UNIVERSITY OF GHANA

Determinants of Ghana's Non-Traditional Export: A case of the Manufacturing Sub-sector

BY

Nana Ama Attaa Kwayowah Ofosu
(10569813)

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DECLARATION

This is to certify that this thesis is the result of research undertaken by **NANA AMA ATTAA KWAYOWAH OFOSU** towards the award of the Masters of Philosophy (MPhil) degree in the Department of economics, University of Ghana.

.....

NANA AMA ATTAA KWAYOWAH OFOSU

(STUDENT - 10569813)

DATE: 6th February 2023

Abena Oduro

PROF ABENA D. ODURO

(SUPERVISOR)

DATE: 6th February 2023

.....

PROF EBO F. TURKSON

(SUPERVISOR)

DATE: Feb. 6th 2023

ABSTRACT

Earnings from Ghana's non-traditional export sector (NTEs) have been substantially bolstered by contributions from the manufacturing sub-sector of the NTEs from 2005 to 2021 although the country has comparative advantage in producing and exporting agricultural products. Considering how important the manufacturing sub-sector is to Ghana's NTE earnings, this study identified the determinants of Ghana's NTEs manufactured exports and how trade costs associated with the sub-sector influenced its exports. This study further investigated the determinants of trade costs associated with Ghana's NTE manufactured exports. The gravity model of trade was utilized to investigate variables of interest. Panel dataset of Ghana and 65 of its trading partners was used. The dataset covered from 2009 to 2019. The Random effects model (REM) was used to ascertain the effect of variables such as infrastructure, Ghana's GDP and GDP of trading partners, the difference in GDP per capitas of country pairs, Ghana's population and of its trading partners, the real effective exchange rate, regional trade blocs (ECOWAS and EU), common language and geographical variables (distance, common border, and landlocked trade partner). This research revealed that Ghana's population, landlocked trading partners and the real exchange rate were negatively related to manufactured exports. A depreciation of the Ghana cedi renders manufactured exports cheaper thus increasing manufactured export flow to trading partners. The negative relationship between Ghana's population and manufactured exports implied that Ghana was a net consumer of manufactured exports hence decreasing Ghana's manufactured exports to partner countries. The analysis also proved that trading with landlocked countries which was a proxy for transportation costs will increase trade costs hence significantly decreasing Ghana's manufactured exports to such partners. These three variables were found to be key determinants of Ghana's manufactured exports to trading partners along with the importer's population, trading with partners with common borders, and ECOWAS which positively and significantly influenced Ghana's manufactured exports. For analyzing the determinants of the trade costs associated with Ghana's manufactured exports over the period 2009 to 2018, 54 trading partners were used. The findings revealed that infrastructure, transportation costs, ECOWAS, common border, and landlocked are key determinants of the trade costs associated with Ghana's NTE manufacturing sub-sector.

DEDICATION

I dedicate this to my late brother, Joseph Fiifi Okae Taylor for always being my biggest fan and the best big brother one can ask for. The past year has been overwhelming with the grief of your absence. I am grateful to still have your words hold me together.

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LIST OF ABBREVIATION

NTEs Non-traditional Exports Sector

GDP Gross Domestic Product

GEPA Ghana Exports Promotion Authority

ERP Economic Recovery Program

SAP Structural Adjustment Program

IMF International Monetary Fund

REER Real Effective Exchange Rate

1D1F One District – One Factory

NES National Export Strategy

WTO World Trade Organization

ECOWAS Economic Community of West African States

EU European Union

CHAPTER ONE

1.0 INTRODUCTION

1.1 Research Background

Many economies especially those of developing countries such as Ghana deem economic growth necessary for economic development. Economic growth which will improve standard of living often comes from macro-economic prosperity which is a result of an open economy. Thus, the growth of a nation's gross domestic product (GDP) is one of the important policy objectives. Export promotion strategy has been a way of growing a country's GDP. Rahman (2009) asserts that exports are essential for bridging the foreign exchange deficit in every economy by boosting a country's import capability and decreasing reliance on foreign aid to fund import activities. Strait (2012) also highlights that export promotion brings an expansion in intra-industry trade as well as minimizes how much external shocks will affect a country's economy. Taiwan, Hong Kong, Singapore and South Korea, before the 1997 Asian financial crises, were massively praised for their rapid economic growth which was through export-oriented industrialization (Krugman, 1994). The experiences of these economies highlighted the significance of exports for economic growth and development. These economies were a significant driving force behind the transition to the export of manufactured and industrialized products in other nations that were historically known for their primary product exports (Amsden, 1993).

From 1957 to 1966, the first president of Ghana after independence, Osagyefo Dr. Kwame Nkrumah pursued his ideology of 'Africanization' which involved massive import-substitution in the hope of consuming only made-in-Ghana products (Aryee, 2018). Cocoa, timber, and minerals were Ghana's first traditional exports when the country first started exporting goods. Additionally, Ghana boosted its imports of both capital goods for the purpose of investment and consumer products to accommodate the country's growing population. In order to encourage the expansion of exports, technical assistance and financial assistance were sought (Killick, 1978). In March 1964, the government of Kwame Nkrumah presented a thorough 7-year development plan from 1964 to 1970 (Jebuni et. al, 1996). According to Jebuni et al. (1996), 1969/70 was the year actual measures were developed as support to non-traditional exports. The introductory section of this

development plan primarily aimed at promoting industrialization, emphasizing the processing of raw materials prior to export to enhance the export's value. Furthermore, the seven-year plan included a second two-year plan from 1968 to 1970 with the sole goal to increase as well as to vary the product mix of Ghana's exports. The incentive structure placed a strong emphasis on promoting the export of produced goods. The Ghana Export Promotion Authority (GEPA) was initially created as part of the promotion package in 1969 and was formerly known as the Ghana Export Promotion Council with the mission to "promote, assist, and develop exports in any manner which the Council judged necessary or desirable"(Jebuni et al, 1992). The NTE sector has been the GEPA's main focus. One of the GEPA's primary objectives is to ensure that Ghana's export trade contributes to faster economic growth by strategic aggressive marketing of Made-in-Ghana products in the global economy. The NTE sector is in three categories: agricultural, processed or semi-processed, or handicrafts (WITS, 2022). Since 2014, the scope of non-traditional exports has expanded to encompass the exportation of services, representing a novel and relatively recent addition. Through this expansion, the GEPA provides export training, conducts international market research, and organizes trade fairs. In the 1970s and early 1980s, Ghana experienced economic regression due to economic mismanagement and an unfavorable global economic environment (Jebuni et al, 1992). According to Jebuni et. al (1992), the population was growing quickly, but the economy was experiencing very slow GDP growth and gross domestic investments declined. The Ghanaian currency was overvalued thus making it expensive to import both processed or semi-processes goods, which increased the country's import costs. As a result of low producer prices, Ghana's top foreign currency earner, cocoa, saw a significant decline in production. High rates of smuggling, primarily of cocoa to neighboring nations, severely decreased the economy's ability to earn foreign currency. The nation was experiencing a serious balance-of-payments crisis by 1981–1982 (Jebuni et al, 1992). The desire to diversify the economy's export base became the main factor driving interest in the NTE sector. The reduction in the world price of cocoa and the strain it inflicted on the economy underlined the necessity for broadening the country's export and production bases in order to diminish its sensitivity to changes in the global economy (Jebuni et. al, 1992). Because of the persistent tendency for over-supply and, as a result, for long-term reductions in the real prices of Ghana's traditional exports, specifically cocoa and gold, on those markets, there was a compelling argument for export diversification. The negative impact of export instability on the expansion of the economy as a result of commodity

concentration in exports was a second justification for diversification. Jebuni et. al (1992) further reports that in 1983, structural reforms recommended and supported by International Monetary Fund (IMF) were used in an attempt to resuscitate the Ghanaian economy. Adopting an outward-focused development strategy with a clear emphasis on export growth as the main route to closing the current account deficit was one of the structural reforms's tenets. The Economic Recovery Program (ERP) as a reform included increasing privatization of productive sectors, adjustments of the cedi's exchange rate, institutional transformation, and trade liberalization to favor exports and imports as well as other vital components in the program. In 1986, the Structural Adjustment Program (SAP) was introduced to support the ERP. These programs allowed export diversification by adding more products into the markets. Developing economies need export diversification to thrive and prosper as suggested by Lwesya (2016). The nominal devaluation of the exchange rate was the first significant policy adjustment linked to the implementation of the ERP since the appreciation of the cedi was considered a major reason for the economic crisis Ghana was facing. Through the SAP and the ERP, the non-traditional export sector was actively considered and provided for (Jebuni et. al, 1992).

Non-Traditional Exports (NTE) are products outside a country's traditional exports. It is reported by Kyereboah-Coleman and Biepke (2006) that in 1988 a three-year export development plan (1988-1990) was initiated by the Ministry of Trade and GEPA. This facilitated a growth of the NTE sector from US$1.9 million in 1984 when the plan was not in motion to US$62.34 million in 1990 after the plan had served its course. ISSER (1997) reports that it accounted for 6.9 percent of total exports and 1.0 percent of GDP in 1990 (ISSER, 1997). This was below the expected level considering the incentives and measures that were put in place. In the context of Vision 2020 which was prepared in 1995, the Government of Ghana expected that the total revenue by the year 2020 would be about $60 billion and NTEs alone would contribute about $12 billion of that value. However, in 2020, Ghana's export earnings were $13.1 billion according to the Observatory of Economic Complexity trade data with NTEs contributing $2.847 billion as recorded in the GEPA 2020 annual report. The 2020 GEPA annual report stated that 152 countries import Ghana's non-traditional export products. By consuming a total value of $977.68 million USD worth of NTEs, the European Union and the United Kingdom contributed 34.4% of the overall market. In spite of this, the value of the market fell by 11.57 percent in 2020 in comparison to how it performed in 2019. According to the report, the decline in import for cut pineapples, fresh bananas, and canned

tuna by trading partners was brought on by the fallout from interruptions in distribution systems. The GEPA is responsible for the non-traditional exports sector and its core activities are to provide market information to the export community, promote product development initiatives, give market penetration assistance to Ghanaian exporters, build the capacity of Ghanaian exporters and develop national export awareness (GEPA, 2015). According to the National Export Strategy, the GEPA is to serve as the central point of coordination for all of the public and private sector organizations that are engaged in the process of export trade development and facilitation.

This study's focus on the manufacturing sub-sector is driven by Ghana's evolving economic landscape, which places a significant emphasis on value addition. Ghana has outlined a comprehensive industrialization plan, encapsulated in its 10-point agenda. This includes initiatives like developing small-medium scale enterprises, diversifying exports, and the "One District, One Factory" program, resulting in the establishment of manufacturing companies such as Ekumfi Juice Factory and the Watermelon Factory in Walewale. These initiatives underline Ghana's commitment to optimizing its processed exports. Through the "One District, One Factory" initiative (1D1F), locally-owned factories are being equipped and empowered to harness the abundant local resources for manufacturing products that can compete effectively both at the domestic and international levels. This aligns with Ghana's long-term objective, as outlined in the National Export Development Strategy (NEDS) for 2012-2017. The overarching goal is to consistently raise the country's gross domestic product and generate employment opportunities by enhancing production for both domestic and international markets. The current National Export Strategy for 2020-2029 centers its focus on an integrated list of 17 priority products, signifying Ghana's commitment to further its economic growth and international competitiveness.These products include processed cocoa, cashews that have been processed and are still in the shell, horticultural products, processed oil seeds, fish and fishery products, textiles and garments, iron and steel products, natural rubber sheets, aluminum products, vehicles, sugar, industrial starch, industrial salt, pharmaceuticals, and services. The three key pillars of the NEDS are to first get a double-digit percentage of the NTEs' contribution to Ghana's total exports, second for NTEs to be dominated by manufactured products, and third for the NTEs to the African Continental Free Trade Area (AfCFTA) become the largest contributor to the NTE basket. As of 2021, the EU and the UK combine top the list with 35.96%, ECOWAS second with 32.92%, and other African countries

ranking third with 27.97% as reported by GEPA analysis of the NTE statistics. The manufacturing sub-sector of Ghana's NTEs holds much promise.

Trade costs, encompassing all expenses involved in the journey of a product from its origin to its final destination, represent a pivotal element in trade discussions. It's essential to note that these costs are separate from production costs and exclude the incremental expenses associated with goods manufacturing (Ackah et al, 2013). It comprises expenses associated with transportation, time, and local distribution, costs associated with borders, costs associated with institutions (such as costs associated with foreign currencies), and costs associated with information (i.e., contract enforcement costs, communication costs). As a result, an analysis of the impact that these costs have on Ghana's manufactured exports to its trade partners will be carried out. In recent years, a significant amount of attention has been paid to the topic of trade costs in international trade research due to the relevance of trade costs to decide the direction and volume of commerce between countries (Anderson and Wincoop, 2004). It's noteworthy that the costs associated with conducting business have shown a declining trend over the past three decades. This decline has resulted in a greater number of countries becoming more open to engaging in international trade. Within the realm of research on global trade, two predominant sources of trade costs have been identified. These are known as direct sources of evidence and indirect sources of evidence (Ackah et.al, 2013). In contrast to the direct sources of trade costs, which are obtained from data on costs from tariff and nontariff barriers and those incurred from the environment, indirect evidence has been obtained primarily through inference from trade flows. Ackah et al. (2013) measured the costs incurred from trading with Economic Community of West African States using the gravity model approach. The gravity model was also utilized by Turkson (2012) in order to determine the costs of bilateral trade in sub-Saharan Africa utilizing observable trade data.

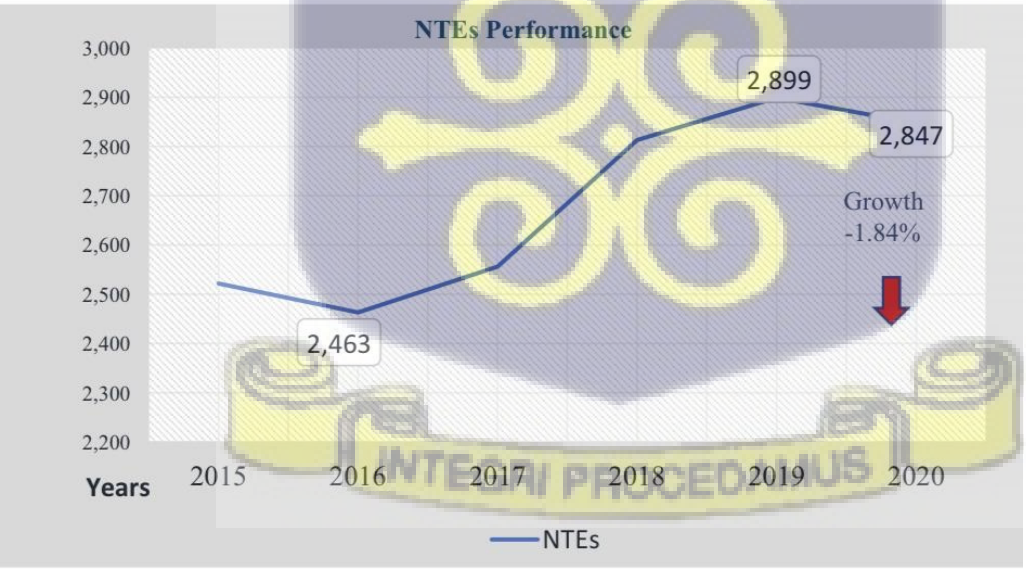
The goal of every economy that opens up to trade is to gain benefits from trade (Wacziarg, 1999). Considering the overall performance of the export sector of Ghana from 2000 to 2019 as shown in Figure 1.0, the share of the export sector earnings to GDP was at its highest from 2000 to 2003 although it was declining over time. The export sector's percentage of GDP fell further from 2006 to 2008 and eventually picked up from 2008 to 2012 before experiencing a steep decline through to 2014. The contribution of Ghana's export sector as a percentage of GDP has been steadily increasing since 2015 although 2016 and 2020 experienced declines. It is safe to point out that

Ghana's export sector can perform better than it currently is. This study focuses on the NTE sector because as shown in Figure 1.1 the growth rate of the NTE sector has been steadily increasing since 2016 although in 2020 the sector experienced a decline thus; the sector has the potential to contribute much more to GDP as a percentage when nurtured well.

Figure 1.0 Export Performance Trends of Ghana from 2000-2019

Source: World Bank, 2020

Figure 1.1 Ghana's NTEs Performance from 2015-2020

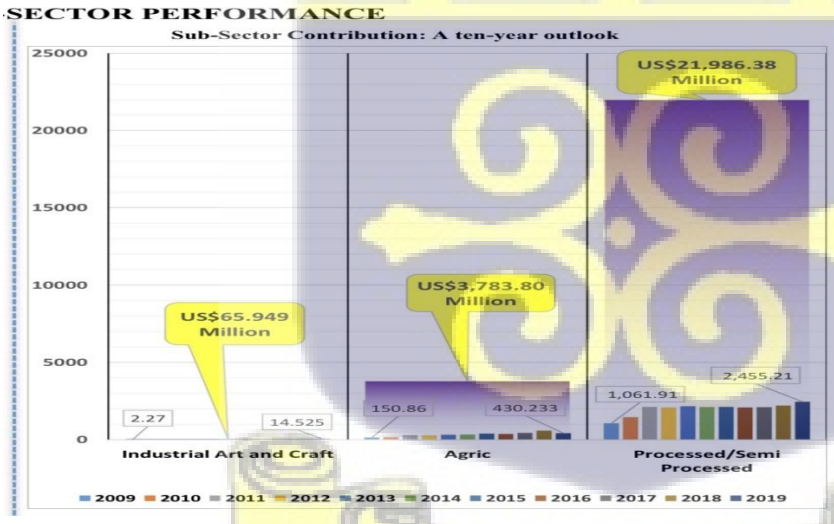


Source: GEPA report, 2021

1.2 Problem Statement

This study aims to investigate the determinants of Ghana's manufacturing sub-sector in non-traditional exports (NTEs). The motivation arises from the significant and consistently high performance of this sub-sector, contributing substantially to Ghana's NTE earnings. To address this, the study will also analyze trade costs within the manufacturing sub-sector to enhance and promote manufactured exports. These findings are essential for shaping effective policies, particularly as Ghana pursues industrialization through value addition strategies. The performance of Ghana's NTE sector sub-sectors over a decade (2009-2019) as illustrated in Figure 1.2, based on data from the GEPA, reveals that the processed/semi-processed /manufacturing NTE sub-sector consistently outperformed the agriculture and industrial art and craft sub-sectors. Notably, in 2020, the manufacturing sub-sector contributed a substantial 83.71% to total NTE earnings, solidifying its position as the most pivotal and profitable sub-sector. This robust performance underscores the potential for further expansion and its significant role in driving Ghana's economic growth. It is this promising outlook that motivates the government's transformation plan, which seeks to accelerate industrialization and value addition to propel economic growth.

Figure 1.2. NTE Sub-Sector of Ghana Performance from 2009-2019



Source: GEPA, 2019

1.3 Research Questions

In examining the factors determining Ghana's Non-Traditional Exports using the manufacturing sub-sector as a proxy, the following questions below will serve as a guide for this thesis:

1. What are the determinants of Ghana's manufacturing sub-sector exports to its trading partners?

2. How do trade costs influence Ghana's NTE manufacturing sub-sector exports?

1.4 Research Objectives

This paper seeks to investigate factors that determine Ghana's non-traditional exports using the manufacturing sub-sector exports. Specifically, the research will:

1. Examine the determinants of Ghana's manufactured exports to its trading partners within the period from 2009-2019.
2. Investigate how trade costs influence Ghana's NTE manufactured exports.
3. Identify some determinants of trade costs of Ghana's manufactured exports.

1.5 Scope of the study

This research will investigate the factors that influence Ghana's manufacturing sub-sector exports to nations that import such goods and the cost of trading. An annual panel data set of Ghana from 2009 to 2019 will be used considering 65 of Ghana's trading partners. The number of counties used is due to the availability of information on the variables to be used in this research. The availability of data is also a factor in the time period's selection.

1.6 Significance of the study

The findings of this study hold significant importance for enhancing the performance of the Non-Traditional Export sector, particularly the manufacturing sub-sector. The study's results have broader implications for employment generation, which, in turn, has a positive impact on the overall standard of living (Vandenberg, 2017). Given that the manufacturing sub-sector is the

leading contributor to Ghana's Non-Traditional Exports earnings, these findings will inform the development of targeted policies aimed at unlocking its full potential and fostering further growth.

1.7 Structure of the study

A background on the research and its objectives will discussed in the first chapter. The second chapter is a general assessment of Ghana's Non-traditional Export sector. The theoretical and empirical literature anchoring this study in discussed in chapter three. The research methodology applied to accomplish the objectives of this study and provide answers to the research questions that were posed are discussed in following chapter. Chapter five discusses the various variables in question, the results expected and the actual econometric estimation results obtained and lastly, a summary of the findings together with some suggestions for future policy will be found in chapter six.

CHAPTER 2

2.0 NON-TRADITIONAL EXPORT SECTOR OF GHANA

2.1 Introduction

This chapter provides an in-depth exploration of Ghana's non-traditional export sector and its various subsectors. It encompasses an analysis of the historical trends in total non-traditional exports and their subsectors spanning from 1986 to 2021. Additionally, it delves into an examination of the top-earning products within these subsectors for the year 2021. The chapter also scrutinizes the primary export destinations for Ghana in 2021, as reported by the Ghana Export Promotion Authority (GEPA). Furthermore, it evaluates the efficacy of the National Export Strategy (NES) introduced to propel export growth in Ghana.

