potential with other countries.

Gani (2008) investigates the main factors influencing trade between Fiji and its Asian partners. Gani adopted the gravity model as an analytical procedure to estimate export and import equations using a combined longitudinal data for the period 1985 to 2002 over a sample of seven Asian countries as an import model and five as an export model. Results from the study indicates that Fiji's imports from and exports to its Asian partners are influenced by population, infrastructure, real exchange rate and distance between the countries.

In Vietnam, Binh et al (2011) applies the gravity model to analyze bilateral trade activities between Vietnam and 60 countries from 2000 to 2010. Using data from International Trade Centre, IMF and World Bank, the study adopted panel data framework to exploit the relationship between Vietnam and its partner countries. The estimated results reveal that economic size of Vietnam and foreign partners, distance and culture have significant effects on bilateral trade flows between Vietnam and 60 of its trading partners. By applying method of speed of convergence, results from the study also reveal that Vietnam has trade potential with new markets such as Africa and Western Asia.

In a similar study, Thai (2006) examines the bilateral trade between Vietnam and 23 European countries based on a gravity model and panel data for a period of 11 years from 1993 to 2004. Estimates from the study indicates that economic size, market size and real exchange rate of Vietnam and 23 European countries have a significant effect in Vietnam's bilateral trade flows and partner countries. However, distance and history does not have any significant effects on bilateral trade flows. Results from the study also shows that Vietnam's trade with 23 European countries has considerable room for growth.

In Africa, Eita (2008) applies the gravity model to Namibian exports covering the period 1998 to 2006 to investigate the factors that determine export flows between Namibia and its 38 main trading partners. The model of the study was estimated to determine whether there is unexploited export potential among Namibia's main trading partners. The estimated results shows that partner countries GDP and Namibian GDP has a positive impact on Namibian export, while partner countries GDP has a negative impact on export. However, Namibia's GDP per capita and real exchange rate does not have any significant impact on exports.

Blomqvist (2004) analyze Singapore's trade flows in two folds. The study first outline and interpret the development of Singapore's trade pattern with its South-East partners against the backdrop of relevant trade policy measures in the context of the Association of Southeast Asian Nations (ASEAN). The second fold of the study applied a simple model of the gravity type to establish and quantify the role of various trade determinants. The results indicated that Singapore's trade pattern remains heavily biased towards East Asia as far as foreign trade is concerned. The results also shows that ASEAN does not contribute much to the development of trade relations between Singapore and its members. However, the newer members of ASEAN seem to have been integrated quickly in Singapore's economic outlook.

Finally, Mukherjee et al (2018) attempt to have used the gravity model to evaluate the factors influencing South Africa's trade with the G-20 and top ten African countries based on panel data estimation between the time period 2007 to 2016. Majority of the data from the study were collected from the International Trade Centre (ITC) and the United Nations Conference on Trade and Development (UNCTAD). The group of countries taken were evaluated in terms of their GDP, their economic size (population) and the distance between them and South Africa respectively. The estimated results affirmed that market size, economic size and distance are significant determining factors for trade flows in South Africa.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter provides an overview of the data and research methodology used in analyzing The Gambia's bilateral activities. It includes the data source, estimation technique, model specification, variables description and methods used in the analysis. However, the chapter is presented in different sections to capture all these in the analysis.

3.2 Data Source

To perform the analysis on the determinants of Gambia's bilateral trade flows with partner countries within the framework of the gravity model, the study used secondary data which were largely quantitative and descriptive in nature. The data are collected over a period of 20 years between The Gambia and 24 of its major trading partners from the year 2000 to 2019.[6] The countries were chosen based on the availability of data and the relative importance of each partner country in The Gambia's total merchandise trade over the sample period. All data observations are annual.

The Data on bilateral trade flows (exports and imports) between The Gambia and partner countries was obtained from the *United Nations Conference on Trade and Development Statistics Database* (UNCTAD).[7] Bilateral exports are measured as the outflow of total value of goods and services in U.S dollars from The Gambia to all partner countries while bilateral imports are measured as the

[6] See appendix for list of selected countries
[7] Visit website: https://unctadstat.unctad.org/EN/

inflow of total value of gods and services in U.S dollars from a partner country to The Gambia. Data on GDP, Per Capita GDP, Population, exchange rate and consumer price indexes were sourced from the *World Development Indicators* (WDI) database of the World Bank.[8] GDP is measured in real terms at constant 2010 US$ to account for inflation. While data on distance measured (in Kilometer) between Banjul (capital city of The Gambia) and capital cities of partner countries was obtained from the Great Circle Distance between capital cities (Byers, 1997; http://www.chemical-ecology.net/).

However, information on ECOWAS membership was obtained from the ECOWAS website[9] while data on common languages of the sample countries was sourced from the *U.S Central Intelligence Agency (CIA) World Fact Book.*[10]Data on EU countries was also obtained from the EU website.[11]

3.3 Model Specification and Methodology

3.3.1 Specification of the Gravity Model

Among the mentioned trade theories, the gravity model will be chosen to quantify The Gambia's bilateral trade flows with its partner countries. The estimating model follows from equation 3, where the basic gravity model implies that the value of trade between The Gambia and a partner country is determined by the economic size measured by GDP and the distance between the two countries. In addition to the basic gravity model, an augmented gravity model will be estimated. The model is augmented by incorporating several conditioning variables that may affect bilateral

[8] Available online at : https://databank.worldbank.org/source/world-development-indicators
[9] Visit https://www.ecowas.int/
[10] Viewed online at: https://www.cia.gov/the-world-factbook/
[11] Visit: https://europa.eu/european-union/about-eu/countries_en

trade flows beyond income and distance. Thus, the augmented gravity equation is expressed as follows:

$$\ln(\boldsymbol{TT_{ijt}}) = a + \mathrm{Q}_1\boldsymbol{lnGDP_{it}} + \mathrm{Q}_2\boldsymbol{lnGDP_{jt}} + \mathrm{Q}_3\boldsymbol{PCGDPD_{ijt}} + \mathrm{Q}_4\boldsymbol{lnPOP_{it}} + \mathrm{Q}_5\boldsymbol{lnPOP_{jt}} + \mathrm{Q}_6\boldsymbol{lnRBER_{ijt}} + \mathrm{Q}_7\boldsymbol{lnD_{ij}} + \mathrm{Q}_8\boldsymbol{lnLANG_{ij}} + \mathrm{Q}_9\boldsymbol{ECOWAS_{ij}} + \mathrm{Q}_{10}\boldsymbol{EU_j} + \boldsymbol{\delta_{ij}} + \boldsymbol{\theta_t} + \boldsymbol{\mu_{ijt}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \quad (\mathbf{4})$$

