

**UNIVERSITY OF GHANA  
LEGON**



**COLLEGE OF HUMANITIES  
SCHOOL OF SOCIAL SCIENCES**

**GHANA'S EXPORT PERFORMANCE: THE ROLE OF EXCHANGE  
RATE VOLATILITY, EXCHANGE RATE POLICIES AND  
CHALLENGES TO EXPORT DIVERSIFICATION**

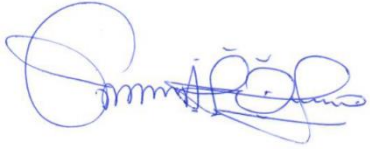
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**A THESIS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES  
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DOCTOR OF PHILOSOPHY IN DEVELOPMENT ECONOMICS**

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DECEMBER 2019**

**DECLARATION**

I hereby certify that this thesis is my original research work and that neither part nor the whole has ever been presented in this University or any other institution for the award of any academic degree. I have duly acknowledged all references.



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We the undersigned supervisors certify that this is an original work that we supervised the candidate to produce. We are also convinced that the thesis meets all the required standards set by the University of Ghana for an award of a Doctor of Philosophy Degree.



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## ABSTRACT

The thesis is divided into three empirical papers to address the core issues regarding the main drivers of Ghana's export performance both at the macro and micro levels with focus on the role of exchange rate volatility and exchange rate policies, and the constraints to Ghana's export diversification effort by examining its economic complexity levels as well as the product space and the prospects for structural transformation.

The empirical chapter one, titled "**Ghana's Export Performance: The role of Exchange Rate Volatility and Exchange Rate Policies**" investigates the heterogeneous responses of the various components of total export (cocoa beans export, natural resources export, and non-traditional export) to exchange rate volatility and exchange rate policies. By using a linear ARDL technique on quarterly data for the period 2000 to 2016, the impact of exchange rate volatility on total export and its components is not statistically supported in the immediate short run. On the contrary, the results from a non-linear ARDL technique that decouples the exchange rate volatility into negative and positive effects suggest that a negative short-run response of non-traditional export and total export to negative exchange rate volatility (excessive depreciation) is statistically supported in Ghana. Besides, the results from the non-linear ARDL suggest that exporters of natural resources (gold, crude oil, and other minerals) respond positively to positive exchange rate volatility (excessive appreciation) in the short run, which could be attributed to their ability to secure risk mitigating schemes. This may have implications for capital outflows if appropriate measures are not instituted to check the orderly transfer of profits by owners of the capital used for the exploitation of these natural resources, who tend to be foreigners. However, neither the linear nor the non-linear ARDL techniques statistically support a response of cocoa beans export to exchange rate volatility in the immediate short run. This outcome may be attributed to the protection offered against short

term risk due to the marketing arrangements established by the Ghana Cocoa Board over the years.

In the long run, the results from both the linear and non-linear ARDL techniques provide evidence in support of the argument that exchange rate volatility depresses non-traditional export performance. The outcome is however different for total export conditioned on whether the linear or the non-linear ARDL technique is applied.

On the role of exchange rate policies, results from the ARDL techniques support the argument that an increase in anti-export bias policies undermines the performance of non-traditional export, which is not the same for natural resources and total export. Cocoa beans export appears not to be adversely affected due to the protection that cocoa farmers enjoy from the purchase's arrangements established by the Ghana Cocoa Board.

The empirical chapter two, with the title "**Ghana's Economic Complexity and Product Space: Implications for Export Diversification**" assesses the fundamental challenges confronting Ghana's quest to achieve a more diversified export base. The study is anchored on the theoretical arguments of Hausmann, Hwang and Rodrik (2007) and Hidalgo, Klinger, Barabási and Hausmann (2007) that the nature of the products, constituting a country's export basket, which reflects the productive capabilities acquired over the years, matters a lot in any diversification effort.