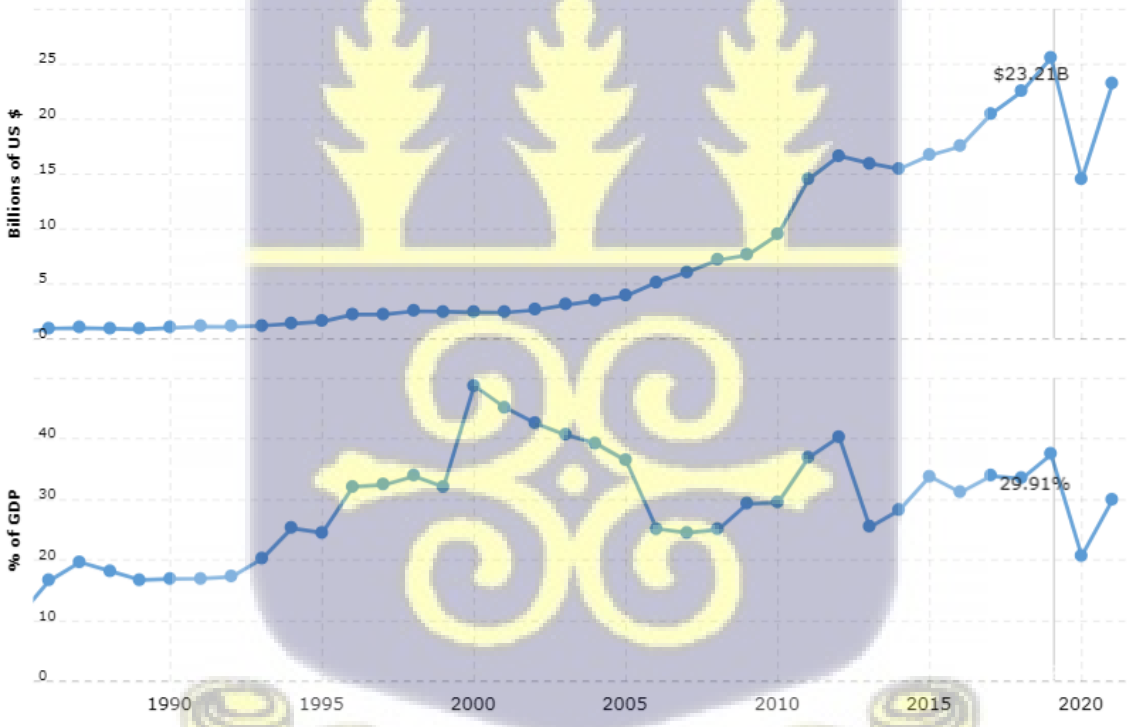
2.2 Export Performance of Ghana from 1986 to 2021

As outlined in the preceding chapter, Ghana's exports fall into two categories: traditional exports and non-traditional exports. Traditional exports primarily consist of primary commodities, while non-traditional exports encompass a wide range of products beyond the traditional ones (GEPA, 2021). However, the traditional export sector has proven insufficient in sustaining the necessary economic growth to meet Ghana's socio-economic demands and reduce its dependence on international donor support. Therefore, there is a pressing need to diversify the country's export portfolio. This is particularly crucial as the non-traditional exports (NTEs) sector, besides generating employment and revenue, holds the potential to alleviate poverty. 77% and 23% of 2021 export earnings came from traditional and non-traditional exports respectively (GEPA, 2021). Ghana's exports earnings climbed from $635 million in 1986 to $14,377 million in 2021 (WTO, 2021), which is equivalent to an annual growth rate of exports of 70 percent on average during the period. The trends in Ghana's overall export revenues are visually presented in Figure 4, covering the years from 1986 to 2021. Notably, the year 2019 witnessed a significant drop in export earnings, plummeting from 23.21 billion US dollars to nearly 15 billion US dollars, mainly attributed to the disruptive impact of the COVID-19 pandemic. Widespread lockdowns and

disruptions in global trade severely affected both export and import activities. However, it's promising to observe the gradual recovery of export earnings, especially from 2020 to 2021.

During this period, there was a notable shift in export earnings as a percentage of GDP, declining from 29.91% in 2019 to 20% in 2020. Nonetheless, the resurgence in exports signals positive prospects for Ghana's economy as it rebounds from the pandemic-induced setback. Notably, the World Trade Organization (WTO) emphasized in its global trade forecasts for 2021 that many regions could experience a substantial rebound, possibly reaching double-digit growth, estimated at around 21% to 24%, provided that the COVID-19 pandemic is effectively controlled and international trade continues to expand..

Figure 2.0: Ghana's export earnings trends from 1986 to 2021

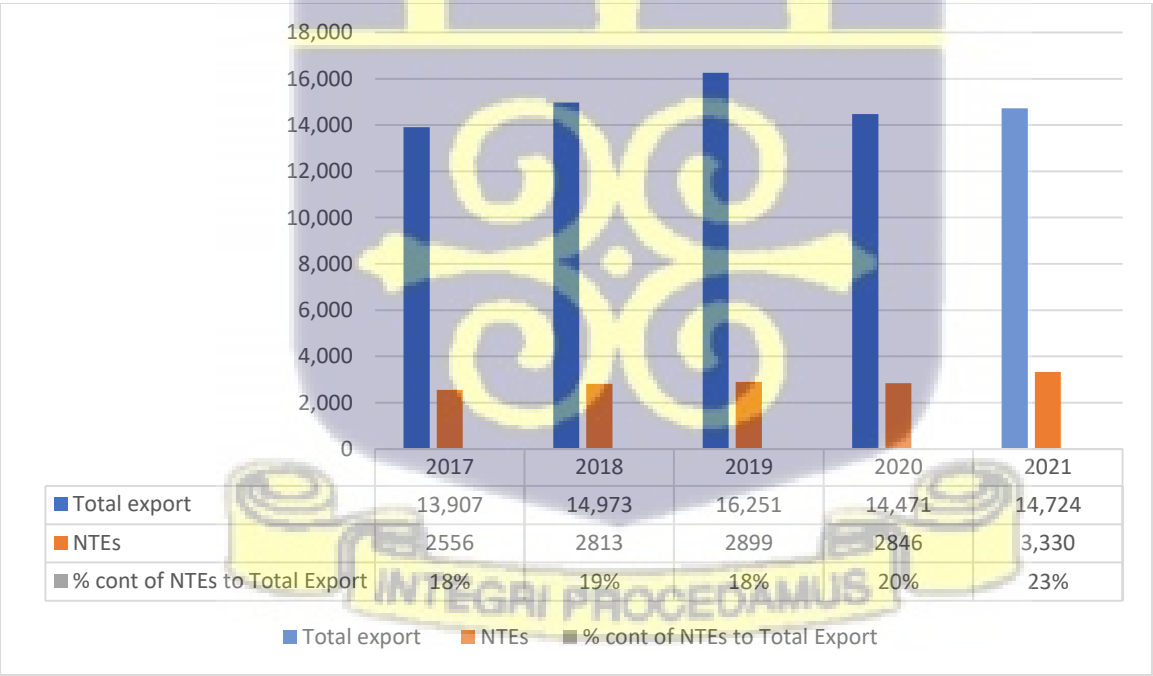


Source: World Bank, 2021

2.3 Ghana's Non-Traditional Export Sector and its Sub-sectors

As previously mentioned, products that are exported from Ghana but are not classified as primary exports fall under the category of Non-Traditional Exports (NTEs). The current spectrum of Ghana's NTEs encompasses a diverse range, including cocoa paste, cocoa butter, cashew nuts, plastic articles, canned tuna, natural rubber sheets, refined palm olein, iron/steel circles, rods, sheets, cocoa powder, and aluminum plates, among others. The establishment of the Ghana Export Promotion Authority (GEPA) in 1968 marked the inception of Non-Traditional Exports (NTEs) in 1969. This strategic move was a pivotal component of the Ghanaian government's plan to diversify away from overreliance on traditional exports, a response to the volatile price fluctuations that often characterized these primary exports and aimed to address the country's recurring trade imbalances. The importance of export diversification cannot be overstated, as it serves as a stabilizing force for the economy, as highlighted by Oduro et al. in 1992. Within the NTEs sector, there exist three distinct subsectors: agriculture, processed and semi-processed goods, as well as handicrafts..

Figure 2.1 | NTE Compared to Total National Exports



	2017	2018	2019	2020	2021
Total export	13,907	14,973	16,251	14,471	14,724
NTEs	2556	2813	2899	2846	3,330
% cont of NTEs to Total Export	18%	19%	18%	20%	23%

Source: GEPA, 2021

In 2021, total exports demonstrated a growth of 1.75 percent when compared to the preceding year. Moreover, it's noteworthy that a consistent annual growth rate of 1.75 percent was projected for total national exports over a five-year period spanning from 2017 to 2021. This expansion in total exports was achieved in a context where Non-Traditional Exports (NTEs) exhibited more substantial growth in 2021 in comparison to 2020. The accelerated NTE growth can be attributed to increased demand across all categories of traditional export products, resulting in an impressive average growth rate of 21.57% in earnings. In contrast, NTE earnings experienced even more substantial growth, with an average growth rate of 25.12% observed across various subsectors. Furthermore, it's essential to recognize the rising contribution of NTEs to Total National exports over recent years. In 2017, 2018, 2019, 2020, and 2021, NTEs accounted for 18%, 19%, 18%, 20%, and 22.62% of the total, respectively. Several factors contributed to this noteworthy performance of the NTE sector in 2021, including increased demand for major processed/semi-processed NTE products, expansions, and optimized utilization of production capacities by major companies, active participation of new 1D1F export-oriented companies, compliance with the protocols of the ECOWAS Trade Liberalization Scheme (ETLS) by most member States, and the persistent trade facilitation efforts undertaken by the Ghana Export Promotion Authority (GEPA) under the auspices of the Ministry. Table 2.1 provides a detailed breakdown of the subsectors' performance in 2021 compared to 2020, revealing that each of the subsectors experienced increased export earnings relative to their 2020 figures..

Table 2.1 | Sub-Sector Performance 2020 against 2021

SECTOR	2021 VALUE US$	2020 VALUE US$
Agricultural products	476,007,805	433,015,533
Handicraft products	45,198,590	30,630,413
Manufacturing products	2,809,111,193	2,382,989,904

Source: Estimated values from GEPA 2021 report

Table 2.2 presents the top 10 Non-Traditional Export (NTE) products of 2021 in descending order. The leading NTE product was cocoa paste, categorized as a manufactured/processed export, with export earnings that exhibited a 7.01% increase from 2020 to 2021. Following closely was cocoa butter, another manufactured/processed export, which saw an impressive growth of 43.83% in export earnings from 2020 to 2021.

Table 2.2 | Percentage Contribution of Top 10 products to NTEs: 2021

	2021	2020	GROWTH
PRODUCT	VALUE US$	VALUE US$	2021/2020
Cocoa paste	495,888,783	463,412,910	7.01%
Cocoa butter	363,948,927	253,043,995	43.83%
Cashew nuts	287,457,707	251,377,478	14.35%
Articles of plastics	181,841,749	156,543,602	16.16%
Canned tuna	152,236,735	127,886,444	19.04%
Iron/steel circles, rods, sheets, billets	139,949,347	118,606,650	17.99%
Natural rubber sheets	135,401,629	73,599,142	83.97%
Refined palm olein	127,124,318	89,526,409	42.00%
Cocoa powder	122,124,318	77,466,846	57.53%
Aluminum plates	90,980,299	60,526,163	50.32%

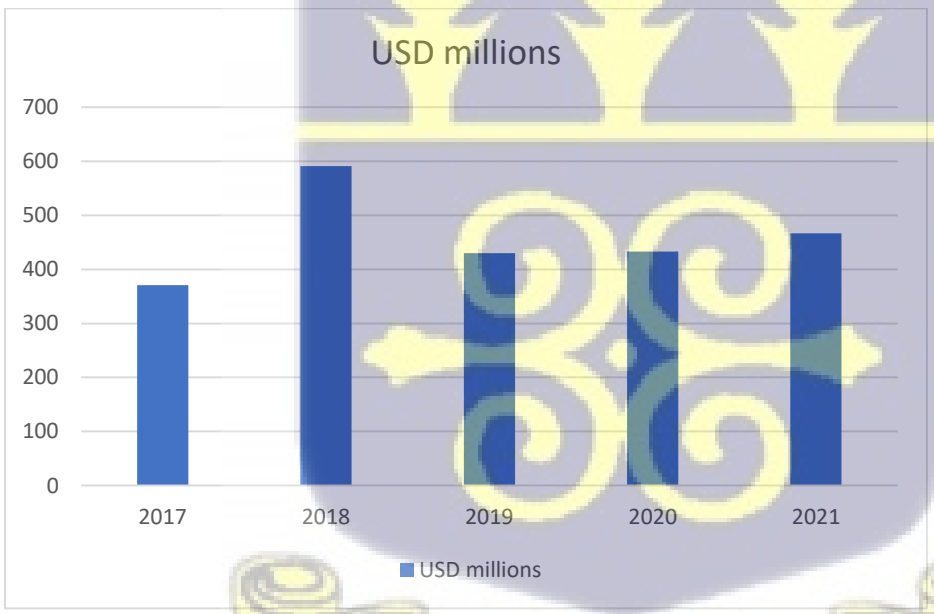
Source: Estimated values from GEPA 2021 report

2.3.1 Agricultural Sub-sector

Figure 2.2, displayed below, illustrates the performance of the Non-Traditional Export (NTE) sector from 2017 to 2021. The sector reached its peak earnings in 2018 but experienced a

significant decline in 2019. Subsequently, there was a modest recovery in 2020 and 2021. The decline observed from 2019 to 2021 can be largely attributed to the global pandemic, which prompted countries to impose border closures, leading to decreased international trade, particularly in primary products. Table 2.3 reveals that the Agricultural sub-sector's total earnings in 2021 amounted to US$476.01 million, marking a 9.93% increase compared to the US$433.02 million earned in 2020. Throughout this period, the Agricultural sub-sector contributed 14.29% to the overall earnings of the NTEs. Figure 2.3, depicted below, provides insights into the performance of the top ten earners in the Agricultural sub-sector and their comparative performance between 2020 and 2021. Cashew nuts emerged as the leading earner among all agricultural produce in 2021, exhibiting a remarkable 14.35% growth from 2020 to 2021. It contributed significantly, accounting for 60.38% of the total sub-sector earnings. In contrast, flowers were among the lower-earning products in the top ten agric earners, contributing around 1% to the total sub-sector earnings, with an 8.10% growth in 2021 compared to its 2020 earnings..

Figure 2.2: Agricultural Sub-Sector Performance, 2017 to 2021



Source: Estimated values from GEPA 2021 report

Table 2.3 clearly indicates that cashew nuts have maintained their position as the top agricultural product in both 2020 and 2021. Nonetheless, it's noteworthy that several of the top 10 products have experienced a decrease in their contribution to export earnings from 2020 to 2021.

Table 2.3 | Comparative Analysis of Top Ten Agricultural Products: 2021/2020

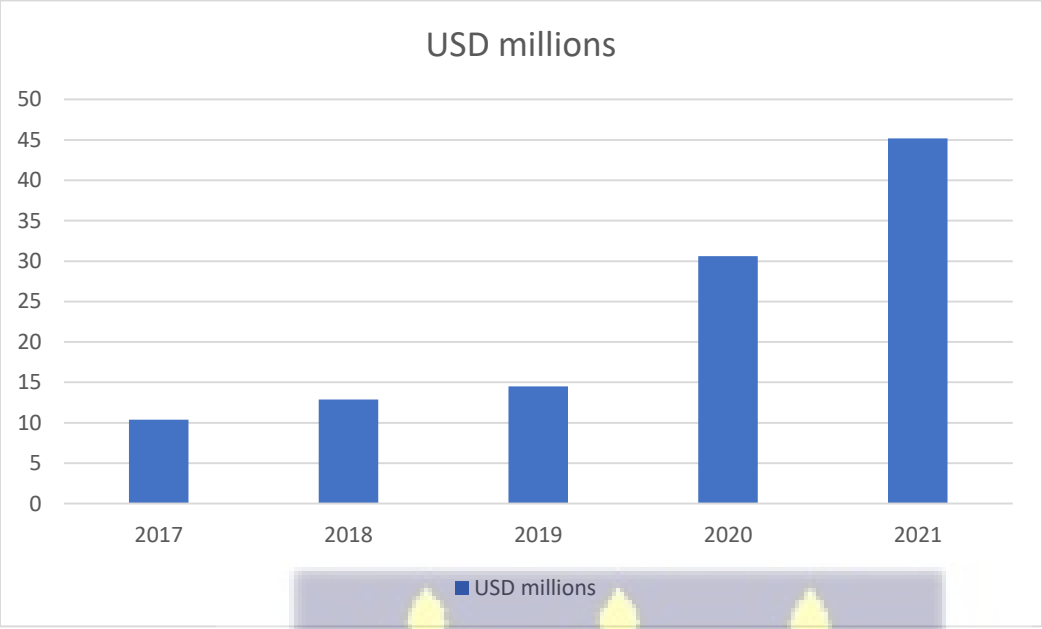
	2021	2020	GROWTH
PRODUCT	VALUE US$	VALUE US$	2021/2020
Cashew nuts	287,457,707	251,377,478	14.35%
Banana	35,567,549	40,771,305	-12.76%
Fresh or chilled tuna	20,562,085	27,346,311	-24.81%
Shea nuts (karite nuts)	20,193,542	13,790,950	46.43%
Mangoes	19,507,483	20,545,410	-5.05%
Soya beans	18,563,952	12,720,920	45.93%
Yams	11,490,801	13,429,328	-14.44%
Medicinal plants & parts	9,791,289	13,337,879	-26.59%
Pineapples	9,464,942	8,785,493	7.73%
Flowers	4,381,695	4,053,213	8.10%

Source: Estimated values from GEPA 2021 report

2.3.2 Industrial Art and Craft Sub-sector

Figure 2.3 illustrates the remarkable growth trajectory of the handicraft subsector from 2017 to 2021. In 2021, the Industrial Art and Craft sub-sector achieved total earnings of US$45,198,590, marking an impressive increase of 47.56% compared to the US$30,630,023 earned in 2020. This sub-sector contributed 1.36% to the overall NTE's earnings (GEPA, 2021). For further insights into the performance of specific products in this sub-sector, refer to Table 4, which lists the top ten Industrial Art and Craft goods' performance in 2021 compared to 2020.

Figure 2.3: Sector Performance 2021



Source: Estimated values from GEPA 2021 report

Table 2.4 | Comparative Analysis of Ten Leading Industrial Art and Craft

	2021	2020	GROWTH
PRODUCT	VALUE US$	VALUE US$	2021/2020
Ceramic products	40,630,390	27,704,975	46.65%
Basket ware	1,962,346	1,068,430	83.67%
Mats	1,134,063	585,549	93.68%
Hides and skins	444,626	338,853	31.22%
Paintings, Drawings	291,099	248,058	17.35%
Bamboo/cane furniture	151,588	113,409	33.66%

Beads	145,330	141,961	2.3%
Traditional musical instruments	132,880	172,401	-22.92%
Statuettes	127,004	26,520	378.90%
Handicraft items NES	98,133	27,080	262.38%

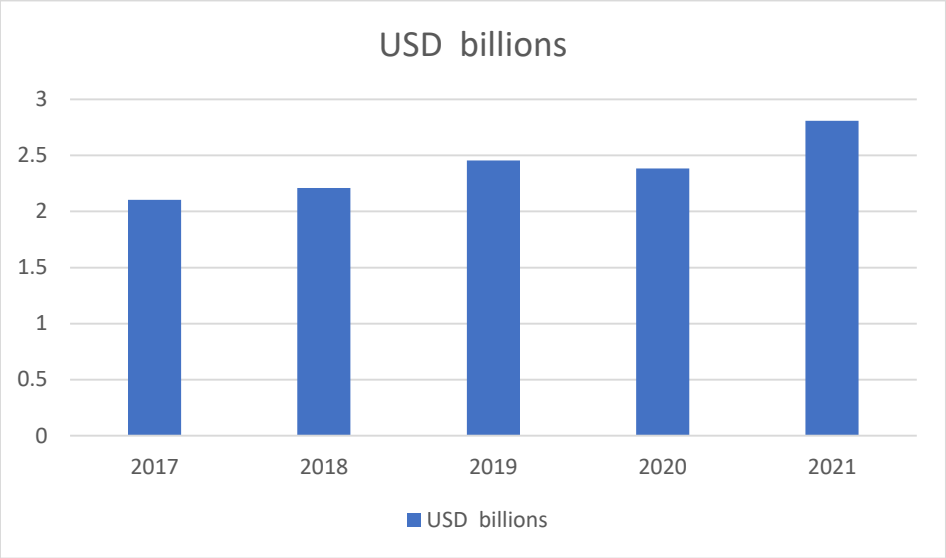
Source: Estimated values from GEPA 2021 report

Within the sub-sector, ceramic products emerged as the highest earner, raking in US$40.6 million in earnings, and contributing substantially to approximately 90% of the subsector's total. On the other end of the spectrum, handicraft items earned a more modest US$98.13 thousand. Collectively, the top ten earners in this sub-sector accounted for a substantial 99.82% of the total Industrial Art & Craft product earnings. Notably, the average earnings of these top performers amounted to US$4.511 million, underscoring their significant contribution to the sub-sector's success.

2.3.3 Manufacturing Sub-sector

Earnings from the processed and semi-processed subsector within NTEs reached $2,809 million in 2021, marking a substantial increase of 17.88% when compared to the earnings of $2,382.98 million in 2020. This remarkable growth was primarily driven by exceptional performances in commodities such as cocoa butter, natural rubber sheets, cocoa powder, refined palm olein, and aluminum plates, sheets, and coils. Accounting for a significant 84.35% of the overall NTE earnings in 2021, this subsector retains its position as the largest contributor to NTEs. Figure 2.4 visually demonstrates the consistent growth trajectory of this subsector from 2017 to 2021. Table 2.5 below provides a comparative analysis of the top ten Processed/Semi-Processed Products and their respective contributions to the total NTE earnings in 2020 and 2021.