Where:

$i = 1$ (The Gambia)

$j = 2, 3, \ldots, 24$ (Partner Countries)

$t = 2000, 2001, \ldots\ldots, 2019$

TT_{ijt}: Gambia's total trade with country j in year t

GDP_{it}: Gross Domestic Product of The Gambia in year t

GDP_{jt}: Gross Domestic Product of country j in year t

$PCGDPD_{ijt}$: Per Capita Gross Domestic Product Differential between country i and country j in year t

POP_{it}: Gambia's population in year t

POP_{jt}: Population of country j in year t

$RBER_{ijt}$: Real Bilateral Exchange Rate between The Gambia and country j in year t

D_{ij}: Distance in kilometers between The Gambia and country j

$LANG_{ij}$: Common Language dummy variable (English, Mandinka, Wolof, and Fula) between The Gambia and country j

$ECOWAS_{ij}$: Dummy for Regional Trade Agreement between The Gambia and country j

EU_j: Dummy variable if country j is a member of the European Union

δ_{ij}: Country specific effects, including unobservable characteristics affecting bilateral trade flows

θ_t: Accounts for time specific effect

μ_{ij}: error term

3.3.2 Explanation of Explanatory Variables

The Gross Domestic Product of The Gambia and partner countries provide a standard way of measuring the economic size of the two countries. The larger the GDP between The Gambia and a partner country, the larger the production capacity in the two countries and thus the more likely to attain economies of scale. Therefore, growth in GDP is expected to increase the volume of bilateral trade between the two countries. Hence, we expect the two variables' coefficients to be positive (i.e., $\beta_1, \beta_2 > 0$).

Per Capita Gross Domestic Product is introduced to analyze bilateral trade flows as the standard gravity model predicts that countries with similar levels of output per capita will trade more than countries with different levels. In general, the smaller the difference in the Per Capita GDP between two countries, the more similar will be their trade preferences and the higher the expected trade. It is calculated as the absolute value of the difference between The Gambia's per Capita GDP and that of its partner countries. The coefficient of the PCGDPD is expected to be positive or negative depending on the similarities between the two countries PCGDP. A negative coefficient ($\beta_3 < 0$) follows the Linder hypothesis which predicts that The Gambia is expected to trade more with those countries it has similar levels of Per Capita GDP that with dissimilar levels. On the other hand, a positive coefficient ($\beta_3 > 0$) follows the Heckscher-Ohlin which predicts that

The Gambia is expected to trade more with those countries it has dissimilar levels of Per Capita GDP that with similar levels.

Population served as an estimate for market size between The Gambia and all partner countries. The larger the market size of an exporting country the more it produces and export to other nations and the higher the absorption rate domestically. On the other hand, the larger the population size of an importing country the larger the market size and the more it imports. Hence, market size is expected to turn out with a positive sign (i.e., $\beta_4, \beta_5 > 0$).

The Real Bilateral Exchange Rate refers to the value of The Gambian Dalasi relative to a partner country currency. It is the price of The Gambian Dalasi expressed in terms of the currency of a foreign trading partner. Following (Bonuedi, 2013) the RBER is calculated as the Nominal Bilateral Exchange Rate (NBER) multiplied by the ratio of foreign price index (P_j) to Gambia's price index (P_i). That is,

$$RBER_{ijt} = NBER_{ijt} \frac{P_j}{P_i}$$

The NBER is calculated as the ratio of the exchange rate (LCU Per USD) between the Gambia and partner countries. However, the NBER is expressed as the national currency of each country per US dollar.

With this formula, the RBER helped explain the trade variation among participating countries. An increase in the exchange rate means that Gambia's currency devalued, as a result import would be more expensive, and exports would be cheaper. On the other hand, a decrease in real exchange rate means that Gambia's currency appreciates, leading to an increase in imports. In brief, RBER coefficient can be positive or negative in the gravity model (i.e., $\beta_6 \gtrless 0$).

Distance served as a proxy for transportation cost in the traditional gravity model. In this study, it is calculated as the distance in kilometers between Banjul, the capital city of The Gambia, to the capital of partner countries. Moreover, it is expected that the greater the geographical distance between The Gambia and a partner country, the higher the associated transaction costs. The lower the distance it is expected the lower the transaction costs. The distance variable is expected to have a negative impact on bilateral trade flows (i.e., $\beta_7 < 0$).

Dummy variable for Common Language is included to capture the impact of historical and cultural links between The Gambia and partner countries. Sharing similar language is expected to reduce the transaction cost of trading between nations by facilitating and expediting trade negotiations. The value is equal to 1 if the countries share common languages English, Mandinka, Wolof or Fula with The Gambia, 0 otherwise. The coefficient is expected to be positive (i.e., $\beta_8 > 0$).

Another dummy variable included is regional trade agreement. To facilitate trade, countries often enter into a regional trade agreement with partners to increase the market size of member countries and attract non-members to transact business with them. A value of 1 is set if a partner country belongs to the ECOWAS as The Gambia, 0 otherwise. We expect the variable to be positive (i.e., $\beta_9 > 0$). As before, result might be unexpected because of the presence of non-tariff barriers among ECOWAS countries

Finally, a dummy for EU membership is included to take into account if a partner country is a member of the European Union since the EU represents one of the largest trading partner regions with The Gambia. It is equals to 1 if a partner country is a member of the EU, 0 otherwise. The coefficient is expected to be positive (i.e., $\beta_{10} > 0$).