Hence, the study employs the concepts of Economic Complexity Index (ECI) and Product Complexity Index (PCI), Product Space and Revealed Comparative Advantage (RCA) generated based on trade data at the HS 4-digit classification level for 1240 products, for the period 1995 to 2016, to undertake comparative analyses between Ghana and some selective countries (Nigeria, Singapore, and Malaysia) to address the question relating to why Ghana's export basket is less diversified. The study also examines sectors that have emerged from the products that the country has established a comparative advantage and how that has contributed

to its structural transformation effort. The study further identifies new products of strategic value that Ghana can easily deploy its acquired productive knowledge to promote future export diversification efforts and at the same time develop such products for the ECOWAS market.

The study provides evidence to show that Ghana and other similar countries in the sub-Saharan African region are caught in the trap of producing and exporting products that are of low sophistication level (low PCIs) reflecting in low and negative ECIs for their export baskets. This suggests that the productive capabilities or the collective know-how embedded in these products are limited. Thus, the opportunities for Ghana to leverage on the productive capabilities acquired over the years to chart new paths for structural transformation and subsequent diversification of the economy is constrained. This puts Ghana in a vicious circle or quandary as far as its diversification effort is concerned.

The empirical chapter three, with a title “**Firm-Level Assessment of Exchange Rate Uncertainty on Ghana’s Non-Traditional Export Performance**” revisits the exchange rate volatility and export performance nexus, but this time around at the firm-level, where the exchange rate volatility issue is cast within the context of macroeconomic uncertainty. Based on the resources base view and contingency theories, a plethora of academic research has been undertaken to investigate both the internal and external factors that drive export performance at the Firm-level. Besides, the study investigates the possible institutional constraints resulting in Ghana missing out on the US\$ 5 billion target for NTE set for the end of 2017 as envisioned under the Ghana National Export Strategy Plan, 2013-2017.

A survey was conducted on NTE firms in Ghana to elicit responses, which were used to construct subjective measures for export performance and the key predictors. Some 87 firms responded to the survey, representing a response rate of 45.8 percent. A similar survey was conducted for some institutions to elicit their views on the possible constraints encountered in

the implementation of the Ghana National Export Strategic Plan, 2013-2017. In this case, three out of five institutions contacted unreservedly offered their perspectives on the issue.

From both the descriptive and econometric analysis the study provides empirical evidence to support both the resource base view that firms can leverage on their internal resources to enhance their comparative advantage and competitiveness, as well as the contingency theory that assesses the firm's capabilities to overcome external headwinds.

Specifically, the results from the study suggest that firms demonstrating moderate to average levels of export commitment and at the same time displaying moderate to average levels of product development capabilities are less likely to report low export performance. At the same time, average to high levels of export performance are more likely to be predicted by firms that demonstrate a high adoption rate of export promotion programmes. The study also finds moderate to average and high levels of macroeconomic uncertainties are more likely to predict low export performance and less likely to predict average to high levels of export performance. From a descriptive analysis of the responses from firms and government agencies, the study suggests that the Ghana National Export Strategy Plan, 2013-2017 suffered from both awareness and financial resources deficits, thus affecting the attainment of set targets. To the extent that most of the key stakeholders demonstrated limited awareness of the strategic plan, it was equally possible that not many activities were executed to actualise the objectives of the strategy. Besides the vehicle intended to provide funding support for firms, EDAIF appeared not to be effective in delivering the volumes of credit required. Meanwhile, the implementing agency, GEPA, was starved of the requisite funds to execute the priority projects.