Figure 2.4: Sector Performance 2021



Source: Estimated values from GEPA 2021 report

Table 2.5 | Comparative analysis of the top ten Processed/Semi-Processed Products and their contributions to the total NTE earnings in 2020 and 2021.

	2021	2020	% GROWTH
PRODUCT	VALUE US$	VALUE US$	2021/2020
Cocoa paste	495,888,783	463,412,910	7.01%
Cocoa butter	363,948,927	253,043,995	43.83%
Articles of Plastics	181,841,749	156,543,602	16.16%
Canned Tuna	152,236,735	127,886,444	19.04%
Iron Steel, Circles, rods, sheets billets	139,949,347	127,886,700	9.43%

Natural Rubber Sheets	135,401,629	73,599,142	83.97%
Refined Palm Olein	127,124,318	89,526,409	42.00%
Cocoa powder	122,035,466	77,466,846	57.53%
Aluminum	90,980,299	60,526,163	50.32%
Shea (karite) oil	90,258,460	92,255,770	-2.16%

Source: Estimated values from GEPA 2021 report

As observed from Table 2.5, manufactured goods experienced significant growth in their contribution to export earnings from 2020 to 2021. Cocoa products are observed to have experienced significant growth aside along with natural rubber sheets and refined palm olein.

2.4 Non-Traditional Export Markets of Ghana

In 2021 Non-Traditional Export (NTE) products were exported to 152 countries. These countries are represented in five groups as follows: The European Union (EU) & United Kingdom, the ECOWAS, Other Developed Countries, the Rest of Africa, and Emerging Economies. As shown in table 2.6 below, the EU & UK markets are the leading destinations contributing 35.96% to total market value by absorbing the US$1.197 billion value of NTEs. This market value grew by 22.49% relative to 2020 performance. The export of NTE goods into ECOWAS was US$ 1,096,275,617, an increase from US$ 783,838,565 representing a 39.86% increase from the previous year. This market destination represents a 32.92% share of the total Non-traditional export market. In the rest of Africa, Other Developed Countries, as well as Emerging Economies, absorbed 1.59%, 7.85%, and 21.67% respectively, of NTEs. A comparison of the performance of the various market destinations by category in the year under review to the previous year shows a growth of 22.49%, 39.86%, and 27.97% in the performances of the European Union & United Kingdom, ECOWAS, and Rest of Africa respectively. The performance of other Developed Countries and Emerging Economies experienced falls of 15.91% and 1.46% respectively in the year under review from the previous year. The performance of the markets in 2021 relative to 2020, is shown in Table 2.6.

Table 2.6 | Ghana's NTE Profit by Destination Category 2021

PRODUCT	2021	2020	% GROWTH
European Union EU	1,197,567,901	977,683,872	22.49%
ECOWAS	1,096,275,617	783,838,565	39.86%
Emerging Economies	721,680,645	32,395,397	-1.46%
Other developing Countries	261,719,570	311,234,129	-15.91%
Rest of Africa	53,073,855	41,483,907	27.94%

Source: Estimated values from GEPA 2021 report

Table 2.7 | Ghana's Top Ten Destinations for NTEs 2021

COUNTRY	CONTRIBUTION NTEs Earnings USD
Netherlands	423,926,197
Burkina Faso	366,953,225
India	217,966,922
Togo	198,048,344
United States	182,819,636
Germany	178,592,547
France	155,541,399
UK	136,956,170

Senegal	123,869,824
Vietnam	118,891,557

Source: Estimated values from GEPA 2021 report

According to the data presented in Table 2.7, the Netherlands was the leading market destination for NTEs in 2021, consuming a total of 423.96 million dollars' worth of NTEs. In terms of destinations by category, the top ten market destinations included three countries from the European Union and the United Kingdom, three countries from the Economic Community of West African States (ECOWAS), one country from other developed countries, and two countries from emerging economies. Burkina Faso, Togo, and Senegal, three countries that are members of the Economic Community of West African States (ECOWAS), ranked second, fourth, and ninth, respectively, among the top ten market destinations.

Table 2.8 | Top 10 ECOWAS Countries for Ghana's NTEs 2021

	2021	2020	% GROWTH
COUNTRY	VALUE US$	VALUE US$	2021/2020
Burkina Faso	366,953,225	242,742,173	51.17%
Togo	198,048,344	100,002,202	32.48%
Senegal	123,869,824	50,925,000	23.87%
Cote D'Ivoire	90,591,618	67,848,389	33.52%
Mali	88,195,798	50,925,000	73.19%
Niger	78,602,938	66,781,867	17.70%
Nigeria	57,429,991	31,255,689	83.74%
Benin	31,915,476	36,545,794	-12.67%
Guinea	10,402,892	9,188,022,	13.22%
Sierra Leone	9,927,196	7,301,133	35.97%

Source: Estimated values from GEPA 2021 report

According to the data shown in Table 2.8, which can be found above, Burkina Faso emerged as the most popular destination for NTEs in both ECOWAS and Africa. In 2021, it continued to lead the pack as the best location to export to, just as it had in 2016, 2017, 2018, 2019, and 2020. Togo and Senegal, in that order, were ECOWAS's second and third most popular export destinations, respectively. Burkina Faso's contribution to the top ten ECOWAS markets increased by 51.17% compared to the amount it contributed the year before, giving it a share of 34.75% of the total. Sierra Leone came in tenth place and improved its performance by 35.5% over the previous year. In 2021, the ten top ECOWAS states had an average export value of US$105.59 million, which was an increase from their average export value of US$76.62 million in 2020. This demonstrates that the average value of the top ten ECOWAS States has increased by 37.81% over 2021. NTE performance along the Abidjan-Lagos Corridor, showed growth in NTE earning from Cote D'Ivoire, Togo, and Nigeria. Earnings from Benin however showed a fall due to the imposition of full import duties on ETLS-approved products that ought to have attracted zero-rated duties as stipulated by ECOWAS Protocols.

Table 2.9 | Top U.K and European (EU) Countries for Ghana's NTEs 2021

	2021	2020	% GROWTH
COUNTRY	VALUE US$	VALUE US$	2021/2020
Netherlands	423,962,197	383,099,337	10.67%
Germany	178,592,647	128,768,805	38.69%
France	155,541,399	113,478,662	30.07%
United Kingdom	136,965,170	111,508,012	22.83%
Italy	116,328,483	237,519,874	210.04%
Spain	95,000,922	111,328,102	-14.67%
Belgium	73,306,310	68,263,041	7.38%

Greece	6,399,663	3,079,592	107.81%
Portugal	4,866,913	5,577,600	-12.74%
Ireland	4,258,834	1,469,510	189.81%

Estimated values from GEPA 2021 report

The Netherlands emerged as the lead EU & UK market for Ghana's NTEs in 2021 as shown in Table 2.9. It recorded US$423.96 million, a rise of 10.67% over 2020 earnings. Germany was the second lead market in Europe for NTEs absorbing NTEs worth US$178.59 million in 2021, representing an increase of 38.69% over 2020 performance. France, the third in 2021, contributed a value of US$155.54 million, representing an increase of 37.07% from 2020. Ireland was the tenth in ranking of the top ten EU & UK destinations for NTEs, contributing a value of US$4.25 million. This represents a rise of 189.81% in value over 2020 figures. The average import value of the top 10 EU importing Countries in 2021 was US$119.5 million relative to US$96.4 million in 2020. The overall performance of the E.U & UK market category showed a positive growth of 22.49% in value in 2021 relative to 2020.

2.5 Policy initiatives to support the NTE sector of Ghana

The NTEs have been a top focus for the administrations of Ghana ever since Ghana gained its independence, as was previously mentioned. The creating and putting into action plans for sectorial and district development with the intention of eliminating poverty and enhancing the social wellbeing of the populace are guided by Medium-Term National Development Policy Frameworks supplied by the succeeding governments. Such national development policy frameworks include the Ghana Poverty Reduction Strategy (GPRS I) for the years 2003 to 2005 and the Growth and Poverty Reduction Strategy (GPRS II) for the years 2006 to 2009. An overall assessment of the GPRS I implementation's effects on the entire policy environment found that the macroeconomic situation was favorable, significantly stabilized, and had the ability to support greater growth rates. In light of this, the GPRS II was approved and implemented between 2006 and 2009 with a change in context and a target of continuous poverty reduction and attaining middle-income status within a definable planning term. It focused on creating policies and initiatives that may alter the structure

of the economy and take advantage of shared quicker development. In order to fulfill its pledge to oversee development and offer a replacement for the GPRS II, the government launched an initiative to construct a medium-term national development strategy framework in 2009. The Ghana Shared Growth and Development Agenda (GSGDA), 2010–2013, sought to achieve and maintain macroeconomic stability while putting the economy on a higher path of collective growth and poverty reduction. This was done in light of the significant fiscal deficit that was experienced in 2008 and the difficult macroeconomic situation that was inherited. By the decade ending in 2020, the medium-term strategy aimed to industrialize industry, modernize agriculture, and sustainably exploit Ghana's natural resources, particularly its mineral, oil, and gas resources, in order to lay the framework for a fundamental restructuring of the economy. The process was aided by rapid infrastructural and population growth as well as the use of science, technology, and innovation. Priority was given to funding policies, programs, and initiatives in the areas of agriculture, infrastructure (including energy, oil, and gas), water and sanitation, health, and education (including ICT, Science, Technology, and Innovation). The GSGDA came in two volumes: Volume I, the policy framework, analyzes the macroeconomic context and the development policy choices that must be made to accomplish the goals of GSGDA. The entities in charge of implementing each component of the strategy were also listed in a policy matrix that highlights concerns, policy goals, and approaches. The indicative budgetary requirements for the successful implementation of the GSGDA's objectives and initiatives were shown in Volume II, the four-year costing framework. The GSGDA policies and plans were used to compile the thematic areas that were projected to receive money and be implemented throughout the GSGDA planning period. Following the implementation of policies and initiatives, these sections highlighted the primary objectives that were projected to be achieved in each of thematic areas. Macroeconomic stability was ensured and maintained, the competitiveness of Ghana's private sector was increased, agricultural modernization and resource management was accelerated, infrastructure and human settlements were developed, oil and gas development was advanced, human development, employment, and productivity were advanced, and an open and accountable government was encouraged. According to the Ghana Shared Growth and Development Agenda 2010-2013, the private sector is the primary driver of change and a crucial player in the growth of Ghana's non-traditional export sector. Two tactics were implemented in order to respond to this GSGDA result. To increase the private sector's competitiveness, the First Medium-Term Private

Sector Development Strategy (PSDSI) was put into place. The Second Medium-Term Private Sector Development Strategy (PSDS II) was developed as a follow-up with the primary goal of improving livelihoods for everyone from 2010 to 2015. The National Export Strategy (NES), which was a part of the GSGDA Medium-Term Development Policy Program, was introduced in December 2011. The NES was created to support other ongoing projects and programs in the trade, employment, agriculture, finance, science and technology, communications, local government, lands, environment, women/children affairs, and health sectors, as well as the government's Medium-Term Development Framework (2010-2013) and the Private Sector Development Strategy II (2010-2015), in order to avoid duplication (including those that were externally funded by Development Partners). The purpose of the NES is to provide the private sector with the strategic guidance and motivation required to gather the cash, supplies, and resources required to deliver the NTEs. Making Ghana a top-tier exporter of competitive goods and services is the NES's goal. From 2012 to 2017, the first NES for the NTE sector was in operation.

The National Export Strategy (NES) had three main goals from 2012 to 2017: first, increase non-traditional exports significantly, with annual growth targets reaching $5.0 billion in the fifth year of the National Export Strategy (2017), which would have increased NTEs' earnings by 35%; second, strengthen and resource export development-related institutions and networks of business development service providers, policies, and programs; and third, ensure that every diaspora member of the United States participates in the National Export Initiative. The National Export Strategy (2013-2017) had four planned Strategic Outcomes: the first was to reduce impediments, uncertainties, risks, and costs associated with production and conducting export business; the second was to improve the delivery of support services along the export value chain; the third was to build the capacities of GEPA, Metropolitan, Municipal, and District Assemblies enhanced to promote export so that every District could develop at least one significant export. The NES covered significant topics such the development of export competencies and human capital, as well as infrastructure, transportation, technology, trade facilitation, and finance. The significant annual rate increases in non-traditional product export growth, the significant growth in jobs created in the NTE sector and by "spillovers," and the percentage increase in trade figures to reflect the performance of NTEs are just a few of the indicators that were used to measure the overall performance of the NES. As can be observed from figure 1.1, while experiencing a decline from 2015 to 2016, the annual NTEs performance climbed and has continued to advance.

In 2020, Ghana launched the 10-year National Export Development Strategy (2020-2029). If the Ghana National Export Development Strategy (NEDS) is fully funded and put into action, it is expected that Non-Traditional Exports (NTEs) will increase from $2.8 billion in 2020 to $25.3 billion in 2029, with deep structural changes positioning Ghana as a competitive export-led industrialized economy. The government has made the strategic choice to change the economy's structure from one based on the export of raw materials to one focused on the export of manufactured goods. The release of the policy document "The 10-Point Agenda for Industrial Transformation" has supported this. The National Export Development Strategy (NEDS) operates within the scope of the Ministry of Trade and Industry's policy framework. It is driven by the private sector, but the government is helping to support it. Extensive study and engagement with a diverse range of stakeholders, including the organized private led to the formation of this report. Before the draft paper was finished, MOTI provided significant inputs that were taken into consideration. Considering that it was essential to gain the interest and devotion of the stakeholders, it was necessary to engage in this comprehensive collaborative process. The Ghana Export Promotion Authority is the primary institution responsible for putting NEDS into action. The NEDS is designed to rest on three strategic Pillars:

i. To expand and diversify the supply base for value-added industrial export products and services.

ii. To improve the business regulatory environment for export.

iii. To build and expand the required human capital for industrial export development and marketing.

The NEDS has also adopted a set of export-oriented, pro-industrialization policy initiatives with essential components like:

i. Ensuring the successful, consistent, and reliable provision of power and water at competitively cheap prices for enterprises that are export-oriented and manufacturing industries;

ii. In consultation with the business sector, the prudent protection of local industry from "severe injury" caused by a surge of imported items of poor quality and underpriced;

iii. Elimination or reduction of tariffs placed on inputs imported for use in production within the country and for export;

iv. Enhancing the effectiveness of cost-cutting strategies already in place;

v. The Ghana Exim Bank ought to encourage export-oriented businesses more and position itself to pay for a sizable amount of the NEDS implementation costs. Exim bank needs to establish a special facility to back credit. For better institutional coordination, the Ministry of Trade and Industry should assume the Exim bank's oversight responsibilities.

vi. Local products and services should be used as much as feasible in government purchases to increase overall demand for local products and services and promote industrialization.

vii. Aiding Ghanaian-owned businesses involved in the cocoa value chain to expand into the consumer market, where the majority of the chain's wealth is produced, to seize a sizeable piece of that money for Ghana.

viii. Redesign the educational system to produce a much higher proportion of graduates in science, technology, and engineering with an emphasis on contemporary agriculture, manufacturing, and services to meet the needs of export-oriented industrialization for human resources enterprises that may turn Ghana's raw materials and natural resources into manufactured economic wealth.

2.6 Conclusion

From observing the comparative analyses of the growth of both the top 10 agricultural products and manufactured products from 2020 to 2021 in Table 2.3 and 2.5 respectively, it is clear that nine out of 10 the processed/semi-processed products had their contribution/value to export

earnings increase significantly while the contribution/value of five out of 10 of the agricultural products to export earnings decrease. The manufacturing subsector has been the major contributor to Ghana's export earnings. It is also noted that out of Ghana's top 10 NTEs destinations, there are only three African countries i.e. Burkina, Togo, and Senegal showing that Ghana trades more with countries outside Africa. It has been discussed in this chapter that Ghana desires industrial transformation and hence has implemented policies such as National Export Development Strategy and the one district one factory initiative which are situated in its 10-point Agenda.

CHAPTER 3

3.0 LITERATURE REVIEW

3.1 Introduction

This chapter discusses the theoretical and empirical literature on the determinants of Ghana's manufactured exports to its trading partners, how trade costs determine exports, and the determinants of trade costs. The chapter will first begin with a theoretical review of the research areas by highlighting the theories that support the variables of interest. Following is a discussion on using the gravity model of trade to analayse the determinants of exports. The empirical literature on the determinants of trade costs is then highlighted. The empirical literature on determinants of exports that used different methods for the analysis will also be discussed and finally the conclusion of the chapter.

3.2 Theoretical Review

The determinants of manufactured exports can be considered in two-folds. There are first the micro-level determinants which deal with the firm-level factors that affect a country's manufacturing sub-sector which in extension influences manufactured exports and second the macro-level determinants which involve world market and environmental conditions that influence the sub-sector wholly and in extension its exports. According to Jebuni et al (1996), there are two sources of constraints: those due to world conditions affecting market access which may be external both to the country and the firm, and those due to domestic economic and production conditions. There are many different economic explanations that have been proposed to explain international trade. Since quite some time ago, the most widely used model of international trade has been the neoclassical Hecksher-Ohlin model. According to the concept, countries would specialize in the manufacturing and export of items in which they have a comparative cost advantage due to the relative abundance of a given factor of production. This will allow the country to take use of its competitive edge in the market. This hypothesis would suggest that exporting labor-intensive items like textiles from a typical developing country, which often has an abundance of labor but a dearth of capital, would be beneficial. On the other hand, industrialized nations

would export commodities that required a lot of money. However, the Hecksher-Ohlin model requires very strong assumptions, like perfect competition, no economies of scale, and the free availability of technology, to arrive at this conclusion. Some of these strict assumptions were loosened in the 1980s, when so-called new or strategic trade theory emerged. International trade patterns were found to be determined by imperfect competition and economies of scale in a number of models (Helleiner, 1992). Furthermore, neo-technology and technology-gap theories stress the significance of technological advancements in affecting regional and global patterns of commerce (Dosi et al.). This literature argues that innovation, specialization, and learning are the primary factors in establishing a competitive advantage. It has been argued that the manufacturing sector is particularly vulnerable to shifts in macroeconomic conditions because it is a more "traditional" arm that exists in a macroeconomic setting (Enu & Havi, 2014). Therefore, policymakers should pay close attention to how changes in macroeconomic conditions affect manufacturing production, as stated by Solow (1956) and Diaku (1972). Overvaluation of foreign exchange rates is a major macroeconomic factor that has slowed the expansion of manufacturing exports (Collier and Gunning 1999). Overvaluation contributed to a precipitous drop in exports in Ghana, Uganda, and Tanzania during the 1970s and 1980s, as reported by Collier and Gunning (1999). The policy shift that resulted in increased exports was decisive. Export growth in manufactured goods appears to require policies that prevent the RER from being overvalued. According to Sekkat and Varoudakis (2000), the domestic relative price of tradable goods has increased relative to the price of non-tradable items in all nations that have successfully encouraged manufactured exports.

Also, trade costs must be considered when discussing variables which influence the flow of exports and imports. Trade costs are incurred when goods are exchanged, whether they are exported or imported. The term "trade costs" refers to any and all expenses, with the exception of the marginal cost of producing the thing, that are incurred throughout the process of moving a product from the producer to the end consumer (Turkson, 2014). Transportation costs (both direct and indirect), policy obstacles (tariffs and non-tariff barriers), information costs, contract enforcement costs, currency conversion costs, legal and regulatory costs, and wholesale and retail distribution costs at the local level are all examples of trade costs (Anderson and Wincoop, 2004). These costs, unlike those associated with domestic trade, are split between the place of origin and the country of importation. True costs of international trade are hard to understand and quantify, as stated by Anderson and Wincoop (2004). Natural costs, expenses incurred prior to crossing a border, costs

incurred after crossing a border, and costs incurred beyond a border are the types of costs identified by Khan and Kalirajan (2011). In an effort to test these ideas without having access to comprehensive data on both the home and partner nations, the authors come to a decision that decreasing partner countries' explicit and implicit beyond-the-border costs were the primary reason of increasing export. The cost takes into account all expenses that must be paid in both the country that is doing the exporting and the country that is doing the importing. These expenses include packaging, handling at departure, loading from warehouse, pre-carriage, export customs clearance, post-carriage, main transportation, transportation insurance, handling at arrival, import customs clearance, and unloading into warehouse. This is in accordance with the International Commercial Terms of 2010. As indicated in Nordås and Piermartini (2004), the variables of the gravity model of trade serve as proxies of some trade costs hence helping to understand how trade costs influence manufactured exports. The variables distance, border, and landlocked serve as proxies for transportation costs. Common language represents communication/information cost. Institutional and infrastructural shortcomings create obstacles to trade, although their impact varies widely from nation to nation (Novy, 2011). When discussing the challenges posed by trade barriers, a number of studies have pointedly stressed the importance of a nation's level of developed infrastructure (as a stand-in for the costs of international trade). When it comes to commerce, the physical infrastructure of a nation is of the utmost importance. For instance, Bougheas et al. (1999) have illustrated the conditions under which it influences trade volumes by including transport infrastructure in a two-country Ricardian framework. This allowed them to demonstrate the situations under which it has an effect. According to Francois and Manchin (2006), the quality of a country's institutional system as well as its transport and communication infrastructure are major factors not only in determining the amount of a country's exports but also in determining the likelihood of such exports. It has been demonstrated by Nords and Piermartini (2004) that the quality of infrastructure is a significant factor in determining the performance of trade. Among all indicators of infrastructure, port efficiency has the greatest impact on trade performance on its own.

The theoretical literature on the factors that determine trade costs, such as Arvis et al. (2013), Nov (2013), and Kouty (2013) highlights two primary causes of trade costs. These sources include tariffs and non-tariff barriers to trade. According to the available research, external sources are one of the primary sources. These sources are independent of societal norms and regulations. The other

primary source is endogenous sources, which are those that are unique to the nation of origin or the partner country. De (2005, 2006b) provided evidence that transaction costs are statistically significant in explaining variations in trade in Asia. Jacob Marschak (1965), who established the relationship between economy and language despite the fact that it does not appear to be very evident at first glance, was the one who came up with the term "economics of language" in the 1960s. According to Marschak, language was an essential instrument for men to carry out their economic activities; for this reason, he considered language to be a resource. Expertise in a foreign language is, therefore, an important determinant to trade, and not only the official language(s) of the countries involved. Some authors have found a correlation between common language and trade (Melitz & Toubal, 2014; Fidrmuc & Fidrmuc, 2016).