Table 1 – Descriptive Statistics

Variable	Obs	Mean	Std.Dev	Min	Max
Trade*ij*	480	12167.75	23289.79	23.676	201195.6
GDP*i*	480	1.43e+09	2.2e+08	1100000000	1.91e+09
GDP*j*	480	1.7e+12	3.24e+12	661000000	1.83e+13
PCGDPD*ij*	480	20405.99	19910.94	1.917539	55070.97
Population*i*	480	1792195	311982.9	1317703	2347703
Population*j*	480	1.53e+08	3.46e+08	1201301	1.4e+09
RBER*ij*	480	16.54511	18.17238	0.0021999	62.04825
Distance*ij*	480	5259.377	4118.144	157.8271	13335.56
ECOWAS	480	0.333333	0.471896	0	1
LANGUAGE	480	0.583333	0.493521	0	1
EU	480	0.291667	0.455004	0	1

Source: Author's computation using Stata 15.1

3.3 Econometric Methodology

Classical gravity models generally used cross-section data to estimate bilateral trade flows between countries for a particular time period. While cross-section data is still being used in analyzing bilateral trade flows (Siliverstovs and Schumacher, 2008), researchers have indicated methodological flaws in the development of the gravity model using cross-section framework as it does not allow for heterogeneity in the regression equation (Chegg and Wall, 2005). In view of this, a panel data framework is being implemented to estimate the gravity equation. The use of

panel data framework has several advantages over cross-section analysis. First, the use of panel data provides a more accurate way of controlling for unobservable heterogeneity by allowing for individual specific effects. Second, panel data makes it possible to capture the relevant relationships among variables over time. Finally, panel data can help to assess levels and trends over time. Therefore, we have used panel data methodology for the analysis of our empirical gravity model of trade estimation.

There are numerous panel data techniques being implemented by researchers in the estimation of gravity model. The three main models include **Pooled OLS**, **Fixed Effects** and **Random Effects**. Each model has its own advantages, disadvantages, and motivation of its use. To decide which model to choose, we need to consider the data properties as well as the results of the tests.

The **pooled OLS** is the most basic model for analyzing gravity model using panel data. The pooled model specifies constant coefficients which is the usual assumption for cross section analysis. It is the most restrictive panel data model, and it is not used much in literatures. In panel data, Pooled OLS can be used to derived unbiased and consistent estimates of parameters if all the assumptions of the classical linear regression models are met. However, it is impossible to satisfy all the assumptions required since each entity has its individual characteristics called the individual effects which can affect the explanatory variables. For example, the quality of institutions although not included in the model, will likely affect the bilateral trade flow between two countries. Hence, adopting Pooled OLS model can lead to bias estimates if individual effects are correlated with the regressors. If individual effects exist and must be reflected in the model, then the Fixed effect and the Random effect will be the more preferred model. However, if individual effects do not exist, the pooled OLS model will be the best choice. The **Breusch-Pagan LM** test will be applied to

select which of Pooled or Random and Fixed effect is the most appropriate model for interpreting the estimate results.

In our estimation, since the individual/country effects δ_{ij} are present in the regression, we have to decide whether they are treated as fixed or random. The **Fixed Effect Model (FEM)** will be selected if there is a correlation between the individual effects and the explanatory variables. Thus, the impact of the individual effects will be controlled and separated from the explanatory variables to estimate the net effects of the explanatory variables on the dependent variable. Meanwhile, if there is no correlation between the individual effects and the explanatory variables, then the **Random Effect Model (REM)** is more effective (Gujarati, 2003). In another statement, (Egger, 2000) stated that the FEM would be more appropriate when estimating typical trade flows between an ex-ante predetermined selection of nations. On the other hand, the REM would be a better choice when estimating typical trade flows between a randomly drawn sample of trading partners from a larger population. Since our study includes trade flows between The Gambia and 24 of its main trading partners, our intuition leads us to believe that the FEM will be more appropriate than the REM. However, the study applies the **Hausman test** to check whether the FEM is more efficient. This will be the case under the null hypothesis that the two estimation methods are both consistent and should therefore yield coefficients that are similar. The alternative hypothesis is that the coefficients are different, and we will need to use the FEM. A significant Hausman test means a large and significant difference between the two estimated coefficients, and so we reject the null hypothesis that the two methods are consistent in favor of the alternative that the Fixed Effect is efficient.

A major concern with the FEM is that we cannot directly estimate variables that do not change over time, due to the complete elimination of all time invariant variables during the regression.

However, following (Zarzoso and Lehmann, 2002), these variables can be easily estimated by running a secondary regression with the individual/country specific fixed effects δ_{ij} as the dependent variable and distance and dummies as explanatory variables.

$$\boldsymbol{IE_{ij} = a_0 + a_1 D_{ij} + a_2 ECOWAS + a_3 LANG + a_3 EU + \mu_{ij}} \quad \ldots\ldots\ldots\ldots\ldots \quad (\mathbf{5})$$

Where IE_{ij} denotes the individual/country specific effects and all other variables are as defined before.

3.4 Panel Unit Root Test

Before estimating the gravity model in equation 4, it is necessary to perform a pre-estimation test to analyze the univariate characteristics of the data to avoid the possibility of spurious regression normally associated with the time series component of panel data estimates. The pre-estimation test used in this study is the panel unit root test. The study employs the test to ascertain the stationarity properties of the time variant variables in the data series, meaning, whether the variables exhibit a constant mean and variance. If all the variables in the model are stationary at levels, then the traditional OLS estimation technique can be applied to estimate the relationship between the variables. If any of the variable is nonstationary at levels, then it should be replaced by its first difference. A second difference is applied if any of the variables are nonstationary at first difference. However, if the problem continues, a test for cointegration is required.

There are different types of unit root tests suggested by different authors. This study employs the panel unit root tests developed by **Levin Lin and Chu (LLC), (2002)**, and **Im Pesaran and Shin (IPS), (2003)** to assess the stationarity of the variables. Both tests assumes that the autoregressive

parameters are common across cross-section with null hypothesis of a unit root (Eita and Jordaan, 2007). However, results from the IPS might not be consistent with the inherent nature of the panel data since the IPS lead us to believe that the whole data is stationary only if one of the series is stationary. Therefore, the LLC test is employed as a robustness check to establish stationarity in the variables.

3.5 Econometric Issues

Here we address some of the econometric issues that might arise in estimating the gravity equation. However, we focus on only those issues that might have significant effects on our estimated results.

3.5.1 Unobserved Heterogeneity

Unobserved heterogeneity is one issue that must be taken into consideration in estimating the gravity model. It is defined as differences across units of analysis that are not measured, influence the outcome, and may correlate with observed characteristics of interest (Nunez, 2018). Although its origin and form might be different, it always poses the same problem: if ignored and correlates with the covariates of interest, it leads to biased and inconsistent estimates of the variables of interest. However, this issue is addressed once we employ the panel fixed effect model in estimating our data. Pane fixed effect model allow researchers to control from the possibly correlated, time invariant heterogeneity without observing it. Although the Hausman test still needs to be applied to verify if the fixed effect is the right model to implement.