## DEDICATION

This thesis is dedicated to *Millicent, Awura Adwoa, Maame Boatemaa, Nana Serwaa and my mother, Dorcas Owusu.*

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## TABLE OF CONTENTS

DECLARATION .....	ii
ABSTRACT.....	iii
DEDICATION.....	vii
ACKNOWLEDGEMENTS.....	viii
LIST OF TABLES.....	xii
LIST OF FIGURES .....	xiv
LIST OF ABBREVIATIONS.....	xv
CHAPTER ONE.....	1
INTRODUCTION .....	1
1.1 Background and Motivation.....	2
1.2 Research Questions .....	20
1.3 Research Objectives .....	20
1.4 Thesis Structure.....	21
CHAPTER TWO .....	23
AN OVERVIEW OF EXCHANGE RATE AND TRADE POLICIES AND DEVELOPMENTS IN GHANA AND EXPORT PERFORMANCE .....	23
2.0 Introduction.....	23
2.1 Pre 2000 Era.....	24
2.2 Post 2000 Era .....	29
2.3 Institutional Structures responsible for Promoting Export.....	34
2.3.1 Ministry of Trade and Industry (MoTI).....	34
2.3.2 Ghana Export Promotion Authority (GEPA).....	35
2.3.3 Ghana Export-Import Bank (GEXIM) .....	38
2.3.4 Ghana Standards Authority (GSA).....	40
2.3.5 Ghana Free Zones Board (GFZB) .....	40
CHAPTER THREE .....	42
LITERATURE REVIEW .....	42
3.1 The Exchange Rate Volatility and Exchange Rate Policies, and Export Performance nexus.....	42
3.1.1 Theoretical Literature .....	42
3.1.2 Empirical Literature.....	50
3.2 Literature Review on Economic Complexity, Product Space and Export Diversification .....	58
3.2.1 Theoretical Literature .....	59
3.2.2 Empirical Literature:.....	63

3.3 Literature on Determinants of Firm-level Export Performance .....	70
3.3.1 Theoretical Literature .....	70
3.3.2 Empirical Literature .....	79
CHAPTER FOUR.....	85
GHANA’S EXPORT PERFORMANCE: THE ROLE OF EXCHANGE RATE VOLATILITY AND EXCHANGE RATE POLICIES.....	85
4.0 Introduction .....	85
4.1 Methodology and Model Specifications .....	85
4.1.1 Econometric Model for the Export Equations .....	89
4.1.2 Data Sources .....	92
4.1.3 Estimation Technique for the Export Models .....	93
4.1.4 Exchange Rate Volatility.....	97
4.2 Empirical Results and Analysis.....	99
4.2.1 Unit Root Test .....	99
4.2.2 Bounds Tests for Long-run Co-integration (Linear technique) .....	100
4.2.3 Diagnostic Analysis (Linear technique) .....	101
4.2.4 Results on Exchange Rate Volatility .....	103
4.2.5 Analysis of results on the short-run and long-run linear ARDL Export Models .....	104
4.2.6 Analysis of results on the Short-run and Long-run non-linear ARDL Export Models.....	111
4.3 Conclusion.....	116
CHAPTER FIVE .....	119
GHANA’S ECONOMIC COMPLEXITY AND PRODUCT SPACE: IMPLICATIONS FOR EXPORT DIVERSIFICATION.....	119
5. 1 Introduction .....	119
5.2 Model Specification and Data Source .....	127
5.2.1 Introduction .....	127
5.2.2 The Theoretical Model.....	128
5.2.3 Empirical Model .....	135
5.2.4 Data Source .....	144
5.3 The Analytical Section .....	145
5.3.1 The Relationship between ECIs and Income Per Capita .....	146
5.3.2 Evolution of Ghana’s Economic Complexity .....	147
5.3.3 Analysis of Ghana’s Revealed Comparative Advantage (RCA).....	150
5.3.4 How Ghana’s RCAs have evolved between the years 2000 and 2016 by adopting a categorisation scheme of the RCAs .....	152
5.3.5 The Product Space of Ghana and Selected Countries.....	159