This thesis aims to examine the determinants of Ghana's Non-Traditional Export (NTE) manufactured exports to trading partners, focusing on various macro-level determinants, environmental factors, regional trade agreements, and trade costs. The specific factors are the real effective exchange rate (REER), the gross domestic product of Ghana and trading partners (GDP), foreign direct investment (FDI), infrastructure (INFAS), the population of Ghana and trading partners (POP), gross fixed capital formation (GFCF), the difference in GDP per capita (GDP_Diss), land area (AREA), distance (DISS), common border common language (COMLANG), landlocked, foreign direct investment (FDI), transportation cost, ECOWAS, EU, and UK.

3.3 Methodological Review

The gravity model is a valuable framework for explaining the volume of international trade between countries, allowing for the incorporation of additional variables to elucidate trade flow dynamics (Paas, 2000). Thus, this study is employing the gravity model of trade for the analysis. The fundamental gravity model of trade received harsh criticism for not having a theoretical foundation in the 1960s and 1970s. As a result, the credibility of its empirical predictability power was compromised (Frankel, 1997). However, due to the growing importance of macroeconomic and geographic factors, the model started to draw interest again in the late 1970s to provide theoretical answers to trade concerns. The gravity equation was improved and theoretically

validated by the studies of Anderson & Wincoop (2003), Deardorff (1995), and Anderson (1979). Their research showed how the gravity model of trade may be used to construct specific trade models like the Ricardian theory and the Heckscher-Ohlin model. The earliest work was that of Linnerman (1966), who by incorporating demographic factors in the model provided a hypothetical basis for the gravity model of trade. The most important attempt to improve the Armington Assumption-based gravity model's theoretical foundation came from Anderson's work in 1979. The study employed the Cobb-Douglas preference and the premise that items varied according to their places of origin. Anderson (1979) utilized the constant elasticity of substitution (CES) utility function to approximate the linear spending system, which assumes that each product is produced by a single nation and that a nation's tastes for goods are homothetic and uniform across importing nations. He employed the gravity model as an alternative to cross-sectional budget studies that do not take tariffs and transportation costs into account, as mentioned in his study. However Anderson's model is constrained by the fact that it is only applicable for countries with equal preferences for traded items and identical structures with regard to transit cost and trade tax, as noted by Kristjansdottir (2002). Similar to Anderson (1979), Bergstrand (1985) used the Armington Assumption to explain his gravity model of trade by assuming constant elasticity of substitution preferences and a microeconomic foundation of a straightforward monopolistic competition model. After putting his model to test, he came to the conclusion that trade flows are reasonably and significantly impacted by price levels and exchange rates. Bergsrand referred to his model as the generalized gravity model of trade, as mentioned by Rahman and Dutta (2012). The gravity model of trade received additional theoretical support from Helpman and Krugman's (1985) claim that bilateral trade depends on the sum of the GDPs of the trading partners. According to Frankel (1997), if the goal is to investigate the theoretical impact of the preferential trade agreement on the amount of commerce and economic wellbeing of the population, Helpman and Krugman's (1985) methodology is the one we build upon. By deriving the gravity model of the trade from the Heckscher-Ohlin model's theoretical framework, Deardorff (1995)'s work contributed to the theoretical underpinnings of the gravity model. His approach is really a simplification of Anderson's (1979) model, and it makes the assumption that the same preferences apply to all traded items, as opposed to just one particular good as in Anderson's (1979) model. In the absence of trade obstacles, he claimed, trade in homogenous items renders producers and consumers unconcerned about trading partners in both local and international trade, so long as they

sell or purchase the desired goods. When preferential trade agreements are equal between trading partners, Deardorrf (1995) was persuaded to construct an estimated trade flow that exactly matches a straightforward frictionless gravity model, according to Makochekanwa and Jordaan (2008). The studies mentioned above provided solid clarity for the gravity model of trade's theoretical underpinnings, but none of them made it obvious how important distance is to trade. The renowned Anderson and Wincoop study from 2003, "Gravity with Gravitas: A solution to the Border Puzzle," had a crucial impact on the gravity model of trade's theoretical underpinnings. The authors included a distance component called Multilateral Trade Resistance because they were unhappy with the theoretical foundation of the gravity model (MTR). They are credited with making one of the most significant theoretical contributions to the development of the gravity model of commerce with their model. The assumption that all traded products are differentiated by the nation of origin and that each country must specialize in the production of only one straightforward commodity led to criticism of Anderson and Wincoop's (2003) model. Furthermore, the assumption was unfounded, making it impossible to offer a specific formula for calculating the constant elasticity of substitution (CES) between the exchanged goods rather than simply assuming a value. The efforts of Bergstrand et al. (2013) gave rise to a number of CES estimation methods. The research described above concludes that the gravity model of trade's theoretical underpinnings and empirical success has been established, thereby validating its application.

3.4. Empirical Review

Empirical literature discusses previous research and papers written on the subject of manufactured exports and the factors that influence their flow. Research on this subject has been done first using time series analysis whereby data on manufactured exports is analyzed at consistent intervals over a set time which helps to show how the variables of interest change over time and second using panel data analysis which has often employed the gravity model of trade. The gravity model of trade helps to investigate the determinants of trade flows between trading partners hence being chosen for this study to ascertain the determinants of manufactured exports between Ghana and its trading partners. The following paragraphs discuss the empirical literature done on first the determinants of manufactured exports, second the influence of trade costs on manufactured exports, and third the determinants of trade costs which used the gravity model approach.

3.4.1 Determinants of Manufactured Exports

The gravity model was first used by Tinbergen (1962) to study international trade flows. His 18-nation statistics showed that income and distance affect trade movements. Adjacency and membership in Britain's Commonwealth and Benelux FTA also influence trade flows, the study found. Bergstrand (1985) investigated the bilateral export patterns of 15 countries that were members of the Organization for Economic Co-operation and Development (OECD). He did this by applying the gravity model of trade. The paper addressed gravity model of trade theoretical concerns. The study found that the magnitude of pair countries' economies, the imports prices, proximity, and trade agreement all positively affect bilateral exports, but characteristics like physical distance between capital cities negatively affect trade. The remaining estimation variables were insignificant. Heteroscedasticity plagues the study's results due to cross-sectional data. Bi and Kong (2022) conducted research in which they investigated the trade between Fiji and some countries. This study calculated the export levels of commodities trade that Fiji engages in with its regional partners. The findings indicated that the exchange rate had a coefficient that was negative and insignificant effect of regional trade. According to the findings, the coefficient value indicating a correlation between the exchange rate and total commerce was closer to zero, indicating that there is either no association or one that is insignificant. Because they all produced p-values that were less than 0.05, the exchange rate, distance, and GDP were all significant factors in regional trade. The p-values for these factors were respectively 0.0318, 0.0, and 0.0. Since the p-value for the population variable was 0.2335, it was determined that the population variable did not meet the criteria for significance. The estimation using the gravity model showed similar results, with the exception of the exchange rate, which did not turn out to be significant.

Abafita and Tadesse (2021) examined the determinants of coffee trade and identified regional trade agreements as an important variable. Their study employed the gravity model analysis with ordinary least squares (OLS) and Poisson pseudo maximum Likelihood (PPML) estimator for analyzing panel data on bilateral coffee trade flows. According to the findings of their research, the GDP and population of exporting countries, in addition to the GDP of importing countries, are essential factors in boosting coffee commerce. It was discovered that geographical distance constituted a barrier to the commerce of coffee, whereas a common border facilitated trade. The coffee trade was facilitated by the use of common language. Depreciation of the exporting

country's currency, the quantity of fertile land in the exporting country, the quality of the country's infrastructure, and the worldwide economic downturn were also found to considerably increase coffee trade. However, it was observed that coffee commerce was drastically curtailed due to taxes imposed by the importing countries. The regional trade agreement (RTA) variable did not have a substantial impact on the coffee trade between the two countries. Ghanaian bidirectional trade flows were examined by Osei-Assibey (2017). He used OLS robust errors on three regressions with the augmented gravity model of trade. His research concluded that exchange rate instability was negative and not crucial to imports but positive and significant for exports. The three regressions estimated positive and negative relationships between income and per capita income. Utilizing panel data, Binh et al. (2015) used a gravity model to conduct an analysis of the bilateral trade activities that took place between Vietnam and 60 other countries between the years 2000 and 2010. According to the estimates, the economic scale of Vietnam, the economic magnitude and market size of trade partners, cultural differences and the distance between countries pairs all play a significant role in determining the trade flows between Vietnam and these 60 nations. Using the speed of convergence method, it was discovered that Vietnam has a potential for commerce, particularly with some emerging markets like Africa and Western Asia. This was one of the findings of the method.

Wonyra (2017) conducted an assessment of the factors that influence total trade cost and manufactured trade cost in ECOWAS countries. He employed the econometric approach of the gravity model to conduct his analysis. The primary finding was that classic gravity model variables and indices of ease of doing business have an effect on both total trade cost and manufactured trade cost. A common border, the use of a common language, the cost of firm creation, the custom environment, the benefit of firms, the GDP of an export country, the GDP of an import country, and the distance are the primary factors that influence trade costs between ECOWAS countries and their trade partners. Other factors that play a role include: the benefit of firms, the GDP of an export country, and the GDP of an import country. To be more explicit, the research revealed that the level of development of countries, as determined by their GDP, had a negative impact on the costs of trade.

Braha et al. (2016) investigated the factors influencing Albanian agriculture export. The gravity model and Poisson Pseudo Maximum Likelihood (PPML) estimation method were used to

examine Albanian exports from 1996 to 2013. They found that export flows rise with domestic economic size (GDP). The research also demonstrated that sharing a border, price stability (inflation), RTAs, and institutional quality of trading partners boost Albanian agricultural exports, but distance has a negative effect. Dlamini et al. (2016) used the gravity model of trade to study Swaziland's sugar exports. The study used a panel dataset of Swaziland and its 25 key trading partners from 2001 to 2013 and found that GDP, importer land size, official common language, COMESA, and EU trading blocs all positively affect sugar exports. The study found that distances, the trading partner's population, and Swaziland's trade openness negatively affect sugar exportsThe research conducted by Zeray (2015) is centered on determining the elements that influence Ethiopia's trade performance within neighboring nations. Panel data for the period of 19 years (from 1991 to 2009) of sample nations were estimated using random effect estimators using the gravity model of trade. The coefficients that were obtained showed that the total trade flow was determined by Ethiopia's per capita GDP, the product of the GDP of Ethiopia and its trading partners, the weighted distance between Ethiopia and the bordering region, and the per capita GDP differential. Additionally, the total trade flow was also determined by the per capita GDP differential. The GDP of Ethiopia's trading partners, the GDP of the exporting country on a per capita basis, and the real bilateral exchange rate were all factors that had an impact on the total amount of goods that Ethiopia exported to the bordering region. The findings of this study suggested that a devaluation of the real exchange rate would have an effect on the international competitiveness of Ethiopian exports. As a result, the authors of this study recommended that a country's real exchange rate be devalued in order to benefit from the export competitiveness of that country. The report also pointed out how important it is for the government to pay sufficient attention to destination markets that have lower overall transportation cost.

A gravity model research by Jordaan and Eita (2011) examined South Africa's wood exports. The results showed that South Africa's population and importer's GDP positively affect wood exports, with statistically significant coefficients. Wood product exports are negatively impacted by importer population and local GDP. The importer's population growth implies self-sufficiency. Distance was statistically negligible. Regional trade agreements influenced wood exports. NAFTA and EU participation decreased exports, but SADC membership increased wood product exports. Finally, South Africa and its trading partners had untapped trade potential from 2002 to 2004. Habab et al. (2010) examined Egyptian agricultural export growth using the gravity model of trade.

Egypt and its 50 biggest trade partners were paneled from 1994 to 2008. Egypt's GDP and exchange rate volatility boost agricultural trade, whereas GDP per capita and transportation expenses, proxied by distance, negatively affected trade. All were significant.

Chan et al. (2007) used the gravity model to analyze China's textile exports. The study found that China's textile exports are negatively affected by population growth and the real bilateral exchange rate, but favourably affected by China's GDP and her importer's GDP, GDP per capita, and trade organization membership. All variables except distance were significant. Kristjansdottir (2002) examined Icelandic export growth using the gravity equation. Iceland exports were analyzed using a panel dataset from four industries and 16 top trading partners over 11 years. Her empirical findings demonstrated that regional trading blocs and individual industries matter more than Iceland's size and affluence in export volume, even when controlled for small country sizes. The study found that distance and nation characteristics affected marine products differently. According to the findings of some research (Eita, 2009; Hatab, 2010), the GDP of the country that is doing the importing has a positive influence on export growth, however the distance that separates the two nations doing the trade has a negative influence on export performance. In a study that is very similar to this one, Roy and Rayhan (2011) use a method called the gravity model panel data to investigate the factors that determine trade flows in Bangladesh. This study covered a total of 14 countries, one of which was Bangladesh. The other 13 countries included in this study are all members of the South Asian Association for Regional Cooperation (SAARC), which has a trade agreement with Bangladesh (SAARC). Sohn (2005) used the gravity model in Korea to investigate the factors that determine Korea's bilateral trade flows and to derive the implications those factors have for Korea's trade policy. Rahman (2009) used generalized gravity models to investigate Australia's potential for global commerce with its 57 trading partners during the time span of 1972 to 2006. The standard gravity model was "augmented" in that study by introducing dummies for a common language and RTA membership, as well as the GDP per capita of Australia and its partners, the per capita GDP disparity between Australia and its partners, and the openness of its partners. In order to explore the factors that influence Namibian exports, Eita (2008) utilized an expanded version of the gravity model. The model was applied to panel data that covered 39 countries during the period of 1998-2006. Eita (2008) modeled Namibia's exports in this study as a function of the country's total GDP as well as its GDP per capita, as well as the GDP of Namibia's biggest importers, the distance between the two countries, and the exchange rate.

3.4.2 Trade Costs and Exports

There is evidence of an inverse relationship between trade costs and the volume (or value) of exports, according to a number of gravity model studies that took into account a variety of time periods and countries (including studies that focused on a single nation) and made use of a variety of research methodologies (Anderson & Wincoop, 2004; Arivs et al., 2013; De, 2007). While earlier research categorized trade costs according to distance or as border variables (e.g., Kepaptsolou et al., 2010; Pham & Nguyen, 2015). A wealth of information regarding trade costs and how they affect international commerce were provided by Anderson and Wincoop (2004). For industrialized nations, the tax equivalent of "representative" trade costs is approximately 170%. This number can be broken down in the following ways: The expenses associated with transportation account for 21% of total costs, the costs associated with trade barriers at international borders account for 44% of total costs, and the costs associated with retail and wholesale distribution account for 55% of total costs.

De (2007) conducted an investigation into the effect that trade expenses have on commerce by presenting empirical evidence from Asian nations and also used the gravity model. According to De (2007), Asia's trade is suffering as a direct result of the region's historically high trade costs. The region's trade is being negatively impacted by high trade costs at a time when Asia's economic interdependence is expanding concurrently with tariff reductions. As a result of much higher freight prices in developing nations compared to developed countries, the costs of shipping goods to developing Asia are 116% more than the costs of shipping goods to developing countries. The research also found evidence that higher auxiliary shipping costs are having a negative impact at a time when ocean freight prices are typically dropping. This was established by the report. De (2007) came to the conclusion that infrastructure quality, tariffs, and transportation costs had a substantial impact on trade patterns in the Asian region after estimating an augmented gravity model at the 4-digit HS level for 2004. According to the findings of the study, a cut of 10% in both tariffs and transportation costs would result in an increase of around 2% and 6% in bilateral trade, respectively. Furthermore, the other conclusions that the paper draws are that free trade agreements (FTAs) and similar languages have been beneficial to Asian neighbors. The author was particularly concerned about the low-income countries' (LDCs') poor infrastructure quality, suggesting that their percentage of global trade would probably drop if these nations continued to trail behind

developed ones in infrastructure development. The gravity model was utilized by Khan and Kalirajan (2011) in order to investigate the influence of trade costs in Pakistan. For the empirical study that took place between 1994 and 2004, 79 of Pakistan's trading partners were selected as the nations of interest. The decline in "explicit and implicit beyond the border" trade costs, along with an increase in demand, led to an increase in Pakistan's exports to certain partner nations between the years 1999 and 2004. However, Pakistan's export losses increased as a result of "beyond the border" trade costs, which were particularly high with China and India. Arvis et al. (2013) used recently collected data on international commerce and industry to derive estimates of trade costs for up to 167 nations throughout the course of the period 1995-2012. Estimates from the gravity model were utilized so that a distinction could be made between the trading of manufactured goods and trading of agricultural goods. In both cases, the absolute trade costs are quite significant in terms of ad valorem equivalents, ranging from a little over 80% for high-income nations in manufacturing to over 300% for low-income countries in agricultural. This variation is due to the fact that different countries have different levels of manufacturing and agricultural production. Their findings suggested that although global economic integration has increased substantially over the past few decades, there are still potentially large unexploited gains to be obtained by further narrowing the price gap between exports and imports. This is despite the fact that global economic integration has increased substantially. According to the findings of Persson (2013)'s empirical research, nations that have high transaction costs associated with exporting commodities will typically have lower export volumes.

Tu and Giang (2018) examined trade costs and Vietnam's exports from 2001 to 2013. Annual export data from Vietnam to 70 of its major importers was analyzed using static linear panel data. Trade costs were estimated using the gravity model for Vietnamese bilateral exports. The results of the fixed effects model indicated that cost incurred from trade affects Vietnam's export value to its trading partners. The importing country's population, trade openness, GDP, and Vietnam's GDP also affect bilateral export value. Trade cost significantly affects Vietnamese bilateral export performance.

3.3.3 Determinants of Trade Costs

Limao and Venables (2001) conducted an investigation into the effects of regional characteristics and infrastructure on trade costs as a dependent variable. Wilmsmeier et al. (2006) conducted research on the countries of South America and came to the conclusion that factors such as port efficiency, infrastructure, the participation of the private sector, and connectivity between ports (distance) are key factors in determining costs. In a study that was conducted more recently, Marti and Puertas (2017) examined the significance of logistical performance in international trade and its impact on costs, with a particular emphasis on the research of developing nations. They came to the conclusion that it is impossible to design a universal pattern for all emerging areas due to the fact that the economic, cultural, and political characteristics of these areas are quite distinct from one another. The findings point to areas that need to be improved upon in order to better these countries' positions in the international arena.

At the sector level, Martinez-Zarzoso et al. (2003) evaluated the factors influencing maritime transport costs, applied to the ceramics business in Spain. This study was conducted in Spain. Along the same lines, Martinez-Zarzoso et al. (2008) focused on the determinants of maritime and land transport costs. They looked into four different industries (agroindustry, ceramics, automotive, and machinery), and they came to the conclusion that the magnitudes of these costs limit trade, particularly in high value-added sectors. Chen and Novy (2011) performed an analysis of the costs of trade between European countries. They did so by differentiating between various economic sectors, and their findings provided evidence about crucial aspects such as distance, non-tariff measures, and initiatives of member countries. Kouty (2013) conducted an analysis of the factors that determine trade expenses using data from the economies of 30 African countries and 100 trading partners. According to the findings of the study, exogenous factors like distance and isolation had a positive and significant impact on trade costs. On the other hand, the study found that endogenous factors like area, having a common official language, sharing a border, and being part of the same regional community had a negative and significant impact on trade costs.

3.5 Other models and determinants of exports

There have been several works done to investigate the determinants of exports that employed time series analysis such as the Johansson Co-integration and Vector Error Correction technique, the generalized least square (GLS) estimation technique, and the multivariate time series model. The difference between these models and the gravity model approach is that the gravity model predicts/estimates how the volume of trade between all possible country pairs is influenced originally by their economic size and distance. The following paragraphs discuss some literature on determinants of exports that employed other models besides the gravity model.

Anagaw and Demissie (2013) used Johansson Co-integration and Vector Error Correction to analyze Ethiopian exports from 1970 to 2011. The home country's GDP, real effective exchange rate, financial development, trade liberalization, and infrastructural development favorably affect Ethiopia's export performance and are statistically significant. Export success was statistically unrelated to trading partners' actual GDP. Skosana and Kabuyab (2014) used cointegration to analyze Swaziland's 1980–2010 export performance. Cointegration and vector error correction were evaluated to determine the variables' long-term relationship and the speed of adjustment to the long-term equilibrium. Their study found that long-run elasticities of 0.58, 1.19, and 0.36 for foreign direct investment, world demand, and nominal exchange rate, and 0.26, 4.3, and 0.50 for short-run elasticities, determine exports.

Boansi et al. (2014) explored factors that boost Ghanaian pineapple exports. The study used the Ordinary Least Square Estimator for a detached regression equation of export value and volume. The study found that Ghana's fresh pineapple exports have a competitive advantage and are more value-driven than volume-driven. The study also found that Ghana's production, trade openness, and competitiveness index boost pineapple export value and volume. Domestic demand and net foreign direct investment inflows hurt fresh pineapple exports. Tobit estimate showed all variables were significant. Agyei-Sasu et al. analyzed Ghanaian horticulture exports (2010). 52 Ghanaian horticultural exporting company managers and representatives provided primary data. Their findings showed that managers' educational level, employment experience, export management training, entrepreneurial orientation, export department presence, product diversity, and government backing directly affect export success. Export obstacles and working cash shortages reduce Ghana's export success. Kyereboah-Coleman et al. (2006) used a 1995–2004 panel dataset

to explore the relationship between cooperative governance and Ghana's non-traditional export performance using GLS estimation. The study found that indigenous ownership and non-executive directors on NTE boards improve performance in Ghana.