3.5.2 Endogeneity

Bergstrand (1985, 1989) argues that GDP (economic size) can be treated as exogenous variable in the estimation of the gravity model. However, there is theoretical and empirical support that trade

can also affect GDP. The possibility of endogeneity on these variables therefore may arise and the effect of income on trade may be misleading. Like unobservable heterogeneity, panel fixed effect model is one possible way to solve the problem of endogeneity. Nevertheless, endogeneity bias is not a simple violation to deal with. The fixed effect model might prove unsuccessful to eliminate other sources of endogeneity bias as it only takes care of those biases arising from omitted variables that are constant over time. Therefore, an alternative way to deal with the endogeneity concerns is through instrumental variables (IV) techniques, as suggested by Anderson (1979), where lagged values of GDP and population is used as instruments. The use of the instruments does not change the coefficients of any of the variables to any significant effects, implying that endogeneity of income (GDP), if it exists at all, does not lead to any significant misrepresentation of the initially predictive relationship in the gravity model. However, the populations of trading partners are often heterogenous (Gul and Yasin, 2011). Notwithstanding, there are other possible ways of dealing with the endogeneity problem as suggested by different authors, each with its own advantages and flaws. Therefore, it is important to confine ourselves to the specification of the fixed effect model as a possible remedy for the endogeneity issue for the purpose of this study.

3.5.3 Multicollinearity

Multicollinearity exists when there is high correlation between two or more independent variables in a model. Other things being equal, an independent variable that is very highly correlated with one or more independent variables will have a relatively large standard error. This implies that the partial regression coefficient is unstable and will likely vary from one sample to the next (Allen, 2004). Therefore, in estimating the gravity model all variables are tested for multicollinearity to prevent unreliable and unstable results of our estimates. Simple correlation is being used to test for multicollinearity in our specification. To apply the simple correlation rule, each independent

variable of the model is regressed on the remaining independent variables. If the correlation between any two variables is greater than 0.5, then we conclude that there is severe multicollinearity between those variables. However, if there are several correlations of sufficient magnitude, then our model needs to be corrected to consider the issue of multicollinearity.

CHAPTER FOUR

RESULTS PRESENTATION AND ANALYSIS

4.1 Introduction

This chapter presents and analyze the empirical findings of the gravity models of bilateral trade flows between The Gambia and its 24 major trading partners. Panel unit root tests are employed first to assess the stationarity of all the variables. Secondly, the chapter analyze the econometric issues that might arise in estimating the gravity model. Finally, results of the OLS estimation techniques (Pooled, FEM and REM) are presented and discussed to establish the relationship between the variables.

4.2 Results of Panel Unit Root Tests

As a pre-estimation test for the gravity model, a panel unit root test was carried out to establish the stationarity properties of all time variant variables. This is achieved by employing the LLC and the IPS unit root tests on the variables over the estimated period of 20 years. These tests assume under the null hypothesis that Panels contain unit roots and the alternative that panels are stationary. The panel unit root test was used with 1 lag specification regarding the LLC and the IPS tests. Both tests were conducted with and without the inclusion of time trend to ascertain the stationarity properties of all the variables. The results are presented in Table-2.

The LLC test results show that all the variables except population of partner countries (Pop_j) and Real Bilateral Exchange rate ($RBER_{ij}$) are non-stationary at level. With the inclusion of time trend, the LLC test reveals that GDP of partner countries (GDP_j), Per Capital GDP differential

Table-2: Panel Unit Root Tests Results

	LLC		IPS		LLC		IPS	
	Level		Level		First-Difference		First-Difference	
Variables	**Constant**	**Constant + trend**	**Constant**	**Constant + trend**	**Constant**	**Constant + trend**	**Constant**	**Constant + trend**
$Trade_{ij}$	1.203	-0.604	1.977	0.628	-9.291***	-7.441***	-11.43***	-9.502***
	(0.886)	(0.273)	(0.976)	(0.735)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_i	8.197	3.248	12.407	1.303	-10.30***	-10.14***	-8.70***	-6.090***
	(1.000)	(0.999)	(1.000)	(0.904)	(0.000)	(0.000)	(0.000)	(0.000)
GDP_j	0.471	-1.893**	7.603	1.752	-6.541***	-----	-6.28***	-4.849***
	(0.993)	(0.029)	(1.000)	(0.960)	(0.000)	-----	(0.000)	(0.000)
$PCGDPD_{ij}$	-0.911	-3.313***	2.092	-0.451	-8.795***	-----	-8.15***	-5.904***
	(0.181)	(0.001)	(0.982)	(0.326)	(0.000)	-----	(0.000)	(0.000)
Pop_i	13.942	1.242	12.979	10.783	-11.09***	-47.24***	11.38***	-38.21***
	(1.000)	(0.893)	(1.000)	(1.000)	(0.000)	(0.000)	(0.000)	(0.000)
Pop_j	-6.873***	-14.80***	1.399	-16.94***	-----	-----	-5.89***	-----
	(0.000)	(0.000)	(0.919)	(0.000)	-----	-----	(0.000)	-----
$RBER_{ij}$	-9.773***	-10.238	-8.847***	-5654***	-----	-----	------	-----
	(0.000)	(0.000)	(0.000)	(0.000)	-----	-----	------	-----

Source: Author's construction using Stata 15.1
*Note: *** and ** indicate statistical significance at 1% and 5% levels respectively.*

($PCGDPD_{ij}$) and partner countries population (Pop_j) achieved stationarity at their levels; however other variables remain non-stationary indicating the presence of unit root in the variables. The IPS test under the same specification yielded different result as the LLC test, with only Real Bilateral Exchange Rate ($RBER_{ij}$) achieving stationarity at levels both with and without the inclusion of time trend. In addition, partner countries population achieve stationarity at levels only with the inclusion of time trend. All other variables are non-stationary at level both with and without the inclusion of deterministic time trend indicating the presence of unit root.

The results of Table-2 also reveal that all the variables that were non-stationary at levels achieved stationarity after first differencing the data series with and without the inclusion of deterministic time trend. Therefore, both the LLC and the IPS tests strongly reject the null hypothesis of the presence of unit root in all the variables after first differencing the data, suggesting the existence of stationarity in all the variables.