5.3.6 Selection of New Products within Ghana’s Knowledge Frontier .....	164
5.4 Conclusions .....	178
CHAPTER SIX.....	183
FIRM-LEVEL ASSESSMENT OF THE EFFECT OF EXCHANGE RATE UNCERTAINTY ON GHANA’S NON-TRADITIONAL EXPORT PERFORMANCE.....	183
6.1 Introduction .....	183
6.2 Research Motivation and Questions.....	185
6.3 Research Objective.....	187
6.4 A Brief Overview of Macroeconomic Conditions .....	187
6.5 Empirical Strategy.....	189
6.5.1 Survey and Data Collection .....	189
6.5.1.1 Questionnaire Design.....	190
6.5.1.2 Sampling Method.....	191
6.5.1.3 Construction of Indicators for Export Performance and the Determinants .....	193
6.5.2 Methodology.....	198
6.6.3 Descriptive Analysis of Some Institutional and Firm-level Constraints that impinged on the Ghana National Export Strategy Plan, 2013-2017 .....	221
6.7 Conclusions.....	225
CHAPTER SEVEN .....	227
CONCLUSIONS AND POLICY RECOMMENDATIONS .....	227
7.1 Conclusions .....	227
7.2 Policy Recommendations:.....	237
7.3 Contributions to Knowledge .....	239
7.4 Limitations on the Empirical Studies .....	240
Appendix A.....	242
.....	246
Appendix B .....	248
Appendix C .....	250
References:.....	262

## LIST OF TABLES

Table 1.1: Non-Traditional Export Performance By Sector (US\$) .....	15
Table 4.1: Results of Unit Root Test .....	99
Table 4.2: ARDL bounds test for linear models .....	101
Table 4.3: Diagnostic Test for the Various Models .....	102
Table 4.4: Results Short-run and Long-runARDL Linear models .....	105
Table 4.5: Results on Short-run and Long-runARDL Non-linear models.....	112
Table 4.5: Results on Short-run and Long-runARDL Non-linear models cont'd .....	<b>Error!</b>
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Table 5.1: Ghana's Export Products with RCA (2000 & 2016) .....	150
Table 5.2: Number of Export Products with RCA, Ghana and ECOWAS countries (2016)	151
Table 5.3: Product Community and Evolution of Reveal Comparative Advantage Categories of Selected Countries .....	158
Table 5.4: Products identified within Ghana's productive knowledge (using 2016 export basket).....	169
Table 5.4 Products identified within Ghana's productive knowledge (using 2016 export basket),Cont'd.....	170
Table 5.4 Products identified within Ghana's productive knowledge (using 2016 export basket),Cont'd.....	171
Table 5.5: 'Frontier' Products Capable of Engendering Regional Trade (Using 2016 Export Basket) And Ecowas Import Intensity Indices.....	176
Table 5.5: 'Frontier' Products Capable of Engendering Regional Trade (Using 2016 Export Basket) And Ecowas Import Intensity Indices cont'd .....	177
Table 6.1: Composition of Credit Allocation and Finance .....	188
Table 6.2: Lending Rates .....	188
Table 6.3: A Categorization Scheme for Deriving a Composite Export Performance Indicator .....	195
Table 6.4 a: Frequencies of Both Dependent and Independent Categorical Variables .....	200
Table 6.4 b: Frequencies of Both Dependent and Independent Categorical Variables .....	201
Table 6.5: Cross-tabulation between Exchange Volatility item and Export Performance Measure.....	203
Table 6.6: Cross-tabulation between Measures of Macroeconomic Uncertainty and Export Performance .....	203