In his investigation into the factors that determine manufacturing output in Ethiopia, Mulualem (2006) utilized the Ordinary Least Squares (OLS) estimate method. He based his findings on annual data spanning the years 1970 to 2004. The results of the model indicate that Ethiopian manufacturing exports are positively and significantly influenced by investment to GDP ratio, total factor productivity, and foreign income, while the real effective exchange rate was found to have an insignificant influence on exports. These findings are based on the fact that the real effective exchange rate was found to have an insignificant influence on exports.

In their empirical study, Sekkat and Varoudakis (2000) evaluated the impact of exchange rate policies on the performance of manufacturing exports for a panel of major SSA countries over the period of 1970 to 1992. They found that depreciation fosters the performance of manufacturing exports and confirmed that this was the case. According to the findings of Thorbecke and Zhang (2009), an increase in the value of the Chinese currency would result in a significant decline in China's exports of apparel, furniture, and footwear. Zia and Mahmood (2013) demonstrated that an increase in the manufacturing sector's exports occurs after a devaluation of the currency rate; however, exchange rate instability prevents this rise from being fully realized. Grobar (1993) found, based on empirical evidence, that RER uncertainty has a detrimental impact on specific kinds of manufactured exports coming from less-developed nations. Hunegaw (2011) conducted research into the connection between the real effective exchange rate (REER) and the amount of manufactured goods exported by East African nations. According to the findings of the study, an increase in exports of labor-intensive, low-skill, medium-skill, high-skill, and aggregate manufacturing products, respectively, is improved by around 0.8%, 1.2%, 0.5%, 0.5%, and 0.6% when the REER is devalued by 1%. The estimate was significant at the 1% level for exports that were labor-intensive, low-skill, high-skill, and technology-intensive, and it was significant at the 5% level for exports that were medium-skill and overall manufacturing. The favorable effect was in line with what is generally accepted theoretically.

Hunegaw (2011) found that REER depreciation benefits all East African industrial exports. The report suggested exchange rate devaluations affect Eastern African export performance. Allard et

al. (2005) examined the link between foreign/domestic demand, relative pricing, REER, capacity utilization rate, and manufactured products exports for France, Germany, Italy, and Spain from 1980 to 2004. The paper employed error correction. The 2001–2004 REER appreciation hurt euro area exports in proportion to its degree. Demand boosted exports worldwide, but local demand only affected imports. According to the European Commission (2010a, 2010b), euro-area exports were mostly driven by real exchange rates and international demand.

Hunegaw (2011) showed a positive and elastic link between manufacturing exports and domestic real gross domestic product (GDP), indicating that economic expansion affects manufacturing exports. Penny, Pritzker, Ken, and Brian (2015) defined GDP as the entire value of goods and services generated within a country, regardless of asset ownership or labor nationality. GDP measures production, independent of whether it is used for consumption, investment in new fixed assets or inventories, or replacement of depreciated fixed assets. GDP, according to Pritzker, Arnold, and Moyer (2015), measures an economy's output of goods and services. Export-real income hypothesis is vague (Hunegaw, 2011). He notes that rising real GDP increases import demand and home production of tradable commodities, making the ratio of exports to imports relatively imprecise and empirical. Hunegaw (2011) found that manufacturing exports in all classes rise with real GDP. The report observed that standard theory predicts that foreign real GDP increases exports. High-skill and technology-intensive manufacturing exports at 1% and 5% of East African trading partners had the greatest favorable effect.

Research and development (R&D) is frequently substituted for technology, which is consistent with the neo-technology and technology gap hypotheses. Overall outcomes are mixed. Willmore (1992) and Wagner (2001) come to the conclusion that research and development have a positive impact on exports for large pooled samples of Brazilian and German companies, respectively. According to Lall (1981), R&D is significantly negative for a sample of approximately one hundred Indian engineering enterprises. On the other hand, according to the research conducted by Lefebvre et al. (1998), R&D is not significant at all for many specialized supplier companies. There were two hypotheses put up to account for the varying results. To begin, the significance of research and development in relation to the number of exports varies depending on the industry as well as the country. Second, research and development only account for a portion of technology because it does not take into account the gradual enhancements that can be made to both products

and procedures. This is targeted specifically toward small and medium-sized businesses, many of whom do not possess a dedicated R&D department (Brouwer and Kleinknecht, 1993). It is generally believed that R&D spending is minimal among businesses located in developing countries; this is due to the fact that overall technical change is adaptable (Kumar and Siddharthan, 1994). Wignaraja (2001) and Wignaraja and Ikiara (1999) investigated whether or not there is a correlation between a company's level of exports and its technology index. The research was conducted on companies located in Kenya and Mauritius. In both of the investigations, a positive and statistically significant coefficient was discovered. Sadly, the sample sizes of the two research were both quite small (approximately 40 firms each), and one of the studies used OLS, which may have led to skewed results.

Zhang (2007) demonstrates that the influx of FDI and infrastructure have significant and positive effects on high-tech exports, whereas Srholec (2007) identifies enrollment in higher education, granted patents, and access to computers as significant factors that have a positive effect on high-tech exports. Both of these authors point to the fact that high-tech exports are positively impacted by a number of other factors as well. According to the findings of Allard (2009), an increase in FDI investments was found to be a contributing factor to the expansion of exports in the Czech Republic, Hungary, Poland, and Slovakia over the period of observation. There is widespread agreement among development economists that foreign direct investment plays a significant part in the expansion of the economies of receiving countries (Akinlo, 2004; Seetanah and Khadaroo, 2007). Foreign direct investment raises the stock of capital, which in turn leads to more effective use of existing resources, which in turn boosts productivity, employment, and economic growth (Seetanah and Khadaroo, 2007). The reason behind foreign direct investment in export marketing is an important consideration (WorldBank, 1993). If the goal is to gain a larger share of the domestic market, then foreign direct investment (FDI) might not contribute to increased exports. On the other hand, if the goal is to expand into international markets by making use of a nation's comparative advantage, then FDI might help increase exports. Therefore, the policy regime determines whether or not foreign direct investment (FDI) helps the growth of exports (Sharma, 2000). Krugman (1979) examines the effects of factors such as geographical location, monopolistic competition, migration of capital and labor, the cost of transportation, and differentiated products with growing returns to scale as major factors in international commerce. The geographic implication of increasing returns holds industry in a certain place, where it is

difficult for industries of another country to compete with it. Research that was pioneered by Johnson and Robison (2005) demonstrates that increasing exports in particular industries can redistribute economic and political power as well as increase the quality of institutions, which in turn results in linked developmental advantages. The model has established itself as a reliable tool in the fields of economic geography and international commerce. Businesses are relocating to larger markets because the costs of transportation are lower there. These larger markets have an abundance of inexpensive intermediaries, which has led to the organization of regional economies around an industrial core.

Tkalec and Vizek (2009) conducted research to explore the effect that macroeconomic policies have on the output of manufactured goods in Croatia. The method of multiple regression was utilized in the research project to investigate the relationship between the output of 22 different manufacturing sectors and the factors of individual consumption and investment, interest rates, the real effective exchange rate, government consumption, fiscal deficit, and demand from overseas markets. The data for the analysis ranged from the first quarter of 1998 to the third quarter of 2008. According to the findings, alterations in fiscal conditions, the real effective exchange rate, and personal spending appear to have the greatest impact on industries with a low level of technological intensity. According to the findings of the study, the level of output in industries with high technological intensity is generally responsive to changes in investments, changes in international demand, and changes in fiscal policy. Again, it was discovered that fiscal policy appears to be especially significant for manufacturing output, both in terms of the number of fiscal elasticities and the shorter time lags. This was the case regardless of the country. According to the findings of the study, production decreased in industries with high and medium-high levels of technological intensity after a currency depreciation, while it increased in industries with low levels of technological intensity. This was found to be the case for industries with low technological intensity.

Anaman and Osei-Amponsah (2009) used cointegration and error correction mechanism to establish a long-run relationship between manufacturing output and the level of per capita real gross domestic product (GDP), the export-import ratio, and political stability as part of their investigation into the factors that determine manufacturing output in Ghana over the period of 1974-2006. This was done in order to determine the factors that influence manufacturing output in

Ghana. In the short term, the level of output of manufacturing was shown to be driven by the ratio of exports to imports as well as by political stability. As a result, the relevance of the growth of export-based manufacturing enterprises in increasing manufacturing output in the country was emphasized.

Enu and Havi (2014) used a multivariate time series method to investigate the macroeconomic determinants that influence the performance of Ghana's manufacturing sector. It was discovered that the rate of manufacturing production and the actual gross domestic product per capita had an inverse relationship with one another. Manufacturing production was negatively impacted by factors such as gross fixed capital formation, the consumer price index, and the real exchange rate in the short term. In the long run, macroeconomic variables like private sector credit, labor force, GDP per capita, and real exchange rates were unfavorable to the growth and development of Ghana's manufacturing sector. On the other hand, consumer price index, telephone (representing infrastructure development), and gross fixed capital formation were favorable to the growth and development of Ghana's manufacturing sector. In conclusion, it is recommended that credit from the private sector be increased to the manufacturing sector, that the training of the labor force be skilled and technically oriented, and that policies be implemented to stabilize the real exchange rate in order to stop the downward trend in manufacturing production.

Edwards and Alves (2006) perform a comparative examination of the factors that determined South Africa's export supply during the course of 28 manufacturing sub-sectors from 1970 to 2002. The export volume was employed as the dependent variable in their pooled estimating model, and the exchange rate, infrastructure costs, tariff rates, and variable costs were used as the explanatory factors. According to the results of the generalized method of moment analysis, all of the explanatory factors that were utilized are significant drivers of export performance.

CHAPTER 4

4.0 METHODOLOGY

4.1 Introduction

The empirical method to achieve the study's objectives are discussed in this section of the research. This chapter will specify the gravity equation utilized in the study and describe the variables, measurements, and sources. The chapter will further provide the sources of data and discuss econometric methodology topics like estimation and robustness checks.

4.2 Gravity Model of Trade

In recent years, the gravity model of trade has been seen as the best and most comprehensive way to figure out what makes international trade flows happen. Newton's theory of gravity is a basis for the gravity model of trade (Becchetta et al, 2012). Newton's theory of gravity says that two objects attract each other in a way that depends on how far apart their centers of gravity are (in meters). Stewart (1948) and Zipf (1946) used the gravity model in the social sciences to study trips between cities. They did this by putting the following information into the model:

$$I_{ij} = E\,(POP_i \times POP_j)/ D_{ij}^{k} \qquad 3.0$$

Where I_{ij} represents the number of journeys between cities i and j, POPi and POPj are the population in a city i and j respectively which is representing the distance between the cities and E is the intercept of the equation (Rahman, 2003). Tinbergen (1962) and Poyhonen (1963) were the first to use Newton's law of gravitation to look at trade flows. They thought that just like planets are often pulled by their sizes and proximity, so would nations be pulled by their GDP and proximity (Becchetta et al., 2012). Their gravity theory took into account economies of scale by estimating the size of the market based on the size of a country's population and GDP. The distance between trading partners was added to their model to show the effect of geography. So, the gravity model of trade says that the amount of trade between two countries is directly related to their GDP and negatively related to their distance from each other. The basic gravity model of trade has a multiplicative form, which is shown below:

$E_{ij} = \beta_0 Yi^{\beta_1} Yj^{\beta_2} Dij^{\beta_3}$ 3.1

Where Eij is the export flows between countries i and j, represents the GDP of country i and j respectively, measures the distance between the capital cities of country i and j, and finally, s are coefficients of the variable noted above. The log-linear form of equation (3.2) is shown below:

$LnEij = \beta_0 + \beta_1 lnY_t + \beta_2 lnY_j + \beta_3 lnDij$ 3.2

Distance serves as a proxy for transportation costs, implying that as the distance between trading partners increases, the cost of transportation is expected to rise. On the other hand, β_1 and β_2 are anticipated to have a positive value, while β_3 is anticipated to have a negative value. In recent years, the model has seen widespread application in empirical research. However, it has also faced substantial criticism owing to its lack of a solid theoretical foundation. Exports between two countries are hypothesized to be proportional to each country's economic mass (which is measured by GDP and population size) and inversely proportional to the distance that separates them. This is the model's most fundamental form. Several different gravity model specifications were offered by empirical works such as Limao and Venables (1999), Breuss and Egger (1999), Chen and Wall (1999), and Egger (2000). The academic literature on international trade has demonstrated that the elements that govern the expansion or performance of exports vary from one study to the next. Additionally, there have been a variety of models developed to evaluate the performance of exports. The Gravity models and the vector error correction models are two of the most common approaches that have been utilized (Mabeta, 2015). The premise that a country's export performance is a function of its Gross Domestic Product (GDP), population, and the distance that separates it from another nation's trading partner is the foundation of gravity models. These models indicate that the volume of exports is expected to exhibit a more significant increase when the importing country has a higher income and when the trading countries are in closer proximity. Conversely, the volume of exports is anticipated to show a smaller increase when there is greater distance between the trading nations.

4.3. Model Specification

The enhanced gravity equation of trade is used in this study on Ghana's manufactured exports. Due to its empirical robustness and explanatory strength, the gravity equation is often employed to

study bilateral trade flows. Kepaptsoglou et al. (2010) found that the gravity model is robust when studying international trade flows. We use McCallum (1995)'s augmented gravity model, later adapted by Braha et al. (2016), to explore factors that affect Ghana's manufacturing exports. McCallum's logarithmic model:

$$\ln TRAij = \beta_0 + \beta_1 \ln GDPi + \beta_2 \ln GDPj + \beta_3 \ln Dij + \lambda_k DUMij + uij \quad (4.1)$$

Where TRAij denotes the flow of trade from country i to country j; GDP represents the gross domestic product; and Dij signifies the geographical distance that separates the capital cities of nation i and country j. Uij is the stochastic error term, while n and k are the parameters of the model that need to be estimated. DUMij is a dummy variable that determines trade flows. In order to ensure that Equation (4.1) accurately represents the gravity model for the Manufacturing Sub-sector of NTEs in Ghana, several additional variables have been added to the equation. The dependent variable in the modified form of the gravity equation has been changed from TRAij to MANUgjt, which reflects manufactured exports from Ghana (g) to trade partners (j). This change was made because the dependent variable of interest in this study is manufactured exports (MANUgjt) and not total trade (TRAij). This modification is expressed in the log-linear form of the model that is required to be used in the estimation in the following manner:

$$lnMANU_{gjt} = \lambda_0 + \lambda_1 \ln GDP_{gt} + \lambda_2 lnGDP_{jt} + \lambda_3 lnPOP_{jt} + \lambda_4 lnDISS_{gj} + \lambda_5 lnREER_{gjt} + \lambda_6 lnPOP_{gt} + \lambda_7 lnINFRAS_{gt} + \lambda_8 lnFDI_{gt} + \lambda_9 lnTRANS_{gjt} + \lambda_{10} lnGDP\_Diss_{gjt} + \lambda_{11} lnGFCF_{gjt} + \delta_1 EU_{gj} + \delta_2 ECOWAS_{gj} + \delta_3 LANDLOC_{gj} + \delta_4 BORDER_{gj} + \delta_5 COMLAN_{gj} + \varepsilon_{gj} \quad (4.2)$$

Where the dependent variable MANUgjt indicates the amount of goods exported by Ghana's manufacturing sector to its trade partner nation j at the given time t. The variables that are considered to be explanatory are as follows: Gross Domestic Product (GDP), Population size (POP), Distance between capital cities of country g, Ghana, and j, trading partners (DISS), the real effective exchange rate between country g and j (REERgjt), foreign direct investment of Ghana (FDI), trade cost components such as infrastructure (INFRAS) and transportation costs (TRANS), and other variables such as European Union (EUgj), ECOWASgj, landlocked

(LANDLOCKEDgj), Border and Commo language with trading partners. Equation 4.2 will help answer the research questions of this study.

To achieve the third research objective of identifying the determinants of the trade costs of Ghana's manufactured exports, this study considers some expenses linked to the trading of goods between two countries in a broader context following the framework presented by Novy (2013). Utilizing a gravity model for estimation, Novy (2013) calculated trade costs by taking the geometric average of bilateral and global trade costs, highlighting the significantly elevated costs associated with international trade in comparison to domestic trade. Novy (2013)'s formula:

$$\tau_{ijt} = \left(\frac{t_{ijt}t_{jit}}{t_{iit}t_{jjt}}\right)^{\frac{1}{2}} - 1 = \frac{X_{ii}X_{jj}}{X_{ij}X_{ji}}^{\frac{1}{2(\sigma-1)}} - 1 \qquad (4.3)$$

where
:Geometric mean of trade costs between country i and country j at time t
tijt: Costs of international trade from country i to country j at time t
tjit: Costs of international trade from country j to country i at time t
tiit: Costs of international trade from country i at time t
tjjt: Costs of international trade from country j at time t
xijt: Flow of international trade from country i to country j at time t
xjit: Flow of international trade from country j to country i at time t
xiit: Flow of international trade from country i at time t
xjjt: Flow of international trade from country jat time t
σ: Specific substitution elasticity between goods from the sector.

Novy (2013) assumes that the substitution elasticity remains constant at 8 across all countries and years, reflecting an average estimate. Following the approach of Chen and Novy (2011) and Arvis et al. (2013), we establish an equation to elucidate the determinants of trade costs. A log-linearized equation 4.4 is formed:

$$lnTC_{gjt} = \lambda_0 + \lambda_1 lnDISS_{gj} + \lambda_2 lnINFRAS_{gt} + \lambda_3 lnTRANS_{jgt} + \delta_1 EU_{gj} + \delta_2 ECOWAS_{gj} + \delta_3 LANDLOC_{gj} + \delta_4 BORDER_{gj} + \delta_5 COMLAN_{gj} + \varepsilon_{gj} \quad (4.4)$$

4.3 Description of Variables

4.3.1 Dependent variable

The log of Ghana's manufacturing sub-sector export (lnMANUgjt) is used as the dependent variable of the analysis for the first and second objectives of this study. It measures the foreign income received annually from exports of Ghana's NTEs manufacturing sub-sector. Thus, MANUgit refers to the real total value of all Manufacturing sub-sector products (manufactures) from Ghana to a given trading partner valued in U.S. dollars. Data was obtained from World Integrated Trade Solution (WITS) under their Standard International Trade Classification (SITC) Products. To achieve the third objective, the log of the trade cost of Ghana's manufactured exports to trading partners (lnTCgjt) is used as the dependent variable.

4.3.2 Independent variables and Expected Signs

Gross Domestic Product (GDPgt and GDPjt): These variables represent Ghana's and its trading partners' economic size. Thus, indicating a country's goods and factor demand and supply. GDPgt measures Ghana's production capacity while GDPjt measures importing countries' absorptive ability. This indicates that importing countries with large markets should boost Ghana's manufacturing sub-sector demand. Increases in Ghana's GDP, which gauges productive capacity, boost manufactured exports. Thus, both variables should boost manufacturing. World Bank Development Indicators (WDI) GDP data for Ghana and 65 importing nations was valued at the current US currency.

Population (POPgt and POPjt): The population variables measure the total population of Ghana (POPgt) and her trading partners (POPjt The population variable in the gravity equation shows factor endowment and demand for commodities with different income levels based on exporter and importer per capita incomes. If Ghanaians are net producers of NTEs manufacturing sub-sector items, these variables should benefit the sector. If the trading partner's population is a net consumer of Ghana's manufactured exports, the POPjt should benefit the NTEs manufacturing sub-sector. Since both populations consume or produce, the anticipated sign for POPgt and POPjt is uncertain. These variables are from World Bank Development Indicators (WDI).

Distance (DISSgj): Markusen and Maskus (2002) say distance raises export prices. Trade research commonly uses distance to estimate transportation costs. Ghana's capital cities and commercial partners' distances are measured in kilometers (km). Since distance replaces transportation expenses between Ghana and the importing country, its coefficient should be negative. Distance inversely affects bilateral trade, according to Carrere and Guillamont (2005). Thus, rising shipping costs will limit Ghana's manufactured exports. The CEPII database provided kilometers-measured distance data.

Real effective exchange rate (REERgjt): The nominal effective exchange rate is a measure of the value of a currency (Ghana's currency) against a weighted average of several foreign currencies. The real effective exchange rate index is calculated by dividing the nominal effective exchange rate by a price deflator or an index of costs. As a result of the fact that REER was already computed by the World Bank with the help of the International Monetary Fund's International Financial Statistics, it was directly imported from the database maintained by WDI. The REER is an important indicator of the global competitiveness of a country (Hassan et al, 2016). The real effective exchange rate variable is projected to influence NTEs manufacturing sub-sector growth negatively. This is because an increase in this variable (i.e. appreciation) indicates that exports to trading partners become expensive while imports become cheaper. Thus more foreign currency needs to be exchanged for local currency. A decrease in REER (i.e. depreciation) will make exports cheaper thus increasing the volume of manufactured exports demanded and in turn, increasing its earnings.

Foreign direct investment (FDIgt): This variable refers to direct investment equity flows from partner countries into Ghana. It sums equity capital, reinvestment of earnings, and other capital investments. According to the World Bank, direct investment is a type of international investment that is connected with a resident of one economy exercising control over or a considerable degree of influence over the management of an enterprise that is located in another economy. The data are in current U.S. dollars. In the empirical literature, there has been disagreement on the function of FDI in export promotion (Majeed and Ahmaud, 2006). Pfaffermayr (1996) found a positive effect of FDI on exports. The paper explained that when the government implements policies to promote exports, foreign investment is attracted. A small effect of FDI on exports was also documented by other studies, including Hoekman and Djankov (1997). This study emphasized

how FDI's impact in promoting exports in developing nations is still debatable and heavily dependent on the reasons behind the investment. Hoekman and Djankov (1997) highlighted that one motive behind FDI could be to capture the domestic market which may not contribute to export growth and the other motive could be to top the exports markets by taking advantage of the country's comparative advantage which could have FDI positively contributing to export growth. The expected result is for FDI to positively relate to Ghana's manufactured exports. Thus an increase in FDI should lead to an increase in manufactured exports.