4.3 Results of Multicollinearity Test

From Table-3 below, only few independent variables exhibit a sign of multicollinearity with other independent variables. The unconditional correlation between bilateral trade flows and the independent variables are weak, indicating that multicollinearity is not an issue in our specification of the gravity model.

Table-3: Correlation coefficients

Variables	$Trade_{ij}$	GDP_i	GDP_j	$PCGDP_{ij}$	Pop_i	Pop_j	$RBER_i$	Dis_{ij}	ECO	$LANG$	EU
$Trade_{ij}$	1.00										
GDP_i	0.23	1.00									
GDP_j	0.35	0.09	1.00								
$PCGDPD_{ij}$	-0.14	0.07	0.39	1.00							
Pop_i	0.23	0.97	0.09	0.07	1.00						
Pop_j	0.66	0.02	0.37	-0.22	0.02	1.00					
$RBER_i$	-0.10	0.06	0.29	0.85	0.07	-0.19	1.00				
$Distance_i$	0.23	-0.00	0.23	0.21	-0.00	0.44	-0.06	1.00			
$ECOWAS_i$	-0.11	0.00	-0.36	-0.71	0.00	-0.25	-0.56	-0.71	1.00		
$LANG$	-0.13	0.00	-0.05	-0.47	0.00	-0.05	-0.47	-0.36	0.60	1.00	

EU	-0.11	0.00	-0.02	0.65	0.00	-0.21	0.73	-0.10	-0.45	-0.76	1.00

Source: Author's construction using Stata 15.1

4.4 Empirical Results of the Estimated Pooled OLS, Fixed Effects and Random Effects Models

We estimated the augmented gravity model in equation (4) for aggregate trade flows using several methodologies. In doing so, it is imperative to select an appropriate estimation strategy to consider heterogeneity issues arising from individual and time specific effects in the gravity model. This is achieved by employing the pooled OLS, Fixed effects (FE) and Random effects models, with total bilateral flows as dependent variable. The results are shown in Table-4.

The results from the Pooled regression in column 2 of Table-4 revealed that Gambia's GDP and population are found to have positive but insignificant effect in the determinants of Gambia's bilateral trade flows. However, GDP and population of partner countries as well as Real bilateral exchange rate are found to have positive and statistically significant effect on bilateral trade flows; with GDP of partner countries and Real bilateral exchange rate being statistically significant at the 5% significance level while population of partner countries is found to be significant at the 10% level. Distance and dummy variables (ECOWAS, Language, EU) are found to exert negative effects on The Gambia's bilateral trade flows. While these variables are found to be highly significant at the 1% significance level, the coefficients however, except distance, bear negative signs, inconsistent with our theoretical expectations.

One major limitation associated with the pooled OLS is that it does not allow for heterogeneity of countries. That is, it does not estimate individual, or country specific effects associated with the

Table-4 Regression Estimates of the Gravity trade model for The Gambia

Estimated Method	**Pooled Regression**	**Panel Regression**	
Coefficient	**Pooled OLS**	**FE**	**RE**
$Constant$	-37.674**	-88.453***	-40.156***
	(0.026)	(0.000)	(0.000)
$lnGDP_{it}$	1.202	1.272	1.266
	(0.507)	(0.193)	(0.205)
$lnGDP_{it}$	0.367**	0.823**	0.943***
	(0.021)	(0.018)	(0.001)
$lnPCGDP_{ijt}$	-0.300***	-0.250***	-0.3294***
	(0.003)	(0.001)	(0.000)
$lnPopulation_{it}$	1.347	-0.732	0.670
	(0.394)	(0.431)	(0.460)
$lnPopulation_{jt}$	0.256*	3.486***	0.233
	(0.112)	(0.000)	(0.501)
$lnRBER_{ijt}$	0.090**	0.209	0.112
	(0.035)	(0.271)	(0.421)
$lnDistance_{ijt}$	-1.103***	dropped	-1.576***
	(0.000)	-----	(0.004)
$ECOWAS$	-2.050***	dropped	-0.469
	(0.000)	-----	(0.770)
$LANGUAGE$	-1.030***	dropped	-1.412
	(0.000)	-----	(0.237)
EU	-0.992***	dropped	-1.513
	(0.003)	-----	(0.284)
Adjusted R-squared	0.621	0.574	0.564
No of Countries	24	24	24
Breusch-Pagan LM test	-----	-----	2139.24***
	-----	-----	(0.000)
Hausman test [χ^2]	-----	-----	32.36***
	-----	-----	(0.000)

Source: Author's computation using Stata 15.1

*Note: ***.**. and * indicate statistical significance at 1%, 5% and 10% level respectively. The values in parenthesis are the p-values of associated with parameters.*

panel structure of the pooled data and assumes that all countries are homogenous. This disregard for the effects of unobservable heterogeneity translates into biased and inconsistent estimates of

bilateral trade flows as demonstrated in the study by Cheng and Wall (2005). The Breusch-Pagan LM test was performed to check whether individual effects from the entities do exist in our gravity model of bilateral trade flows. Results from the test reported in Table-4, show that the LM test is highly significant (with a *p*-value of 0.000). This indicates that the Pooled OLS results are biased, and we must select a model that considers individual/country specific effects.

Table-4 still presents the estimation results of the augmented FE and the RE models to address the concern of the biased estimates of the pooled OLS model. The estimates of the country specific-effects are treated as fixed under the FE model and random under the RE model. However, to distinguish between the two models, we test for the null hypothesis that the explanatory variables and the individual/country effects are uncorrelated using the Hausman test. The REM will be preferred if the null hypothesis hold, otherwise the FEM will be preferred.

From the result in Table-4, the Hausman test statistic for the gravity model is 32.36 with a *p*-value of 0.000. since the *p*-value is highly significant, the Hausman test strongly reject the null hypothesis that there is no correlation between the explanatory variables and the individual/country specific effects. The rejection of the null hypothesis leads us to select the FEM over the REM. Since the fixed effect estimates are found to be consistent, our analysis will focus on the fixed effect model. Results of the FEM is shown on the same table.

The coefficients of Gambia's GDP and GDP of partner countries are found to be positive as expected. This implies that The Gambia tends to trade more with larger economies. Specifically, the estimated result show that a 1% increase in domestic GDP increases The Gambia's total bilateral trade flows by 1.27%, whilst the same percentage increase in the GDP of partner countries increases total bilateral trade flows by 0.8%. However, the coefficient of Gambia's GDP is found

to be insignificant,[12] whereas the coefficient of partner countries GDP is significant at the 5% level. This suggest that the larger the economic size of a foreign country, the larger the total bilateral trade flows between The Gambia and that specific country.