Table 6.7: Cross-tabulation between Measures of Export Commitment and Export Performance .....	204
Table 6.8: Cross-tabulation between Measures of Managerial International Experience and Export Performance .....	204
Table 6.9: Cross-tabulation between Measures of Product Development Capabilities and Export Performance .....	205
Table 6.10: Cross-tabulation between Measures of Location Factors and Export Performance .....	205
Table 6.11: Cross-tabulation between Measures of Export Promotion Programmes and Export Performance .....	205
Table 6.12 Results of Ordered Logit Model and Odd Ratios for Export Performance .....	211
Table 6.13 Ranking of factors Constraining Export Business in Ghana .....	215
Table 6.14 Marginal Effects for The Ordered Logit.....	216
Table 6.15: Results of Predicted and Actual Probabilities .....	218
Table 6.16 Results on Omodel Logit to Test Proportionality Assumption.....	219
Table 6.17: Responses on the extent of NTEs firms' involvement the National Export Promotion Activity.....	222
Table 6.18: Responses from Institutions on Key Constraints on Implementation of the National Export Strategy, 2013- 2017 .....	224
Table 4.A1 Definition of Variables .....	242
Table 4.A2 Descriptive Statistics.....	244
Table 4.A3: ARDL BOUNDS TEST FOR NON-LINEAR MODELS.....	244
Table 4.A4: Diagnostic Test for the Various Models (Non-Linear).....	245
Tables 5B.1 Ghana: Ease of Doing Business Report, 2018.....	248
Tables 5B.2 Nigeria: Ease of Doing Business Report, 2018 .....	248
Tables 5B.3 Singapore: Ease of Doing Business Report, 2018.....	249
Tables 5B.4 Malaysia: Ease of Doing Business Report, 2018 .....	249

## LIST OF FIGURES

Figure 1.1: Monthly Exchange Rate Depreciation (Cedi/\$) Jan 2000- Dec 2016 .....	7
Figure 1.2: Bilateral Exchange Rate Depreciation Between Selected SSA Countries and the US\$ .....	8
Figure 1.3: Evolution of Ghana’s Trade and Current A/c Deficits (2006-2016).....	10
Figure 1.4: Distribution of Ghana's Total Export, 2000-2016.....	11
Figure 2.1: Export Performance and Evolution of Real Effective Exchange Rates, 1960-1991 .....	27
Figure 2.2: Export Performance and Evolution of Real Effective Exchange Rates, 1992-2000 .....	28
Figure 2.3: Export Performance and Evolution of Real Effective Exchange Rates (2001-2016) .....	33
Figure 4.1: Measures of Ghana’s Exchange Rate Volatility, 2001Q1-2016Q4. ....	103
Figure 5.1: The Structure of Ghana’s Export Basket for Selected years .....	121
Figure 5.2: Prices of Some Selected Commodities: 1960-2017 .....	122
Figure 5.3: Global Economic Complexity Index and GDP Per Capita, 2016 .....	146
Figure 5.4: Historical Perceptive on Ghana’s Economic Complexity.....	149
Figure 5.5: Evolution of Revealed Comparative Advantage of Selected Countries (bet.2000 and 2016).....	154
Figure 5.6: Ghana’s Product Space.....	160
Figure 5.7: Nigeria’s Product Space .....	161
Figure 5.8: Singapore’s Product Space .....	163
Figure 5.9: Malaysia’s Product Space .....	163
Figure 6.1: Ghana’s Non-traditional Export (in US\$’ billion) .....	184
Figure 4.A1 Stability Test for linear ARDL Model.....	246
Figure 4.A2 Stability Test for Non-linear ARDL Model .....	247

## LIST OF ABBREVIATIONS

AGI	Association of Ghana Industries
ECI	Economic Complexity Index
ECOWAS	Economic Community of West African States
EGARCH	Exponential generalized autoregressive conditional heteroscedasticity
ERP	Economic Recovery Programme
EDAIF	Export trade, agricultural and industrial Fund
FCA	Foreign Currency Account
FEA	Foreign Exchange Accounts
FINSAP	Financial Sector Adjustment Programme
GARCH	Generalized Autoregressive Conditional Heteroscedasticity
GEPA	Ghana Export Promotion Authority
GPRS	Ghana Poverty Reduction Strategy
HIPC	Highly Indebted Poor Country
IMF	International Monetary Fund
NTE	Non-traditional Export
NTE	Non-traditional Export sector
PCI	Product Complexity Index
RCA	Reveal Comparative Advantage
RCIEA	Real Composite Index of Economic Activity
REER	Real Effective Exchange rate
SAP	Structural Adjustment Programme
TARCH	Threshold generalized autoregressive conditional heteroscedasticity
WAMZ	West Africa Monetary Zone