Infrastructure: There is a general consensus among researchers, as expressed in the research published by Vijil and Wagner (2012), and Francois and Manchin (2013), that an increase in the quantity and quality of infrastructure results in a decrease in the trade-related transaction costs. According to the findings of these research, infrastructure has a positive impact on the ties between countries engaged in international trade. Infrastructure was found to have a positive association with the export performance of developing countries by Vijil and Wagner (2012) as well as Francois and Manchin (2013). It was intended that the composite indices of infrastructure produced by Donaubauer et al. (2015) may be used in this research. Donaubauer et al. (2015) created a methodical and all-encompassing method for measuring total infrastructure as well as infrastructure in the four essential subcategories of transportation, communication, energy, and finance. However, due to very low data on these categories for Ghana, infrastructure is represented with Ghana's ICT goods and services imported data (i.e. LNINFRAS) and Gross fixed capital formation (GFCF) data. Imports of ICT goods include, but are not limited to, personal computers and their associated peripherals, communication equipment, consumer electronic equipment, electronic components, and a variety of other information and technology products. Purchases of plant, machinery, and equipment, as well as the construction of roads, railways, and other structures such as schools, offices, hospitals, private residential dwellings, and commercial and industrial buildings, are all included in the GFCF. Land improvements such as fences, ditches, and drains are also a part of this category. Data are in current U.S. dollars. The infrastructure variable (LNINFRAS) and GFCF variables are expected to have a positive sign.

Real GDP per capita Distance (GDP_Dissgjt): The GDP_Dissgjt variable measures the difference in real GDP per capita or the gap in relative factor endowments that exists between Ghana and the countries with whom it trades. Linder (1961) made the observation that countries that have

demands that are comparable will trade items that are comparable. Research such as one conducted by Krugman and Helpman (1985) came to the conclusion that a minus sign should be attached with this variable when it is considered in relation to exports. Therefore, there is a negative correlation between the difference in GDP per capita and the demand for exports. Krugman (1980) has observed that nations with significant income disparities tend to engage in less international trade with one another. To get the value of the variable, take the greatest value and deduct from that number the value of Ghana's GDP per capita that is the lowest among the values for Ghana and the trade partner. The WDI database was the source of the data that was utilized.

Transportation costs (TRANSgjt): This variable accounts for all of Ghana's transport services, including those provided to Ghana's trading partners in the form of sea, air, land, and internal waterway transit, as well as pipeline, space, and power transmission. This variable takes into account the transportation of passengers and goods (freight), the hiring of carriers complete with a crew, the provision of relevant support and auxiliary services, as well as mail and courier services. This data does not include freight insurance, which is counted as part of the category of insurance services; goods purchased in ports by carriers who do not reside in the country; maintenance and repairs performed on transportation equipment; and repairs performed on railway facilities, harbors, and airfield facilities. This information was obtained from the WDI database and is presented as a proportion of Ghana's total exports of services. For the sake of this analysis, the monetary expenses were computed using current United States dollars. Inasmuch as the gravity model only uses distance to model transport costs, transport costs are not only a function of distance; consequently, it is necessary to include this variable in order to determine the impact that trade costs have on Ghana's manufactured exports in order to account for the impact of trade costs. The expected sign in this analysis is negative.

Border: The value of the border variable, which is a dummy variable, is set to 1 if Ghana and its trading partner share a border, and it is set to 0 otherwise. It is widely held that the border variable, which functions as a proxy for trade cost, is capable of influencing bilateral trade flows. As a result, this variable needs to be included in the gravity model in order to evaluate its effects. Trading with trading partners that share a similar border helps to lower the cost of transportation, which in turn enables more trading to take place between the countries that share the border. Endoh (1999) came to the conclusion that member nations that shared borders engaged in increased trade with one

another, regardless of whether or not they were a part of the same regional trade agreement. Endoh's (1999) findings have been verified by further research, such as that conducted by Carrère (2004), Coulibaly (2009), and Turkson (2012). As a consequence of this, the expected sign for the calculated coefficient of the border variable would be positive.

Another dummy variable to be considered in this analysis is the common language (COMLANGgjt) variable. The variable takes 1 if Ghana and the trading partner share a common official language (English) and 0 if otherwise. According to Fidrmuc (2016), speaking the same language amongst trading partners not only makes communication more straightforward but also makes business transactions simpler and more open to scrutiny. Any commercial transaction that does not involve the use of a common official language necessitates the employment of a translation, which comes at an additional expense. It has been demonstrated in research carried out by Cheng and Wall (2005) and Vicard (2011), amongst others, that nations that use the same official language engage in more bilateral trade. In line with the findings of previous research, this study anticipates a positive coefficient for the common language dummy variable. As a result, any trading partner with which Ghana shares an official language will engage in more commerce with Ghana, and the country will consequently ship out a greater quantity of its manufactured goods. A common language can be a form of trade cost (i.e. communication costs) incurred from trading with countries with different languages. Hence in terms of this variable's effect on trade cost, a positive sign should be expected. Trading partners that have the same official language as the exporters reduce communication costs and by extension reduce trade costs.

Regional trade agreements such as the ECOWAS and EU are included in the model as dummy variables. The EUgj dummy variable represents the regional trading bloc from the European countries, and it takes a value of 1 if the importing country is a member, but 0 if not. This variable is anticipated to influence Ghana's NTE manufactured exports positively since countries trade more when in the same RTA and less when otherwise. ECOWAS dummy variables is expected to have a positive relation to Ghana's manufactured exports since Ghana is a member. In terms of trade costs, these variables are expected to have a negative relationship since membership or trade agreement enables members to trade under minimum trade restrictions. According to Carrère (2006), participation in regional agreements might result in a large rise in the amount of trade that takes place.

Landlocked variable investigates whether or not a nation's access to the shoreline has an impact on its commercial activity. The economic activities of a nation, especially trade, are to a considerable extent determined by the location of the nation on the globe. In the case of a landlocked nation, for example, the only way to export or import commodities would be to transit them through another nation, which would result in increased trade costs. Studies such as Carrère (2004) and Turkson (2012) that included the landlocked dummy in their gravity specification discovered that it had a negative impact on the flows of bilateral trade. In line with the findings of the prior research, the current investigation anticipates finding a negative coefficient for the landlocked variable. In the event that the landlocked variable acts as a stand-in for the cost of commerce, one should anticipate a negative sign. Trading with landlocked countries increases the cost of transportation hence increasing the cost of trading as discussed by De (2007).

4.4 Data Description and Sources

It has been usual practice to estimate the gravity model using cross-sectional data, as Gomez and Milgram (2010) point out. However, estimation using cross-sectional data does not adjust for heterogeneity within nations, which means that it could contribute to estimation bias. Therefore, in order to reduce the bias that is associated with evaluating the gravity model of trade using cross-sectional data, research conducted by Egger (2000), Rose and Wincoop (2001), Egger and Pfaffemayr (2004), Glick and Rose (2002), and Melitz (2007) supported the use of panel data, which is a cross-section of several years running in succession. Estimations have shown to be more accurate when panel data are used rather than cross-sectional data or time series data. This has been demonstrated through extensive research. Panel data allow for the study of the features of variables across time and help to avoid the possible problem of multicollinearity that is connected with cross-sectional data. Panel data also help to avoid the problem of multicollinearity that is associated with cross-sectional data (Gomez and Milgram, 2010). Given these advantages of panel data, the research presented here makes use of a panel dataset consisting of annual observations on 65 of Ghana's trading partners over the course of ten years (2009 to 2019) in order to investigate the factors that influence the expansion of the NTE Manufacturing sub-sector in Ghana and the trade costs associated with that sub-sector within the context of the gravity equation. According to a report published by GEPA (2021), non-traditional goods are sold in about 152 countries.

However, only 65 countries have been chosen for this study, mostly because data on Ghana's manufactured exports to these nations is readily available. The availability of data on each of the variables that were going to be included in the analysis guided the decision on the sample size and study period. In conclusion, the yearly data from 2009 to 2019 cover 65 different trading countries that are provided in Appendix A. There is one dependent variable and 18 different explanatory variables. To fulfill the third objective, on the other hand, 50 of the nations listed in Appendix A will be employed, and the study period will be from 2009 to 2018. This is because statistics on the independent variable, trade costs from manufactured exports, were readily available up to 2018.

Table 4.1 Sources of data

Variable	Source
Manufactured Exports	WITS
Trade costs (Manufactured exports)	WITS
GDP and GDP per capita of Ghana and 65 trading partners	World Bank Development Indicators (WDI)
Real effective exchange rate	IMF
The population of Ghana and its trading partners	World Bank Development Indicators (WDI)
Transportation costs	WITS
Infrastructure index (ICT goods imported)	World Bank Development Indicators (WDI)
Foreign Direct Investment	World Bank Development Indicators (WDI)

Gross fixed capital formation	World Bank Development Indicators (WDI)
Distance	Comprehensive Environmental Pollution Index (CEPII).
Area	Comprehensive Environmental Pollution Index (CEPII).
Common language	Comprehensive Environmental Pollution Index (CEPII).
Border	Comprehensive Environmental Pollution Index (CEPII).

4.5 Estimation Techniques

The dataset being used is the panel data as stated above. Three models can be used in panel data estimation. These models are pooled, fixed effects, and random effects. Since individual effects are included in the regressions a decision should be made whether they are treated as random or fixed. The technique for estimating the gravity model can be converted to a log-linear form, as illustrated in equations (4.2) and (4.3), and then panel estimation models such as pooled regression, random and fixed effect models will be applied. The manner in which the data is extracted is an important consideration in determining which estimation method to apply. A random effect model is frequently appropriate for use in estimations in which sample data on the flows of trade to and from trading partners are taken at random from a large population. The Hausman test is carried out in order to determine which model is effective.

4.5.1 Pooled regression model

The pooled regression model is a type of panel estimating method in which the estimation process ignores the panel structure of the data. This type of panel estimation method can be found in statistical research. When estimating panel data with the Ordinary Least Square (OLS) estimator,

it is necessary to combine all of the cross-sectional and time series observations into a single longitudinal dataset. Before performing an estimate using the ordinary least squares method, the pooling ordinary least squares method organizes any data that has both time series and cross-sectional units into a lengthy regression that contains N*T observations. The problem with using the pooled OLS in a panel regression is that most of the time, the unobserved individual-specific effects are combined with the observed error term, which results in the formation of a joint error term. This is a problem because this joint error term can lead to inaccurate conclusions. Because of this joint error term, there is occasionally a loss of its randomness, which leads to the possibility of having both unobserved individual-specific effects as well as seen error terms correlating with the factors that explain the phenomenon. This results in estimations of the parameters being biased and inconsistent. When using panel data for pooled OLS regression, you will frequently run into the issue of heterogeneity. Because of this, the random effect and fixed effect models are generally favored over the pooled OLS estimator.

4.5.2 Random effect model

This model operates on the presumption that the individual effects (heterogeneity) are accounted for by the intercept as well as a random part that is independently and indistinguishably distributed across the various countries. One of the benefits of using this model is that it makes it possible to estimate the impact of time-invariant factors, which is something that the fixed effect model does not make it possible to do. This model is appropriate for use when assessing the flow of trade between random samples derived from big groups of countries that engage in trading (Habab et al., 2010). When measuring the flows of commerce between trading partners picked at random from a vast population, some consider this method to be more appropriate.

4.5.3 Fixed effect model

The fixed effects model is a type of statistical analysis that takes into account the possibility that each cross-sectional unit possesses some characteristics that are exclusive to itself. It is permissible for the intercept of the regression to be different for each individual unit in this method of estimation; however, the intercept remains the same for each unit across time. This method is significantly inferior to the others in that it does not take into account the estimation of the coefficients of time-invariant factors. This is the technique's primary flaw. This model is

appropriate for use for assessing the flow of commerce between trading partners whose identities were determined in advance (Habab et al., 2010). The Hausman test is utilized in the process of determining whether or not the fixed effects estimator and the random effects estimator are substantially different from one another. The Hausman test is carried out with the assumption, known as the null hypothesis, that the two methods of estimate are both reliable and that, as a result, they should generate results that are comparable to one another. Therefore, the conclusion that the null hypothesis should be rejected means that the estimate method that should be used is the fixed effect model rather than the random effect model.

CHAPTER 5

5.0 DISCUSSION OF RESULTS

5.1 Introduction

The purpose of this chapter is to show and discuss the findings that were obtained from the estimation of the models that were specified in the previous chapter of this study. The estimation of the regression models discussed in chapter four of this study was carried out with STATA. The first step in this chapter is to carry out a descriptive statistical analysis of the non-binary variables that were utilized throughout the course of the research. Following that, robustness checks are carried out. After this is finished, the outcomes of the most chosen estimating model will be presented, and then they will be discussedThe last part of this chapter will discuss the components that play a role in determining the costs of trade for Ghana's manufactured exports of NTEs.

5.2 Descriptive Statistics

In this part of the report, an investigation of the statistical characteristics and correlations of the non-binary variables that were incorporated into the model of the study is carried out. The results from STATA are included in the Appendix B that can be found below. According to the correlation matrix that was generated by the analysis, the correlation coefficients between the dependent export variable and the relevant explanatory factors are not very high, which explains why the multicollinearity issue was not found to exist. The mean, standard deviation, minimum, and maximum values are the components of the summary statistics that are included in the study. The aforementioned data is laid out in Table 5.1. During the course of the research, the value of Ghana's NTE-related manufactured exports was around $14,206,970 United States Dollars (USD) on average. The manufactured exports can have a minimum value of $78 USD and a maximum value of $470,873,900 USD, respectively. The gross domestic product (GDP) of Ghana and its trading partners for the time is estimated to be worth approximately $50.7 million USD and $1.03 trillion USD, respectively. When compared side by side, the average gross domestic product (GDP) of Ghana and its trading partners reveals that Ghana's trading partners have a larger economic footprint than Ghana does. The average population of Ghana and its trading partners is about

27,300,000 and 78,000,000 respectively. The average spending on infrastructure, transportation services, and gross fixed capital formation for Ghana is $71USD, $55.6 USD, and $10.4 billion USD. Ghana's average foreign direct income received over the period of study is about $3 billion USD.

Table 5.1: Statistical Summary.

Variables	Mean	Standard Deviation	Minimum	Maximum
Log of Manufactured Exports of Ghana (US$ thousand)	14206.97	47988.97	0.078	470873.9
Log of Trade Costs (US$ thousand)	219.006	109.8829	50.54619	763.2962
Log of Importer's GDP (US$trillion)	1.03	2.61	83 million	2.14
Log of Ghana's GDP (US$million)	5.07	1.36	2.60	6.83
Log of Importer's population	78 million	230 million	901,589	1.41 billion

Log of Ghana's population (million)	2.7	1973601	2.42	30.4
Log of Ghana's infrastructure (US$billion)	71.0	23.0	47.3	111.0
Log of Real effective exchange rate (index=100)	82.0479	10.95046	67.12236	100
Log of Transportation cost (US$billion)	55.6	17.9	32.3	93.0
Log of Gross fixed capital formation (US$ million)	10.0 billion	43.8	37.9	15.1
Log of Foreign Direct Investment (US$ million)	31.7	40.0	23.7	38.8
Distance (km)	301.815	317.536	9.560	1554.244
Common language	0.292	0.455	0	1

Border	0.046	0.210	0	1
Landlocked	0.154	0.361	0	1
ECOWAS	0.2	0.400	0	1
EU	0.2	0.400	0	1

Source: Author's computation

5.3 Diagnostic and Robustness checks

To determine the appropriate estimation technique for the analysis of the specified models stated in chapter 4, the study performed tests such as heterogeneity, heteroscedasticity, and the Hausman test for FE/RE.

5.3.1 Heteroscedasticity

It is necessary for all of the error terms to have an identical and consistent variance if the projected outcomes of the study are to be trusted. This study utilized the Breusch-Pagan/Cook-Weisberg test to test the null hypothesis of constant variance in order to determine whether or not there was heteroscedasticity in the data. The findings of the tests for equations 4.2 and 4.4 reveal that the null hypothesis of constant variance is not supported, which confirms the presence of heteroscedasticity in the data. The exact STATA results are provided in the Appendix B. The test results to equation 4.2 can be found in the number 12, whereas the test results to equation 4.4 can be found in the number 34.

5.3.2 Heterogeneity Bias

After the issue of heteroscedasticity has been identified, another fundamental problem that arises when attempting to estimate a panel dataset by using a pooled regression technique is the problem of heterogeneity bias. Therefore, it is absolutely necessary to conduct tests to determine whether or not the trading partners have individual forms of heterogeneity. The Breusch and Pagan Lagrangian Multiplier test for random effects is utilized in order to screen for any potential bias caused by heterogeneity. The results of the heterogeneity test are used as the foundation for selecting one of the two models—the pooled regression model or the random effects model—to use for both analyses. Due to the fact that the results of the tests indicate that the null hypothesis should not be accepted, the random effect model should be chosen instead of the pooled OLS regression for equations 4.2 and 4.4. The STATA results are included in the appendix **B**, which may be seen below. In the STATA results, the test for equation 4.2 is referred to as number 18, while the test for equation 4.3 is referred to as number 40.

5.3.3 Hausman Test for FE/RE

The Hausman test is done to determine whether the random effects model or fixed effects model is appropriate for an analysis. The null hypothesis is that the preferred model is random effects and the alternate hypothesis is that the model is fixed effect. The null hypothesis is rejected if the prob>chi2 is significant at 0.05 and rejected if otherwise. A rejection of the null hypothesis implies that the fixed effect is suitable for the said analysis hence rejecting the random effect estimations. From the STATA results numbered 24 and 46 in Appendix B, the p-value is not significant at 0.05 since they are each greater than 0.05. The null hypothesis is accepted for both analyses hence the random effect model is chosen.

5.3 Discussion of Empirical Results

The results from the estimation of three models (the Pooled OLS, the random effects and fixed effects model) are presented in this section. Table 5.3 has the results for the first and second objectives of this study which is to investigate the determinants of Ghana's manufactured exports to trading partners and how trade costs affect Ghana's manufactured exports to trading partners.

Preceding that discussion is Table 5.2 which shows the results of the regression model for equation 4.3. The results investigates the determinants of the trade costs of Ghana's manufactured exports.

Table 5.2: Estimates of the gravity model using OLS, RE, and FE from 2009 – 2019

Dependent variable: Log of Manufactured Exports (lnMANUgjt)

Variables	Pooled OLS Model	Fixed Effects Model	Random Effects Model
Constant	299.870 (107.076)**	243.992 (72.847)*	285.782 (72.129)*
Importer's GDP (LNGDP_PAR)	0.6735 (0.239)**	0.609 (0.6241)	-0.142 (0.390)
Ghana's GDP (LNGDP_GH)	4.780 (3.172)	3.435 (2.154)	4.380 (2.135)**
Importer's population (LNPOP_PAR)	0.0531 (0.249)	2.007 (1.442)	0.910 (0.423)**
Ghana's population (LNPOP_GH)	-22.712 (6.845)*	-21.775 (4.754)*	-22.205 (4.604)*
Ghana's infrastructure (LNINFRASgt)	0.316 (0.954)	0.347 (0.636)	0.307 (0.640)

Real effective exchange rate (LNREER)	-6.457 (2.374)**	-5.832 (1.610)*	-6.466 (1.598)*
Transportation cost (LNTRANSgjt)	-0.03 (0.618)	-0.122 (0.414)	-0.0279 (0.415)
Gross fixed capital formation (LNGFCF)	-1.466 (1.564)	-1.143 (1.054)	-1.469 (1.051)
Difference in GDP per capita of country pairs (LNGDP_Diss)	-2.780 (2.399)	9.603 (4.79)**	7.522 (3.661)**
Ghana's Foreign Direct Investment (LNFDIgt)	1.018 (1.719)	1.223 (1.15)	1.017 (1.154)
Distance (LNDISS)	-0.408 (0.1062)*		-0.370 (0.288)
Common language	0.285 (.178)		0.2448 (0.482)
Border	2.369 (0.408)*		2.457 (1.111)**
Landlocked	-1.002 (0.218)*		-1.001 (0.594)***

ECOWAS	4.3861 (0.299)*		4.476 (0.77)*
EU	-0.539 (0.214)**		-0.851 (0.573)

Standard errors are in parentheses

(*) represents level of significance; * is 1%, ** is 5%, *** is 10%

Overall Model Fit

Number of Observations: 715

F (16, 698): 35.50

Prob>F: 0.00

R-squared: 0.4487

Adjusted R^2: 0.4360

The analysis in Appendix B shows that the F-statistics of the overall model significance. The null hypothesis of the F-test is that the coefficients of the independent variables are equal to zero hence there is no significant relationship between the independent variables and dependent variables. The alternate hypothesis is that the coefficients of the independent variables are not equal to zero. The F-value given is 35.50. The p-value of this F-value is 0.0000. Since the p-value is less than the alpha level i.e. 0.05, the null hypothesis is rejected at a high confidence of 99.99%. It can be concluded that overall the independent variable shows a statistically significant relationship with the dependent variables.

The R-squared is the overall measure of association but does not reflect the strength of association between the independent variable and dependent variable. The 0.4487 means that 44.87% of the variance in Ghana's manufactured exports to trading partners can be predicted by the variables used in this study. The adjusted R-squared is said to give a more honest outlook of variance in the model. Having the value 0.4360 shows that 43.60% of the variance in Ghana's manufactured exports to trading partners can be predicted by the dependent variables.