However, the coefficient of per capita GDP differential is found to be negative and highly significant at the 1% significance level. That is a 1% increase in the per capita income differential between The Gambia and partner countries decreases total bilateral trade flows by 0.250%. This suggests that The Gambia's total trade with its trading partners decreases as the difference between its per capita income and that of its trading partners increases. This goes in parallel with the Linder hypothesis theory which states that the smaller the difference in the per capita income between two countries, the smaller will be their demand structure and the higher and the higher the volume of trade between the two countries. In the same way, the result goes against the H-O model which predicts that countries with similar levels of per capita income will trade less than countries with dissimilar levels of per capita income (Bonuedi, 2013). The result concurs with our theoretical expectation of the gravity model of trade.

Unexpectedly, The Gambia's population is found to have a negative effect on total bilateral trade flows. With a coefficient of -0.732 indicating that a 1% increase in The Gambia's population decreases bilateral trade flows by 0.73%. Although the result is statistically insignificant, however, it can be attributed to the high absorption effect of the domestic market size (i.e., high domestic consumption market in The Gambia). On the other hand, the coefficient of partner countries population goes in line with our theoretical expectation. That is, the results are positive and highly significant at the 1% significance level. A 1% increase in the population of partner countries

[12] The insignificance in the coefficient of Gambia's GDP might be due to the smallness in the economic size of The Gambia. The economy does not produce much to trade with the rest of the world.

increases bilateral trade flows by 3.486%. Intuitively, an increase in the market size of partner countries is an indication of high market demand of goods and services from the world market. This stimulates The Gambia's export market and thus increase bilateral trade flows.

The estimated coefficient for real bilateral exchange rate is found to be positively correlated but statistically insignificant in the determinants of The Gambia's bilateral trade flows. From the results in Table-4, a 1% depreciation in The Gambian Dalasi against the foreign currency of trading partners leads to a 0.209% increase in total bilateral trade flows as a result of the relative competitiveness of The Gambia's export to the world market.

As reported in equation (4), the FEM does not estimate time invariant variables, due to the complete elimination of such variables during the within transformation. This problem is easily remedied by running a secondary regression with the individual/country specific fixed effects δ_{ij} as the dependent variable and distance and dummies as explanatory variables. Table-5 presents the results obtained. According to our findings, distance is found to be statistically significant and bears a negative coefficient consistent with our prior expectation. That is to say, whenever the distance of a partner from The Gambia widens by 1%, total bilateral trade flows deteriorate by 3.788%. As a proxy for trade cost, the farther apart countries are from Banjul (capital city of The Gambia), the higher the associated transaction costs, and the lower the bilateral trade flows. Results of the dummy variables indicate that only EU membership is statistically significant at the 10% significance level. That is, bilateral trade flow between The Gambia and a partner country is expected to increase by 1.388%, if the partner country is a member of the EU. However, language and ECOWAS dummies proved insignificant in the determinants of Gambia's bilateral trade

flows.[13] Although ECOWAS membership presents the expected positive coefficient. A slightly low R-squared was obtained, which means that there are other determinants of bilateral trade flows, different from the ones included in the analysis, which should be investigated. This is consistent with the result obtained by Zarzoso and Lehmann (2003).

Table-5: Individual effects regressed over distance and dummies

Independent variables	Coefficients
$Constant$	30.399***
	0.000
$lnDistance_{ijt}$	-3.788***
	0.000
$ECOWAS$	0.420
	0.677
LANGUAGE	-0.641
	0.406
EU	1.388*
	0.090
Adjusted R-squared	0.487

Source: Author's computation using Stata 15.1

*Note: All variables except dummies are expressed in natural logarithms. Results are based on cross-section regression of individual effects. ***.**. and * indicate statistical significance at 1%, 5% and 10% level respectively. The values in parenthesis are the p-values of associated with parameters.*

[13] ECOWAS membership might be insignificant due to the existence of unnecessary trade barriers among ECOWAS countries like non-tariff barriers including unnecessary checkpoints and excessive documentation requested at borders

CHAPTER FIVE

CONCLUSION, SUMMARY AND POLICY RECOMMENDATIONS

5.1 Introduction

This chapter discusses the empirical findings of the research in relation to the objectives of the study and highlight some policy recommendations for policy-makers aimed at improving The Gambia's bilateral trade flows. The first section presents the summary and the conclusion of the study while policy recommendations are given out in the second section.

5.2 Summary and Conclusion

The overriding objective of this study was to analyze the determinants of Gambia's bilateral trade flows within the framework of panel data. With this aim we apply the gravity model to annual bilateral trade flows between The Gambia and 24 of its major trading partners for the period 2000 to 2019.

In estimating the gravity model of total bilateral trade flows, our results shows that The Gambia's bilateral flows is determined by the economic size (GDP) and market size (population) of partner countries. The higher the GDP of a partner country, the higher the demand for The Gambia's export and thus the higher the total bilateral trade flows. Similarly, the higher the population growth in the partner countries, the higher the market demand of goods and services from the rest of the world to sustain the expanding population. However, GDP and population of The Gambia as well as real bilateral exchange rate does not have any significant effects on total bilateral trade flows based on the fixed effect estimates. Per capita GDP differential is found to be perfectly significant in determining total bilateral trade flows with a negative coefficient.

We investigated the role that distance, and dummy variables play as explaining bilateral trade flows by running a secondary regression with the individual/country specific effects as the dependent variable. Our findings support the hypothesis of the importance of these variables since they are all statistically significant and present the expected sign, apart from dummies for ECOWAS membership and language. Our results concerning distance provide some useful insights. Viewing distance as a proxy for trade cost, the larger the distance between The Gambia and a partner country, the higher the associated transaction cost, and the lower the bilateral trade flows. Likewise, the shorter the distance the higher the bilateral trade flows. However, belonging to EU membership is found to have significant effects on total bilateral trade flows. While ECOWAS membership and sharing common official languages proved insignificant in the determinants of The Gambia's bilateral trade flows.