## **CHAPTER ONE**

### **INTRODUCTION**

Classical trade theories that have stressed comparative cost advantage based on differences in productivity and factor endowments, as well as the new trade theories with an emphasis on intra-industry trade and product differentiation, have collectively highlighted the immense benefits of free trade to trading countries. The benefits include an improved standard of living due to the availability of different varieties of goods and services. There is also an enlarged domestic market and increased level of productivity through knowledge transfer as well as an enhanced process of capital accumulation with the potential to boost economic growth. Indeed, studies by Fosu (1999), Bahmani-Oskooee and Oyolola (2007) and Darku (2012) have demonstrated that export growth, a natural consequence of free trade, is an essential component of economic growth for Sub-Saharan Africa and other developing countries.

Some development economists like Paul Prebisch and Ragnar Nurkse, key proponents of export pessimism hold contrary views. Cited in Bhagwati (1988), Prebisch argues that developing countries are not likely to benefit from international trade since they suffer from circular declining trends in their terms of trade and can only benefit from trade if they industrialised. Nurkse also argues that there is a limit of imports that the foreign market can accommodate, as such developing countries can only benefit from trade through governments' inventions.

The above debate notwithstanding, the pace of capital accumulation (human, physical, and technology transfer) that a country can secure from engaging in free trade depends considerably on the natural resource endowment and its ability to efficiently and effectively exploit and transform the resources to increase both the volumes of its export and its composition

(Thirlwall and Hussain, 1982)<sup>1</sup>. In other words, the structural transformation that a country can enjoy from engaging in international trade will depend on its ability to open its economy and increase its importance in the global trade arena. This should reflect in both the volumes and the composition of export trade. Hence, it is expected that if a country is running deficits on its trade accounts, this should be a temporary strategy to improve its domestic capacity through the acquisition of the requisite capital structure to transform its export base so that it can unwind from the deficit positions and usher in periods of sustainable external position and growth prospects. Therefore, the issue of export growth is of paramount importance, more especially where most of the developed countries and the emerging market countries attained their status by pursuing export promotion and enjoyed from export-led growth.

Export growth thrives on a stable environment provided by sound macroeconomic conditions, and the prospects for economic growth are enhanced where the country is systematically relevant both in terms of the type of products exported and the global technology engagement. Exchange rate instability is a major source of macroeconomic uncertainty that undermines productive economic outcomes, especially export activities. Of equal importance are the capabilities that a country has, to be able to produce diverse and complex products to meet the ever-changing taste and preferences of the diverse global consumers.

## **1.1 Background and Motivation**

Exchange rate developments occupy a significant space in macroeconomic discourse and policy analysis. In general, issues on exchange rate developments evoke intense academic enquiry as well as social and political commentary. In the case of a small open economy like Ghana, which is vulnerable to shifts in the global economic landscape, the implications of

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<sup>1</sup> Technology: here we are referring to the three key components of technology (tools or equipment, codes or blueprint and collective know-how or practical skills).

exchange rate dynamics become more germane and as such cannot be discounted. The exchange rate acts as a barometer for gauging the external health of a country and periodic swings in its value impose disproportionate consequences to different segments of the economy. For instance, in the second quarter of 2014, the Association of Ghana Industries (AGI) Business Barometer Indicator suggested a steep decline in business confidence, from an index level of 90.13 in Q1 2014 to 22.42 in Q2 2014. Depreciation of the domestic currency was cited as the main cause among other factors (AGI, 2014).