5.3.1 Economic Size

Gross Domestic Product of Ghana and trading partners

From column 3 of table 5.2, the positive coefficient of LNGDP_GH reveals that manufactured exports from Ghana increases whenever there is an expansion in domestic GDP. A 1% increase in Ghana's GDP will result in a 4.8% increase in Ghana's manufactured exports to trading partners. This estimate is statistically significant at 5% as shown in the table showing that Ghana's GDP is a key determinant in its manufactured exports. With the coefficient 4.87 being greater than 1, the variable in question is said to be fairly elastic hence a little variation in Ghana's GDP will cause a significant change in Ghana's manufactured exports. The estimate of importer's GDP is negative hence implying a negative relationship between the demand for Ghana's manufactured exports and foreign income however this relationship was insignificant.

Population

As stated in chapter 4, the expected signs of Ghana's population and importer's population is ambiguous because it depends on the consumption and production nature of both population. The results shown from Table 5.2 has the coefficient for Ghana's population being negative and statistically significant at 1%. Thus, an increase in Ghana's population will decrease the country's manufactured exports. This could be supported by the argument that countries (especially developing countries) with capital-intensive exports are rather labor-abundant. Ghana is a labor-abundant country because its labor endowment is higher relative to capital hence Ghana has a low capacity to produce capital-intensive goods such as manufactured goods. An increasing Ghanaian population will only result in an increasing production of labor-intensive goods as opposed to capital-intensive goods like manufactured exports. Also, since the variable influences the manufacturing sub-sector negatively, the Ghanaian population is said to be a net consumer of the manufactured exports. As also shown in Table 5.3, a 1% increase in Ghana's population will result in a 22.7% decrease in Ghana's manufactured exports to trading partners. The coefficient is statistically significant at 1% meaning that Ghana's population is a key determinant of Ghana's manufactured exports to trading partners.

On the other hand, the coefficient of importer's population conforms to what was expected. The result in Table 5.2 show a positive relation between importer's population and Ghana's

manufactured exports thus an increase in importer's population would induce an increase in manufactured exports demanded by trading partners. However, this relation is not statistically significant hence importer's population is not a key determinant of Ghana's manufactured exports to trading partners.

GDP Distance/Difference in GDP per capita

This variable is used to determine the development levels of Ghana and its trading partners. The coefficient of this variable is positive and significant at 5% from the random effect estimation. As established earlier, the expected sign has not been concluded. It was found that this variable enters the gravity model with a negative sign by studies like Yamarik and Ghosh (2005) and Frankel, Stein and Wei (1995). However, it was also predicted through the Ricardian and Hecksher-Ohlin Samuelson models that countries with more differences in economic development will trade more (Baxter, 2005). The estimation from Table 5.2 shows that as the difference in GDP per capita increases between Ghana and its trading partner, Ghana's manufactured exports to trading partners will increase. The coefficient is statistically significant at 5% hence proven to be a key determinant for Ghana's manufactured exports to trading partners.

5.3.2 Real Effective Exchange Rate

The expected interaction between REER and manufactured exports is negative as established in chapter 4. The coefficient of LNREER from Table 5.2 is negative and highly significant. This implies that a decrease (i.e. depreciation) of the Ghana cedi as opposed to the trading partners will cause an increase in the demand for Ghana's manufactured exports. This is because a depreciation will make Ghana's manufactured exports cheaper on the world market thus making it more desirable for purchase. Being statistically significant at 1%, this variable is proven to be a key determinant of Ghana's manufactured exports to trading partners.

5.3.3 Foreign Direct Investment

The relationship between exports and FDI is said to be ambiguous as established in chapter 4. According to the estimates shown in Table 5.2, the coefficient of LNFDI is positive which means that an increase in Ghana's FDI should boost Ghana's manufactured exports although statistically insignificant hence not enough to prove an actual relationship between Ghana's FDI and

manufactured exports. It cannot be considered as a key determinant of Ghana's manufactured exports.

5.3.4 Trade Costs

As established in chapter 2, one of this study's objectives is to identify the trade costs to Ghana's NTE manufacturing sector. Distance is used as a proxy for transportation costs while infrastructure and transportation costs itself are considered as components of trade costs.

Distance

From Table 5.2, the negative coefficient of LNDISS implies an inverse relationship between the distance from Ghana to its trading partners and the manufactured exports of Ghana. Thus the further away a trading partner is, the lesser manufactured exports supplied. With distance being a proxy for transport costs, an increase in distance from Ghana to the trading partner implies an increase in transport costs and in turn discouraging Ghana's manufactured exports. However this is not statistically significant hence distance is not a key determinant of Ghana's manufactured exports. Unlike agricultural products, manufactured exports have a long shelf-life since it has been processed hence not influenced by distance. The outcome on distance supports the results of Kwame (2017), Braha et al. (2016), Dlamini (2016), Turkson (2012) and Hatab et al., (2010), but contradicts the findings of Jordaan & Eita (2011).

Infrastructure

As mentioned in chapter 2, infrastructure is a component of trade costs. The estimations from Table 5.2 show a positive relationship between infrastructure and manufactured exports. Thus an increase in Ghana's spending on infrastructure will result in an increase of manufactured exports to Ghana's trading partners as supported by Enu and Havi (2014). However this variable is not statistically significant showing that it is not a key determinant of Ghana's manufactured exports.

Transportation Cost

This variable is also a component of trade costs. From Table 5.2, the variable has a negative relationship with manufactured exports. Hence, an increase in transportation costs will decrease manufactured exports to Ghana's trading partners. However it is statistically insignificant and fairly inelastic implying that it has very little impact on manufactured exports.

Border, Common border and Common language

The estimate from Table 5.2 reveals that common border variable has a positive and significant impact on Ghana's manufactured exports. This implies that trading partners that share borders with Ghana will import more of Ghana's manufactured exports. It should also be noted that trading with countries that share border reduces transportation and transaction costs. This variable significantly impacts the manufactured exports and hence is a key determinant of Ghana's manufactured exports. Common border and common official language exert positive effects on NTEs from Ghana. Common language variable has a positive relationship with Ghana's manufactured exports although not significant thus the official language of the trading partners is of no importance or does not influence Ghana's manufactured exports. The estimate of the landlocked variable shows a 10% significant negative coefficient which implies that trading partners that are landlocked will export less of Ghana's manufacturing exports and this could be due to high domestic transport costs for the trading partners. The landlocked variable is a key determinant of Ghana's manufactured exports to trading partners.

5.3.5 Regional Trade Agreement

Table 5.2 show that dummy variables ECOWAS is positive and statistically significant at 1%. This implies that trading partners that belong to the ECOWAS will trade more with Ghana hence increasing demand and supply for Ghana's manufactured exports. This estimate is also statistically significant implying that it is a key determinant of Ghana's manufactured exports and shows to be very elastic to demand. The EU variable is negative but not statistically significant. This implies that trading partners belonging to the EU is not a key influence on Ghana's manufactured exports to these countries.

Table 5.3: Gravity model estimates of the determinants of Ghana's manufactured export trade cost using OLS, RE, and FE from 2009 – 2018

Dependent variable: Log of Ghana's manufactured export trade cost (lnTCgt)

Variable (log)	Pooled OLS	Fixed Effect Model	Random Effect Model
constant	5.579 (1.65)*	5.405 (0.718)*	5.518 (0.775)*
Transportation cost (LNTRANS)	0.091 (0.052)***	0.09 (0.022)*	0.0902 (0.023)*
Infrastructure (LNINFRAS)	-0.098 (0.052)***	-0.094 (0.022)*	-0.094 (0.023)*
Distance (LNDISS)	-0.018 (0.018)		-0.018 (0.050)
Common language	0.140 (0.037)*	0.047 (0.174)	0.117 (0.089)
Border	-0.624 (0.101)*		-0.630 (0.277)**
Landlocked	0.346 (0.051)*		0.035 (0.139)**
ECOWAS	-0.422 (0.055)*		-0.423 (0.153)**
EU	-0.064 (0.041)		-0.069 (0.112)

Standard errors are in parentheses

(*) represents level of significance; * is 1%, ** is 5%, *** is 10%

Overall Model Fit

Number of Observations: 540

F (8, 531): 33.28

Prob> F: 0.000

R-squared: 0.3339

Adjusted R^2: 0.3339

The analysis in Appendix B shows that the F-statistics of the overall model significance. The null hypothesis of the F-test is that the coefficients of the independent variables are equal to zero hence there is no significant relationship between the independent variables and dependent variables. The alternate hypothesis is that the coefficients of the independent variables are not equal to zero. The F-value given is 33.28. The F-value has its p-value to be 0.0000. Since the p-value is less than the alpha level i.e. 0.05, the null hypothesis is rejected at a high confidence of 99.99%. It can be concluded that overall the independent variable shows a statistically significant relationship with the dependent variables.

The R-squared is the overall measure of association but does not reflect the strength of association between the independent variable and dependent variable. The 0.3339 means that 33.39% of the variance in the trade cost of Ghana's manufactured exports to trading partners can be predicted by the variables used in this study. The adjusted R-squared is said to give a more honest outlook of variance in the model. Having the value 0.3239 shows that 32.39% of the variance in the trade cost of Ghana's manufactured exports to trading partners can be predicted by the dependent variables.

The third objective of this thesis is to investigate the determinants of Ghana's manufactured export trade costs. After regressing equation 4.3, the results in Table 5.4 above were given. The results will be discussed under three components of trade costs; transportation, communication, and transaction.

5.4.1 Transportation cost

The coefficient of the transportation cost variable is positive and statistically significant at 1%. This means that a one percentage increase in transportation costs will increase the trade costs of Ghana's manufactured exports by 0.09%. Also, this variable is a key determinant of Ghana's manufactured export trade cost.

Distance variable which is a proxy for transportation cost has a negative coefficient and not statistically significant. The negative relationship would imply that the longer the distance between trading countries, the more the trade costs incurred. However since it is not significant, distance is not a key determinant of trade cost incurred by Ghana's manufactured exports.

Border variable is also a proxy for transportation cost. From Table 5.3, there is a negative relationship between the border variable and trade costs of Ghana's manufactured exports and is statistically significant at 5%. This means that trading with countries that share a border decreases Ghana's trade cost of its manufactured exports. This variable is a key determinant of trade costs in the NTE manufacturing sub-sector.

The landlocked variable is a proxy for transportation costs. The results show a significant positive relationship between landlocked and trade costs. Trading with landlocked countries increases trade costs. These costs often are domestic transportation costs. The variable being significant at 5% shows that landlocked is a key determinant of trade costs incurred from Ghana's manufactured exports.

5.4.2 Communication cost

The infrastructure variable as explained in chapter 4 is the ICT goods and services imported into Ghana. From Table 5.3, there is a significant negative relationship between the infrastructure variable and trade costs. Thus, a 1% increase in infrastructure will lead to a 0.094% decrease in the trade cost of manufactured exports. Considering the variable's statistical significance at 1%, it is a key determinant of Ghana's manufactured export trade cost. Improvement in ICT connectivity will reduce communication costs in the NTE manufacturing sub-sector.

Common language is a proxy for communication cost. From Table 5.3, there is a positive relationship between common language and trade cost but statistically insignificant hence the

official language of the trading partners does not determine the trade costs of Ghana's manufactured exports.

5.4.3 Regional trade agreements

Regional trade agreements such EU and ECOWAS are expected to have a negative relationship with trade costs since it facilitates free or preferential trade thus reducing transaction costs. From Table 5.3, these variables have a negative relationship with trade costs with ECOWAS being statistically significant at 5%. This shows that trading with members of ECOWAS will significantly reduce the trade costs incurred from manufactured exports. The ECOWAS variable is a key determinant of trade costs.

5.5 Conclusion

The chapter first discussed the descriptive statistics of the analyses showing the mean, maximum and minimum values of the dependent and independent variables. The diagnostic tests done were then discussed and the appropriate model among the pooled OLS, FE and RE for the analyses was chosen. The empirical analyses were done and the results were discussed. The results for regressing equation 4.2 showed that out of the 17 independent variables, eight were statistically significant at either 1%, 5% or 10% thus being key determinants of Ghana's NTE manufactured exports to trading partners. The results for regressing equation 4.4 showed that five out of the eight variables of interest were statistically significant at either 1% or 5% thus being key determinants of trade costs incurred by Ghana's NTE manufacturing subsector.

CHAPTER 6

6.0 CONCLUSION AND RECOMMENDATIONS

6.1 Introduction

In this chapter, we will consolidate the econometric results presented in Chapter 5 and offer policy recommendations to enhance Ghana's Non-Traditional Export (NTE) manufacturing subsector. The objectives of this study were to identify the significant variables influencing Ghana's manufactured exports, investigate the impact of trade costs on the manufacturing subsector, and examine the determinants of trade costs within this sector. To address these objectives, we used a dataset comprising annual panel data from 2009 to 2019 for Ghana and 65 trading partners, employing 17 independent variables, including core gravity model factors, real effective exchange rate, foreign direct investment, difference in GDP per capita, and more..

6.2 Conclusion

This thesis pursued three fundamental objectives: firstly, to identify the significant variables influencing Ghana's manufactured exports to its trading partners; secondly, to investigate the impact of trade costs, which encompassed various components, on Ghana's manufacturing sub-sector; and thirdly, to examine the determinants of trade costs within Ghana's manufacturing sub-sector.

In pursuit of the first two objectives, the study considered Ghana's manufactured exports as the dependent variable in the analysis. It employed annual panel data for Ghana and 65 of its trading partners, spanning from 2009 to 2019. In total, 17 independent variables were taken into account. The selection of the sample period and the 65 nations was primarily based on data availability. In addition to the core variables prescribed by the gravity model of trade, supplementary variables such as the real effective exchange rate, foreign direct investment, differences in GDP per capita, gross fixed capital formation, GDP figures for Ghana and its trading partners, infrastructure, transportation costs, common borders, shared languages, landlocked status of trading partners, and regional trading blocs such as the EU and ECOWAS were included to enhance the model's

comprehensiveness and integrity. Various regression models, including Pooled regression, Random Effects Model (REM), and Fixed Effects Model (FEM), were employed. Robustness checks, such as the Breusch and Pagan Lagrangian multiplier test for random effects, and the Hausman test for fixed or random effects, consistently favored the Random Effects Model.

The results highlighted the statistical significance of several key determinants of Ghana's manufactured exports to trading partners, including Ghana's GDP, its population, trading within the ECOWAS, the real effective exchange rate, differences in GDP per capita between countries, common borders, and landlocked trading partners. A positive coefficient for Ghana's GDP revealed its favorable influence on Ghana's non-traditional export (NTE) manufactured exports to trading partners, signifying that an increase in Ghana's GDP leads to higher exports. Conversely, the population of Ghana exhibited a negative impact on manufactured exports, indicating that Ghana's population primarily functions as consumers rather than producers of these goods. It was emphasized that this effect is contingent on consumption and production dynamics. Moreover, the negative coefficient signified Ghana's status as a labor-abundant country, resulting in the production of fewer capital-intensive goods, thereby influencing manufactured exports. Conversely, the positive coefficient for importer population suggested that an increase in the population boosts demand for Ghana's manufactured exports. Furthermore, the positive coefficient for the ECOWAS variable demonstrated that trading with ECOWAS union members increases manufactured exports to those members. The negative coefficient for the real effective exchange rate highlighted that the depreciation of the Ghanaian cedi leads to improved manufactured exports to trading partners. Additionally, the coefficient for differences in GDP per capita showed a positive effect on Ghana's manufactured exports, signifying that larger economic disparities between Ghana and its trading partners result in higher manufactured exports.

For the second objective, which delved into the impact of trade costs on Ghana's manufactured exports, various variables were examined, including infrastructure, transportation costs, distance, common language, landlocked status, common borders, EU membership, and ECOWAS participation, as components of trade costs. Distance, border, and landlocked variables acted as proxies for transportation costs, while infrastructure and common language were proxies for communication costs. The estimates illustrated that ECOWAS, infrastructure, common language, and common borders had positive effects on Ghana's manufactured exports, whereas the EU and

landlocked status had negative effects. Among these variables, common borders, landlocked status, and ECOWAS were statistically significant at 5%, 10%, and 1%, respectively, underscoring their significance as key components affecting trade costs. Specifically, the coefficient for the common border variable indicated that trading with countries sharing common borders reduced transportation costs, thereby increasing Ghana's manufactured exports to these partners. Conversely, the coefficient for the landlocked variable indicated that trading with landlocked countries increased transportation costs, consequently reducing Ghana's manufactured exports to these nations. Trading with other ECOWAS members was established to enhance Ghana's manufactured exports.

To fulfill the third objective, equation 4.4 was regressed using different models, and after diagnostic tests, the Random Effects Model (RE) was deemed the most suitable for the analysis. The results indicated that infrastructure, transportation costs, common borders, landlocked status, and ECOWAS participation were statistically significant and critical determinants of trade costs incurred within Ghana's manufacturing sub-sector. Transportation costs and landlocked status exhibited a positive relationship with trade costs, signifying that a percentage increase in transportation costs led to a 0.09% increase in trade costs. The positive relationship between trade costs and landlocked countries was attributed to domestic transport expenses. Conversely, infrastructure, common borders, and ECOWAS participation displayed a negative relationship with trade costs. A percentage increase in infrastructure resulted in a 0.094% decrease in trade costs. Moreover, trading with countries sharing common borders decreased the trade costs associated with manufactured exports. Finally, trading with ECOWAS members was found to reduce trade costs, as membership conferred advantages such as free or preferential trade agreements, including reduced tariff and non-tariff barriers to trade.

6.3 Recommendations

Based on the results attained from the estimation of equations 4.2 and 4.4, the following are recommended:

- The study found a negative coefficient of Ghana's population variable hence showing that as Ghana's population increases manufactured exports to trading partners decreases.

Conversely, the positive coefficient linked to the importer's population suggests that Ghana's manufactured exports have promising opportunities in foreign markets. It is imperative to leverage this potential fully. Policies should be devised to meet both domestic and foreign demands for manufactured exports. The government and private production companies should develop and implement strategies to diversify export markets beyond domestic boundaries. Countries with growing populations that offer opportunities for increased export of Ghana's manufactured goods should be targeted. The Minsitry of Trade along with GEPA should establish dedicated export promotion agencies that assist manufacturers in identifying foreign markets and navigating international trade regulations. These agencies can also facilitate the participation of Ghanaian manufacturers in international trade exhibitions. The manufacturing companies and especially the private companies should invest in quality control measures to ensure that Ghanaian manufactured products meet international quality standards. Training and certification programs can be instrumental in achieving this.

- Initiatives such as the one district one factory should be implemented in districts that are yet to have their factories and critically supervised to yield the most productivity. The positive coefficient of the importer's population shows that Ghana's manufactured exports have a foreign market and hence should be taken advantage of. These policies will help meet the domestic demand as well as foreign demand for manufactured exports. Supporting private industries and SMEs is one of Ghana's 10-point agenda for industrial transformation hence with effective supervision and evaluations, Ghana can achieve much economic growth. Economic growth will be reflected through a higher GDP. The GDP of Ghana was found to be a key determinant of Ghana's manufactured exports to trading partners in this study thus policies in the form of government expenditure on infrastructure and supporting private firms will help yield higher incomes.
- One significant determinant of Ghana's manufactured exports and its trade costs, as revealed in this study, is the presence of a common border. The findings indicate that engaging in trade with neighboring countries with common borders can lead to a reduction in trade costs and, consequently, an increase in Ghana's manufactured exports. Ghana shares common borders with Togo, Cote D'Ivoire, and Burkina Faso. As discussed in

Chapter 2, Burkina Faso and Togo ranked as Ghana's top two and four non-traditional export (NTE) trading partners in 2011. To maximize the benefits of this analysis, Ghana should take proactive measures to leverage its common borders with these three countries. By doing so, Ghana can increase its exports of manufactured goods while simultaneously minimizing the associated trade costs.

- The Economic Community of West African States (ECOWAS) has emerged as a significant factor affecting Ghana's manufactured exports and the associated trade costs. This study has revealed that engaging in trade with fellow ECOWAS member countries results in an increase in manufactured exports for Ghana while concurrently reducing trade costs. As discussed in Chapter 2, it is important to note that among the top 10 destinations for non-traditional exports (NTEs), only three are ECOWAS members, which are Burkina Faso, Togo, and Senegal. This underscores the importance of Ghana strengthening its trade relations with fellow ECOWAS members. Furthermore, the study's results indicate that Ghana can benefit from trading with countries within the same regions, as it has been observed that these agreements are associated with increased manufactured exports. While ECOWAS serves as a critical platform for regional trade, Ghana can also explore the possibility of establishing bilateral trade agreements with key ECOWAS partners. These agreements can offer preferential terms for certain goods, facilitating smoother trade relationships and boosting Ghana's exports. The African Continental Free Trade Area (AfCFTA), which became effective in 2019, presents an opportunity for Ghana to further boost its manufactured exports with other member countries. However, to fully exploit this opportunity, Ghana should implement policies aimed at increasing productivity to meet the rising demand in these markets. Also, recognizing that transportation costs play a significant role in trade costs, the government should make strategic investments in transportation and logistics infrastructure. This includes improving road networks, border crossings, and customs procedures to facilitate the smooth movement of goods within the ECOWAS region. Streamlined processes can reduce transit times and costs.

- Infrastructure variable has been identified as a key determinant of trade cost incurred in Ghana’s manufactured sub-sector. The component of infrastructure used in this study from the IMF data is the ICT goods and services imported into Ghana. To leverage the substantial impact of infrastructure on reducing trade costs in Ghana's manufactured sub-

sector, a strategic and systematic approach should be adopted. The integration of technology into the education system should commence at the foundational level and extend through all educational tiers, including primary, secondary, and tertiary institutions. This effort must emphasize digital literacy, coding, and hands-on technological skills development. It is essential to ensure that Ghana's future generations are well-prepared to thrive in a technology-driven world. In addition, Government should develop specific tax incentives and subsidies to encourage businesses, particularly small and medium-sized enterprises (SMEs), to invest in technology adoption. This could include tax breaks for companies investing in ICT infrastructure, software, and employee training. The government should also establish partnerships with tech companies to provide affordable software and hardware solutions to businesses.