In conclusion, our findings lend support to the famous Linder hypothesis, instead of the Heckscher-Ohlin hypothesis, meaning that The Gambia is expected to trade more with those countries it has similar levels of Per Capita GDP that with dissimilar levels. However, results also show that The Gambia tends to trade more with EU countries that ECOWAS countries. This can be attributed to the existence of non-tariff trade barriers among ECOWAS countries. Therefore, it is safe to say that trade between The Gambia and fellow ECOWAS countries is yet to fully exploit its full potential. Moreover, given the changing pattern in the direction of Gambia's bilateral trade flows from the traditional towards the emerging economies, our study unambiguously indicates the relevance of the gravity model in predicting The Gambia's bilateral trade flows as most variables present their expected sign.

5.3 Policy Recommendations

Based on the findings of the study, the following recommendations have been made.

Firstly, since results obtained from the study shows that geographical distance influence The Gambia's bilateral trade flows negatively. As the distance between The Gambia and partner countries gets larger, so does the transportation cost and therefore a lower bilateral trade flow. In this sense, it will be more profitable if The Gambia trade with neighboring countries, such that the gains outweigh the transportation cost. The Gambia should therefore take the advantage of geographical proximity to trade more with ECOWAS member countries. To achieve this however, there is the need for the urgent removal of all trade barriers among member states of the ECOWAS sub-region.

Secondly, it is highly recommended that government policies need to be directed on developing bilateral trade agreements with partner countries to boost export value between The Gambia and such countries. Since market and economic size of partner countries are key determinants of The Gambia's bilateral trade flows, such agreement will strengthen trade ties and hence increase the demand of Gambia's goods and services from such countries.

Finally, The Gambia government should focus on promoting growth-enhancing policies to boost domestic GDP as well as per capita GDP. This is because a higher GDP is an indication of the improvement of the total value of final goods and services produced locally and ready for export. This implies that a rise in the total value of final goods and services improve the productivity and competitiveness of The Gambia's economy in the long run, which will in turn, reduce the domestic currency from depreciation and ensure the desired stability to the economy

REFERENCES

Gomes, L. (1987). *Foreign trade and the national economy: mercantilist and classical perspectives*. Springer.

Raymond, A. (2009). Introduction to International Economics by Dominick Salvatore: Study Guide.

Salvatore, D. (2012). *Introduction to international economics*. Wiley.

Hirschman, A. O. (1980). *National power and the structure of foreign trade* (Vol. 105). Univ of California Press.

Berkum, S. V., & Meijl, H. V. (1998). A survey of trade theories.

Jeyarajah, S. A Survey of the Evolution of International Trade Theories.

Murphy, E. (2013). *The evolution of trade theory: an exercise in the construction of surrogate or substitute worlds?* (Doctoral dissertation, SOAS, University of London).

Sen, Sunanda. "International trade theory and policy: a review of the literature." (2010).

Bernard, A. B., Redding, S. J., & Schott, P. K. (2007). Comparative advantage and heterogeneous firms. *The Review of Economic Studies*, *74*(1), 31-66.

Costinot, A. (2009). On the origins of comparative advantage. *Journal of International Economics*, *77*(2), 255-264.

Murphy, E. (2013). *The evolution of trade theory: an exercise in the construction of surrogate or substitute worlds?* (Doctoral dissertation, SOAS, University of London).

Conti, T. V. (2018). Mercantilism: a materialist approach. *Scandinavian Economic History Review*, *66*(2), 186-200.

Triulzi, U., & Montalbano, P. Federico Caffè Centre Research Report n. 2/2001 Development cooperation policy: a time inconsistency approach.

Salvatore, D. (2013). International Economics 11th ed. Hoboen: Wiley.

Hill W. L. C. (2009). *International Trade Theory* PPT Chapter 5 pp 1-65; Global Business Today, The McGraw-Hill Companies, Inc.

Salvatore, D. (1998). *International Economics*, 6th Edition, Prentice-Hall, New Jersey, United States of America.

Husted, S., & Melvin, M. (2001). International Economics, Addison Welsey Longman. *Inc., Boston*.

Jeyarajah, S. A Survey of the Evolution of International Trade Theories.

Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *The American economic review*, *69*(1), 106-116.

Thai, T. D. (2006). A gravity model for trade between Vietnam and twenty-three European countries.

Rahman, M. M. (2009). Australia's global trade potential: evidence from the gravity model analysis. In *Proceedings of the 2009 Oxford Business and Economics Conference (OBEC 2009)* (pp. 1-41). Oxford University Press.

Chan-Hyun, S. (2001). *A Gravity Model Analysis of Korea's Trade Patterns and the effects of a Regional Trade Agreement. International Centre for the study of East Asia Development*. Kitakyushu. Working Paper Series 2001-09, 1-35.

Squartini, T., & Garlaschelli, D. (2014). Jan Tinbergen's legacy for economic networks: from the gravity model to quantum statistics. In *Econophysics of Agent-Based Models* (pp. 161-186). Springer, Cham.

Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *The American economic review*, *69*(1), 106-116.

Bergstrand, J. H. (1989). The generalized gravity equation, monopolistic competition, and the factor-proportions theory in international trade. *The review of economics and statistics*, 143-153.

Bergstrand, J. H. (1985). The gravity equation in international trade: some microeconomic foundations and empirical evidence. *The review of economics and statistics*, 474-481.

Rahman, M. M., Shahbaz, M., & Farooq, A. (2015). Financial development, international trade, and economic growth in Australia: new evidence from multivariate framework analysis. *Journal of Asia-Pacific Business*, *16*(1), 21-43.

Kortum, S. S. (1997). Research, patenting, and technological change. *Econometrica: Journal of the Econometric Society*, 1389-1419.

Deardorff, A. V., & Stern, R. M. (1998). *Measurement of nontariff barriers* (Vol. 179). University of Michigan Press.

Rose, A. K., & Van Wincoop, E. (2001). National money as a barrier to international trade: The real case for currency union. *American economic review*, *91*(2), 386-390.

Helpman, E., & Krugman, P. R. (1985). *Market structure and foreign trade: Increasing returns, imperfect competition, and the international economy*. MIT press.

Martínez-Zarzoso, I., & Nowak-Lehmann, F. (2003). Augmented gravity model: An empirical application to Mercosur-European Union trade flows. *Journal of applied economics*, *6*(2), 291-316.

Osabuohien, E. S., Efobi, U. R., Odebiyi, J. T., Fayomi, O. O., & Salami, A. O. (2019). Bilateral trade performance in West Africa: A gravity model estimation. *African Development Review*, *31*(1), 1-14.