These discussions bring to focus memories of the collapse of the Bretton Wood's system of fixed exchange rates in 1973, where several countries opted for the floating exchange rates regime to forestall the tendencies for protectionist actions and promote global trade. Notwithstanding, the floating exchange rate regime is perceived to be erratic. There are situations where periodical changes in the nominal exchange rate may reflect adjustments to real shocks to the economy, aimed at addressing misalignment in the real exchange rate. In other cases, it may reflect deep-seated external malaise of an economy and can be potentially disruptive. In the wake of the liberalisation of capital flows, resulting in a significant increase in cross-border financial transactions, the volatility of the exchange rates has intensified, Chit, Rizov and Willenbockel (2010). In addition, general terms of trade shocks coupled with excessive domestic demand for imported goods may equally precipitate volatility in the exchange rate.

Given that exchange rates volatilities create uncertainties that can potentially have adverse effects on the economy, these pose a major source of concern to policymakers, regarding the attainment of key macroeconomic targets, and firms and households in terms of planning for their investments and consumption activities. In the case of exporters, since there is normally a gap between the time for delivery of their contracts and the receipts of their payments, they are usually exposed to exchange rate risks. Hence, the incentives for them to embark on any

exporting activity amid these uncertainties can be impaired. Newbery and Stiglitz (1984) argue that in the presence of uncertainties, more especially in the absence of risk-mitigating mechanism, like the existence of a forward market, suboptimal trade conditions are possibilities.

Consistent with the above discussions, some researchers hold the view that exchange rate volatility is associated with increased risk, creating uncertainties about returns on investments, blurring the potential benefits from international trade and eventually hurting trade. This position is shared by proponents of fixed exchange rates regime. They further argue that the impact is more pronounced in less developed countries where the financial markets are underdeveloped, and hedging products are not only imperfect but also very costly as a scheme for mitigating exchange rate risk. Under such conditions, coupled with the risk-aversion hypothesis, export activity may be negatively correlated with exchange rate volatility (Srinivasan and Kalaiyani 2013; Doroodian 1999; Krugman 1989).

Other economists hold a contrary view that the assumption of risk aversion does not necessarily hurt international trade flows. This is because the volatility of the exchange rate has both substitution and income effects. Therefore, if the positive income effect exceeds the negative substitution effect, then there will be a positive relationship between exchange rate volatility and international trade flows, (Broll and Eckwertt 1999; Franke 1991; De Grauwe 1988).

Other researchers are of the view that the direction of causality between exchange volatility and trade volumes depends on the sources of exchange rate volatility, which could either be emanating from a general microstructure shock, the behavior of the exchange rate fundamentals, or the signaling process of the future policy innovations. In this regard, it may be misleading to consider the total effect of exchange rate volatility on trade without recourse to a general equilibrium framework, which may lead to ambiguous outcomes, (Barkoulas, Baum and Caglayan 2002; Sercu and Uppal 2003).

In recent times it has been argued amongst some scholars that this lack of clarity regarding the exact relationship between exchange rate volatility and export performance is more of the estimation techniques being employed, which tend to assume linearity in the relationship between exchange rate developments and international trade flows. They, therefore, suggest that the use of nonlinear estimation techniques may resolve this conundrum, (Arize, Malindretos, & Igwe, 2017; Mohsen Bahmani-Oskooee & Fariditavana, 2016; Verheyen, 2013).

It is apparent from the above discussion that, the bone of contention is on whether exchange rate uncertainties impact trade flows and general economic welfare. From both theoretical and empirical standpoints, the potential association between exchange rate volatility and export performance is inconclusive. Thus, the direction and magnitude of the impact of exchange rate volatility on trade become an empirical issue, (Chit et al 2008).

In a related development, whilst governments through their trade policies may want to encourage export activity through export promotion strategies, these efforts could be undermined through the distortions in the incentive structure embedded in the exchange policies pursued by the same government. Consequently, the role of exchange rate policies that tends to undermine key macroeconomic variables, more especially in distorting the incentive structure in export activities with ultimate dire consequences for economic growth, has been highlighted by studies like Bhagwati (1988) and Jebuni et al. (1991). Within this context, not much empirical enquiry has been undertaken.