6.4 Suggested area for future research

The sub-sectors of Ghana's NTEs can be analyzed through a comparative study by undertaking a disaggregated analysis of each sub-sector to identify the factors that affect each sector and compare to find similarities or differences. A comparative study will give a bigger picture and a better understanding of why the variables of interest affect each sector in the manner it does and help make the best policies to facilitate the holistic growth of the NTEs.

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APPENDIX

Appendix A

Ghana's trading partners used for the study

Gabon, Brazil, Burkina Faso, Greece, Congo, Japan,Cote D'Ivoire, Denmark, Egypt, Guinea-Bissau, Guinea, Botswana, Gambia, Finland, France, Germany, China, Guinea, Guinea-Bissau, Hong Kong, India, Ireland, Italy, Canada, Kenya, Korea, Lebanon, Cameroon, Liberia, Malaysia, Mali, Morocco, Mauritania, Belgium, Mozambique, Netherlands, New Zealand, Austria, Niger, Nigeria, Norway, Poland, Spain, Sweden, Portugal, Russia, Switzerland, Tanzania, Saudi Arabia, Sierra Leone, Senegal, Singapore, Benin, South Africa, Thailand, Australia, Togo, Turkey, Uganda, UK, United Arab Emirates, US, Vietnam, Czech Republic and Zimbabwe.

Appendix B

```
  Notes:
        1.  Unicode is supported; see help unicode_advice.

1 . doedit "C:\Users\user\Desktop\AMA\DATA\DOO FILE.do"

2 . log using "C:\Users\user\Desktop\costs and determinants 6am.smcl"
-------------------------------------------------------------------------------
      name:  <unnamed>
       log:  C:\Users\user\Desktop\costs and determinants 6am.smcl
  log type:  smcl
 opened on:  23 Jan 2023, 06:49:33

3 . import excel "C:\Users\user\Desktop\LNMANUEX.xlsx", sheet("Sheet1") firstrow

4 . encode Partner, gen(country)

5 .
6 . xtset country YEAR
       panel variable:  country (strongly balanced)
        time variable:  YEAR, 2009 to 2019
                delta:  1 unit

7 .
8 . sum

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     Partner |          0
        YEAR |        715        2014    3.164491        2009       2019
ManuExport~a |        715    14206.97    47988.97        .078   470873.9
      LNMANU |        715    6.903786    2.704156   -2.551046   13.06235
PerCapitaG~a |        715    1837.745    398.2138    1077.662    2361.09
-------------+---------------------------------------------------------
    CapitaGH |        715    7.489778   .2381605    6.982549   7.766879
CapitaOthers |        715    8.947164   1.721242    5.699171   11.54164
PercapitaG~r |        715    21588.98   23312.44    298.6197   102913.5
      DGDPCO |        715    1.914677   1.203063   .0026362   4.306954
       DGDPC |        715    .2862657   1.085639   -5.938401   1.460231
-------------+---------------------------------------------------------
  LNGDP_Diss |        715    2.203999   .1583679    1.942488   2.445955
GDPDistance |        715    9.174148   1.429378    6.976086   11.54157
        REER |        715     82.0479   10.95046    67.12236        100
      LNREER |        715    4.398457   .1329378    4.206517    4.60517
      LNDISS |        715    5.281237   .9658156     2.25757   7.348745
-------------+---------------------------------------------------------
    DISTANCE |        715    301.8148   317.5357    9.559828   1554.244
      LNREMOT |        715   -.8819685   2.714724   -7.391332   5.648522
```

REMOT	715	9.722524	37.90913	.0006166	283.8716
LNAREA	715	12.51702	1.969972	6.4708	16.65315
AREA	715	1365638	3075430	646	1.71e+07
LNGDP_GH	715	24.6079	.301842	23.98321	24.94773
GDP_Gha	715	5.07e+10	1.36e+10	2.60e+10	6.83e+10
LNGDP_PAR	715	25.79974	2.241486	20.53709	30.69313
GDP_partner	715	1.03e+12	2.61e+12	8.30e+08	2.14e+13
GDPWORLD	715	7.65e+13	7.47e+12	6.08e+13	8.77e+13
IMPORTS	715	2.02e+10	4.05e+09	1.10e+10	2.69e+10
INFRAS	715	3.699169	1.543365	2.242675	7.125018
INFRASS	715	7.10e+10	2.30e+10	4.73e+10	1.11e+11
LNINFRAS	715	24.93751	.3073777	24.5798	25.4311
LNFDI	715	21.86745	.1329681	21.58723	22.07906
FDI	715	3.17e+09	4.00e+08	2.37e+09	3.88e+09
GFCF	715	1.04e+10	4.38e+09	3.79e+09	1.51e+10
LNGFCF	715	22.94036	.531934	22.05503	23.4381
Transporta~s	715	17.77766	9.836537	5.048711	30.12755
Serviceexp~s	715	4.49e+09	2.78e+09	1.48e+09	9.92e+09
TRANS	715	5.56e+10	1.79e+10	3.23e+10	9.30e+10
LNTRANS	715	24.69259	.3088653	24.19762	25.25597
LNPOP_GH	715	17.11812	.07259	17.00066	17.23054
Pop_Ghana	715	2.73e+07	1973601	2.42e+07	3.04e+07
LNPOP_PAR	715	16.81056	1.467773	13.71191	21.06525
Pop_partners	715	7.80e+07	2.30e+08	901589	1.41e+09
Border	715	.0461538	.2099651	0	1
landlocked	715	.1538462	.3610538	0	1
COMLANG	715	.2923077	.4551413	0	1
EU	715	.2153846	.4113767	0	1
ECOWAS	715	.2	.40028	0	1
country	715	33	18.7748	1	65

```
9 .
10 . reg LNMANU LNGDP_Diss LNREER LNDISS LNGFCF LNGDP_GH LNGDP_PAR LNFDI LNINFRAS LNTRANS LNPOP_GH I
```

Source	SS	df	MS	Number of obs	=	715
				F(16, 698)	=	35.50
Model	2342.52493	16	146.407808	Prob > F	=	0.0000
Residual	2878.5717	698	4.12402822	R-squared	=	0.4487
				Adj R-squared	=	0.4360
Total	5221.09663	714	7.31246026	Root MSE	=	2.0308

LNMANU	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNGDP_Diss	-2.780043	2.398967	-1.16	0.247	-7.490099	1.930014
LNREER	-6.456749	2.374079	-2.72	0.007	-11.11794	-1.795557
LNDISS	-.4077913	.1061366	-3.84	0.000	-.6161765	-.1994061
LNGFCF	-1.465821	1.563677	-0.94	0.349	-4.535896	1.604254
LNGDP_GH	4.780399	3.171717	1.51	0.132	-1.44685	11.00765
LNGDP_PAR	.6735344	.2394221	2.81	0.005	.2034607	1.143608
LNFDI	1.018352	1.718509	0.59	0.554	-2.355715	4.392419
LNINFRAS	.3157391	.9539949	0.33	0.741	-1.557304	2.188783
LNTRANS	-.0295444	.6181794	-0.05	0.962	-1.243258	1.184169
LNPOP_GH	-22.7115	6.844744	-3.32	0.001	-36.15025	-9.272743
LNPOP_PAR	.0531391	.2487547	0.21	0.831	-.435258	.5415362
Border	2.369268	.4082972	5.80	0.000	1.56763	3.170906
landlocked	-1.001922	.2183172	-4.59	0.000	-1.430559	-.5732847

COMLANG	.2850984	.1784017	1.60	0.110	-.0651699	.6353667
EU	-.5389657	.2137003	-2.52	0.012	-.9585381	-.1193934
ECOWAS	4.386057	.2986532	14.69	0.000	3.79969	4.972423
_cons	299.8704	107.0757	2.80	0.005	89.64136	510.0995

```
11 .
12 . hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of LNMANU

         chi2(1)      =    20.10
         Prob > chi2  =   0.0000

13 .
14 . xtreg LNMANU LNGDP_Diss LNREER LNDISS LNGFCF LNGDP_GH LNGDP_PAR LNFDI LNINFRAS LNTRANS LNPOP_GH
```

Random-effects GLS regression — Number of obs = 715
Group variable: **country** — Number of groups = 65

R-sq:
- within = 0.1721
- between = 0.5299
- overall = 0.4311

Obs per group: min = 11, avg = 11.0, max = 11

Wald chi2(16) = 197.65
corr(u_i, X) = 0 (assumed) — Prob > chi2 = 0.0000

LNMANU	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
LNGDP_Diss	7.522427	3.660538	2.06	0.040	.3479038	14.69695
LNREER	-6.466382	1.597514	-4.05	0.000	-9.597453	-3.335311
LNDISS	-.3703391	.2876644	-1.29	0.198	-.9341509	.1934727
LNGFCF	-1.469414	1.051002	-1.40	0.162	-3.52934	.590511
LNGDP_GH	4.38042	2.135137	2.05	0.040	.1956284	8.565211
LNGDP_PAR	-.1423722	.3897032	-0.37	0.715	-.9061764	.6214321
LNFDI	1.016898	1.153687	0.88	0.378	-1.244288	3.278084
LNINFRAS	.3066767	.6401497	0.48	0.632	-.9479936	1.561347
LNTRANS	-.0279421	.4151504	-0.07	0.946	-.841622	.7857377
LNPOP_GH	-22.20521	4.603861	-4.82	0.000	-31.22861	-13.18181
LNPOP_PAR	.910207	.4226457	2.15	0.031	.0818366	1.738577
Border	2.457013	1.111284	2.21	0.027	.2789372	4.635089
landlocked	-1.001134	.5937769	-1.69	0.092	-2.164915	.1626473
COMLANG	.2447735	.4818041	0.51	0.611	-.6995452	1.189092
EU	-.8505154	.5731542	-1.48	0.138	-1.973877	.2728461
ECOWAS	4.475567	.7699847	5.81	0.000	2.966425	5.98471
_cons	285.1842	72.11273	3.95	0.000	143.8458	426.5226
sigma_u	1.6069346					
sigma_e	1.3538788					
rho	.58484853	(fraction of variance due to u_i)				

```
15 .
16 . estimate store re

17 .
18 . xttest0

   Breusch and Pagan Lagrangian multiplier test for random effects

           LNMANU[country,t] = Xb + u[country] + e[country,t]

           Estimated results:
                        |       Var      sd = sqrt(Var)
                --------+------------------------------
                 LNMANU |     7.31246        2.704156
                      e |     1.832988        1.353879
                      u |     2.582239        1.606935

           Test:   Var(u) = 0
                                chibar2(01) =   1031.03
                             Prob > chibar2 =    0.0000

19 .
20 . xtreg LNMANU LNGDP_Diss LNREER LNDISS LNGFCF LNGDP_GH LNGDP_PAR LNFDI LNINFRAS LNTRANS LNPOP_GH
   note: LNDISS omitted because of collinearity
   note: Border omitted because of collinearity
   note: landlocked omitted because of collinearity
   note: COMLANG omitted because of collinearity
   note: EU omitted because of collinearity
   note: ECOWAS omitted because of collinearity

   Fixed-effects (within) regression               Number of obs      =       715
   Group variable: country                         Number of groups   =        65

   R-sq:                                           Obs per group:
        within  = 0.1815                                         min =        11
        between = 0.0011                                         avg =      11.0
        overall = 0.0033                                         max =        11

                                                   F(10,640)          =     14.19
   corr(u_i, Xb)  = -0.8819                        Prob > F           =    0.0000

------------------------------------------------------------------------------
      LNMANU |      Coef.   Std. Err.      t    P>|t|     [95% Conf. Interval]
-------------+----------------------------------------------------------------
  LNGDP_Diss |   9.603424   4.789949     2.00   0.045     .1975091    19.00934
      LNREER |  -5.832226   1.610399    -3.62   0.000    -8.99453   -2.669922
      LNDISS |          0  (omitted)
      LNGFCF |  -1.143106   1.053603    -1.08   0.278    -3.212042    .9258304
    LNGDP_GH |     3.4353   2.153935     1.59   0.111    -.7943352    7.664934
   LNGDP_PAR |   .6090286   .6241181     0.98   0.330    -.6165381    1.834595
       LNFDI |   1.222998   1.149658     1.06   0.288     -1.03456    3.480556
    LNINFRAS |   .3473258   .6363432     0.55   0.585    -.9022471    1.596899
     LNTRANS |  -.1218438   .4144317    -0.29   0.769     -.935654    .6919665
    LNPOP_GH |  -21.77544   4.753684    -4.58   0.000    -31.11015   -12.44074
   LNPOP_PAR |   2.006555   1.441928     1.39   0.165    -.8249254    4.838036
      Border |          0  (omitted)
  landlocked |          0  (omitted)
     COMLANG |          0  (omitted)
          EU |          0  (omitted)
     ECOWAS |          0  (omitted)
       _cons |   243.9923   72.84714     3.35   0.001      100.944    387.0406
-------------+----------------------------------------------------------------
     sigma_u |   5.075464
------------------------------------------------------------------------------
```

```
      sigma_e |  1.3538788
          rho |  .93357133   (fraction of variance due to u_i)
------------------------------------------------------------------------------
F test that all u_i=0: F(64, 640) = 28.94                     Prob > F = 0.0000

21 .
22 . estimate store fe

23 .
24 . hausman fe re

                 ---- Coefficients ----
                 (b)          (B)            (b-B)     sqrt(diag(V_b-V_B))
                  fe           re          Difference          S.E.
------------------------------------------------------------------------------
   LNGDP_Diss |  9.603424     7.522427       2.080997        3.089347
       LNREER | -5.832226    -6.466382       .6341562        .2033029
        LNGFCF | -1.143106    -1.469414       .3263086        .0739895
      LNGDP_GH |    3.4353      4.38042      -.9451203        .2839514
     LNGDP_PAR |  .6090286    -.1423722       .7514007        .4874985
        LNFDI |  1.222998     1.016898       .2060996               .
     LNINFRAS |  .3473258     .3066767       .0406491               .
      LNTRANS | -.1218438    -.0279421      -.0939016               .
      LNPOP_GH | -21.77544    -22.20521       .4297665        1.184049
     LNPOP_PAR |  2.006555      .910207       1.096348        1.378596
------------------------------------------------------------------------------
                           b = consistent under Ho and Ha; obtained from xtreg
            B = inconsistent under Ha, efficient under Ho; obtained from xtreg

    Test:  Ho:  difference in coefficients not systematic

                  chi2(10) = (b-B)'[(V_b-V_B)^(-1)](b-B)
                           =        12.15
                Prob>chi2 =       0.2752
                (V_b-V_B is not positive definite)

25 . import excel "C:\Users\user\Desktop\LNTRADECOST_MANU.xlsx", sheet("Sheet1") firstrow clear

26 . encode Partner, gen(country)

27 .
28 . xtset country YEAR
       panel variable:  country (strongly balanced)
        time variable:  YEAR, 2009 to 2018
                delta:  1 unit

29 .
30 . sum

    Variable |        Obs        Mean    Std. Dev.       Min        Max
-------------+---------------------------------------------------------
     Partner |          0
        YEAR |        540      2013.5    2.874945        2009       2018
          TC |        540     219.006    109.8829    50.54619   763.2962
        LNTC |        540    5.281138    .4642233    3.922888   6.637646
      Border |        540     .037037    .1890277           0          1
-------------+---------------------------------------------------------
  landlocked |        540    .1296296    .3362069           0          1
     COMLANG |        540    .2981481     .457869           0          1
          EU |        540    .2407407    .4279296           0          1
       ECOWAS |        540    .1481481    .3555762           0          1
      LNDISS |        540    5.340334    .9280619     2.25757   7.348745
```

DISTANCE	540	311.5668	317.7074	9.559828	1554.244
Transporta~s	540	19.05056	9.414116	5.983378	30.12755
SERVICEEX	540	3.95e+09	2.29e+09	1.48e+09	7.57e+09
TRANS	540	5.61e+10	1.87e+10	3.23e+10	9.30e+10
LNTRANS	540	24.69811	.3234964	24.19762	25.25597
LNINFRAS	540	24.93948	.3222948	24.5798	25.4311
country	540	27.5	15.60024	1	54

```
31 .
32 . reg LNTC LNDISS LNTRANS LNINFRAS Border landlocked COMLANG EU ECOWAS
```

Source	SS	df	MS		
				Number of obs	= 540
				F(8, 531)	= 33.28
Model	38.7889426	8	4.84861783	Prob > F	= 0.0000
Residual	77.3673143	531	.145701157	R-squared	= 0.3339
				Adj R-squared	= 0.3239
Total	116.156257	539	.21550326	Root MSE	= .38171

LNTC	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNDISS	-.0174707	.018204	-0.96	0.338	-.0532314	.0182899
LNTRANS	.0910071	.0516549	1.76	0.079	-.010466	.1924801
LNINFRAS	-.0977342	.0518466	-1.89	0.060	-.1995838	.0041154
Border	-.6235902	.1005532	-6.20	0.000	-.821121	-.4260594
landlocked	.3456994	.0505197	6.84	0.000	.2464564	.4449425
COMLANG	.1400728	.0370716	3.78	0.000	.0672478	.2128978
EU	-.0641988	.04088	-1.57	0.117	-.1445052	.0161075
ECOWAS	-.4218694	.0553591	-7.62	0.000	-.5306191	-.3131198
_cons	5.578649	1.64968	3.38	0.001	2.337949	8.819349

```
33 .
34 . hettest

Breusch-Pagan / Cook-Weisberg test for heteroskedasticity
         Ho: Constant variance
         Variables: fitted values of LNTC

         chi2(1)      =    50.72
         Prob > chi2  =   0.0000

35 .
36 . xtreg LNTC LNDISS LNTRANS LNINFRAS Border landlocked COMLANG EU ECOWAS, re

Random-effects GLS regression                   Number of obs      =       540
Group variable: country                         Number of groups   =        54

R-sq:                                           Obs per group:
     within  = 0.0559                                         min =        10
     between = 0.3712                                         avg =      10.0
     overall = 0.3335                                         max =        10

                                                Wald chi2(8)       =     62.30
corr(u_i, X)   = 0 (assumed)                    Prob > chi2        =    0.0000
```

LNTC	Coef.	Std. Err.	z	P>|z|	[95% Conf.	Interval]
LNDISS	-.0178583	.0501371	-0.36	0.722	-.1161252	.0804085
LNTRANS	.0901503	.0225551	4.00	0.000	.0459432	.1343575
LNINFRAS	-.0940642	.0226306	-4.16	0.000	-.1384192	-.0497091
Border	-.6302031	.2765967	-2.28	0.023	-1.172323	-.0880835
landlocked	.3489616	.1389744	2.51	0.012	.0765769	.6213464
COMLANG	.1170932	.0886208	1.32	0.186	-.0566004	.2907868
EU	-.0688439	.1121389	-0.61	0.539	-.2886322	.1509443
ECOWAS	-.4234385	.1524516	-2.78	0.005	-.7222382	-.1246388
_cons	5.518374	.7747262	7.12	0.000	3.999939	7.03681
sigma_u	.32476991					
sigma_e	.16479949					
rho	.79523503	(fraction of variance due to u_i)				

```
37 .
38 . estimate store re

39 .
40 . xttest0

Breusch and Pagan Lagrangian multiplier test for random effects

        LNTC[country,t] = Xb + u[country] + e[country,t]

        Estimated results:
                         |       Var     sd = sqrt(Var)
                ---------+-----------------------------
                    LNTC |    .2155033       .4642233
                       e |    .0271589       .1647995
                       u |    .1054755       .3247699

        Test:   Var(u) = 0
                                 chibar2(01) =  1600.18
                              Prob > chibar2 =   0.0000

41 .
42 . xtreg LNTC LNDISS LNTRANS LNINFRAS Border landlocked COMLANG EU ECOWAS, fe
note: LNDISS omitted because of collinearity
note: Border omitted because of collinearity
note: landlocked omitted because of collinearity
note: EU omitted because of collinearity
note: ECOWAS omitted because of collinearity

Fixed-effects (within) regression               Number of obs      =       540
Group variable: country                         Number of groups   =        54

R-sq:                                           Obs per group:
     within  = 0.0562                                         min =        10
     between = 0.0597                                         avg =      10.0
     overall = 0.0338                                         max =        10

                                                F(3,483)           =      9.58
corr(u_i, Xb)  = 0.0966                         Prob > F           =    0.0000
```

LNTC	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
LNDISS	0	(omitted)				
LNTRANS	.0895594	.0223468	4.01	0.000	.0456504	.1334683
LNINFRAS	-.0942383	.022395	-4.21	0.000	-.1382419	-.0502346
Border	0	(omitted)				
landlocked	0	(omitted)				
COMLANG	.0469965	.1742221	0.27	0.787	-.2953302	.3893233
EU	0	(omitted)				
ECOWAS	0	(omitted)				
_cons	5.405432	.7183835	7.52	0.000	3.993889	6.816975
sigma_u	.43448475					
sigma_e	.16479949					
rho	.87422714	(fraction of variance due to u_i)				

F test that all u_i=0: F(53, 483) = 66.93 Prob > F = 0.0000

```
43 .
44 . estimate store fe

45 .
46 . hausman fe re
```

	Coefficients (b) fe	(B) re	(b-B) Difference	sqrt(diag(V_b-V_B)) S.E.
LNTRANS	.0895594	.0901503	-.000591	.
LNINFRAS	-.0942383	-.0940642	-.0001741	.
COMLANG	.0469965	.1170932	-.0700967	.1499989

b = consistent under Ho and Ha; obtained from xtreg
B = inconsistent under Ha, efficient under Ho; obtained from xtreg

Test: Ho: difference in coefficients not systematic

chi2(3) = (b-B)'[(V_b-V_B)^(-1)](b-B)
= 0.22
Prob>chi2 = 0.9747
(V_b-V_B is not positive definite)

```
47 .
```