Allen, M. P. (2004). *Understanding regression analysis*. Springer Science & Business Media.

Dilanchiev, A. (2012). Empirical analysis of Georgian trade pattern: gravity model. *Journal of Social Sciences*, *1*(1), 75-78.

Schnatz, B., & Bussiere, M. (2006). *Evaluating China's integration in world trade with a gravity model based benchmark* (No. 693).

De Benedictis, L., & Taglioni, D. (2011). The gravity model in international trade. In *The trade impact of European Union preferential policies* (pp. 55-89). Springer, Berlin, Heidelberg.

Eaton, J., & Kortum, S. (1997). Engines of growth: Domestic and foreign sources of innovation. *Japan and the World Economy*, *9*(2), 235-259.

Bonuedi, I. (2013). *Determinants of Ghana's bilateral trade flows: A gravity model approach* (Doctoral dissertation).

El-Sayed, M. A. (2012). *A Gravity Model Analysis of Egypt's Trade and Some Economic Blocks*. INTECH Open Access Publisher.

Aliyu, S. U., & Bawa, S. (2015). Gravity model by panel data approach: empirical evidence from Nigeria. *International Journal of Trade and Global Markets*, *8*(1), 42-57.

Martínez-Zarzoso, I., & Nowak-Lehmann, F. (2003). Augmented gravity model: An empirical application to Mercosur-European Union trade flows. *Journal of applied economics*, *6*(2), 291-316.

"Controlling for heterogeneity in gravity models of trade and integration." (2005).

Cheng, I. H., & Wall, H. J. (2004). *Controlling for heterogeneity in gravity models of trade and integration* (No. 1999-010).

Rahman, M. M. (2003). A panel data analysis of Bangladesh's trade: the gravity model approach. In *Proceedings of the 5th Annual Conference of the European Trade Study Group (ETSG2003)*. European Trade Study Group.

Rahman, M. M. (2009). Australia's global trade potential: evidence from the gravity model analysis. In *Proceedings of the 2009 Oxford Business and Economics Conference (OBEC 2009)* (pp. 1-41). Oxford University Press.

Gani, A. (2019). Factors influencing trade between Fiji and its Asian partners.

Binh, D. T. T., Duong, N. V., & Cuong, H. M. (2011). Applying gravity model to analyze trade activities of Vietnam. In *Forum for Research in Empirical International Trade Working Paper*.

Thai, T. D. (2006). A gravity model for trade between Vietnam and twenty-three European countries.

Eita, J. H. (2008, July). Determinants of Namibian Exports: A gravity model approach. In *13th African Econometric Conference, University of Pretoria, South Africa* (pp. 9-11).

Blomqvist, H. C. (2004). Explaining trade flows of Singapore. *Asian Economic Journal*, *18*(1), 25-43.

Mukherjee, P., KUSHWAHA, V. S., & Modak, K. (2018). South Africaâ€™ s Trade with G20 and Top ten African Countries-Applying Gravity Model. *RAIS Journal for Social Sciences*, *2*(2), 25-38.

Gujarati, D. N. (2003). Basic Econometrics" fourth edition McGraw-Hill. *New York*.

Egger, P. (2000). A note on the proper econometric specification of the gravity equation. *Economics Letters*, *66*(1), 25-31.

Anderson, J. E. (1979). A theoretical foundation for the gravity equation. *The American economic review*, *69*(1), 106-116.

Gul, N. (2011). The Trade Potential of Pakistan: An Application of the Gravity Model Nazia Gul and Hafiz M. Yasin. *Lahore Journal of Economics*, *16*(1), 23-62.

Orindi, M. N. (2010). *Determinants of Kenyan exports: A gravity model approach* (Doctoral dissertation, University of Nairobi, Kenya).

Jakab, Z. M., Kovács, M. A., & Oszlay, A. (2001). How far has trade integration advanced?: An analysis of the actual and potential trade of three Central and Eastern European countries. *Journal of Comparative Economics*, *29*(2), 276-292.

Kang, J. W., & Dagli, S. (2018). International trade and exchange rates. *Journal of Applied Economics*, *21*(1), 84-105.

Ranajoy, B., & Banerjee, T. (2006). *Does the gravity model explain india direction of trade? a panel data approach* (No. WP2006-09-01). Indian Institute of Management Ahmedabad, Research and Publication Department.

Allen, M. P. (2004). *Understanding regression analysis*. Springer Science & Business Media.

Anderson, J. E., & Van Wincoop, E. (2001). Borders, trade and welfare.

Ministry of trade, Industry, Regional integration, and Employment. Gambia External Trade statistics (2011, 2019).

World Trade Organization. Trade Policy Review, The Gambia (2017).

Gambia Bureau of Statistics. Trade Report

Tinbergen, J. (1962). Shaping the world economy; suggestions for an international economic policy.

Pöyhönen, P. (1963). A tentative model for the volume of trade between countries. *Weltwirtschaftliches Archiv*, 93-100.

Krugman, P. R. (2009). Maurice Obstfeld International Economics: Theory & Policy.

APPENDICES

Appendix I: List of 24 Main Trading Partner Countries of The Gambia

1. Belgium	13. Republic of Korea
2. Canada	14. Mali
3. China	15. Netherlands
4. Cote d'Ivoire	16. Nigeria
5. Finland	17. Senegal
6. France	18. Sierra Leone
7. Germany	19. South Africa
8. Ghana	20. Spain
9. Guinea	21. Thailand
10. Guinea-Bissau	22. United Kingdom
11. India	23. United States
12. Italy	24. Hong Kong SAR, China

Appendix II: Partner Countries and their Individual/Country Specific-Fixed Effects

Country	Country Specific-Fixed Effects	Country	Country Specific-Fixed Effects
Belgium	4.601335	Republic of Korea	-2.110133
Canada	-3.433468	Mali	4.060303
China	-12.31285	Netherlands	3.087637
Cote d'Ivoire	5.831247	Nigeria	-7.877874
Finland	3.956333	Senegal	8.185566
France	-3.119246	Sierra Leone	8.106459
Germany	-4.074691	South Africa	-1.897825
Ghana	0.559355	Spain	-1.640209
Guinea	6.642598	Thailand	-1.714772
Guinea-Bissau	14.42192	United Kingdom	-2.373132
India	-12.45015	United States	-9.596784
Italy	-3.600595	Hong Kong, China	5.92402