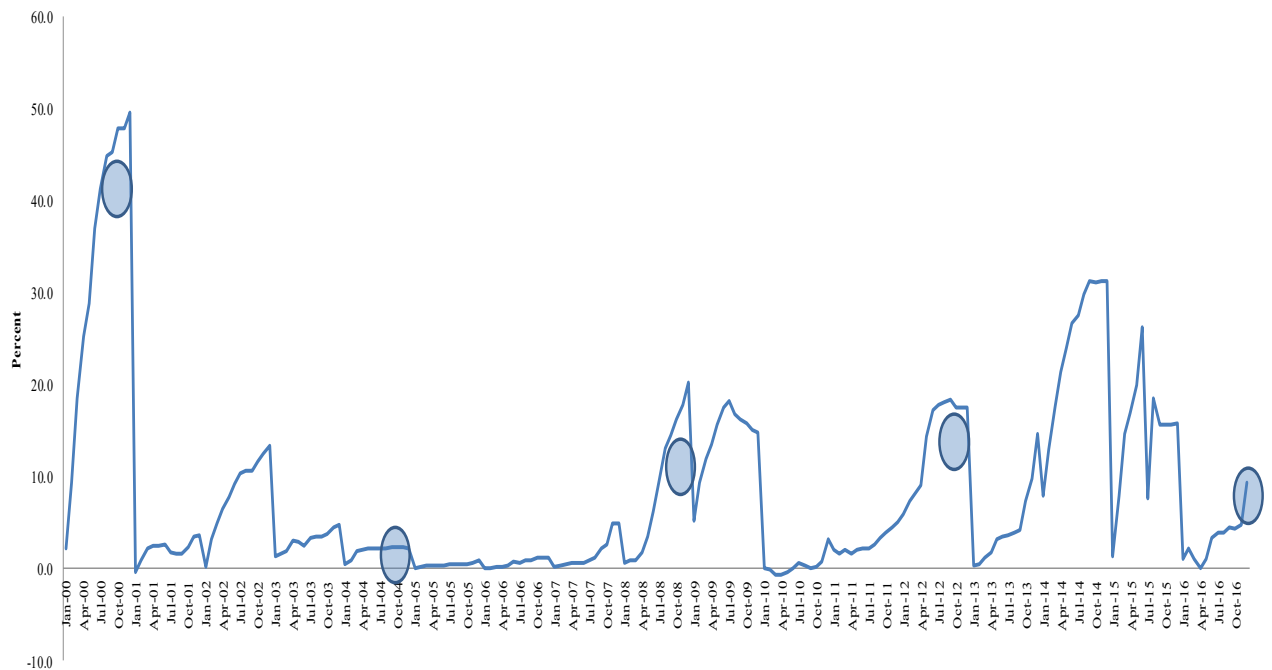
Another important aspect of the export growth discussion relates to how the current composition of a country's export basket could be either an enabler or a constraint to its structural transformation effort leading to a more diversified export base. The nature of the commodities a country produces reflects the extent of technological capabilities, capital accumulation, institutional structures, and know-how. It equally reflects its human resource

capabilities, the general macroeconomic and political environment, and the legal regime. These factors are intrinsically embedded in the society in a complex network that determines the structural transformation a country can experience, reflecting in the diversification of its export's basket. In a world of increasing returns to scale where there is intra-industry trade driven by consumers' desire for variety, countries that concentrate on the production of few products stand the danger of not maximizing its gains from global trade (Krugman, 1979a). One of the important issues regarding a country's attempt to diversify its export portfolio is related to the level of sophistication of the products its export. This level of sophistication is captured by the economic complexity measure, introduced by Hausmann, Hwang, and Rodrik (2007) and Hausmann et al. (2013). Countries are said to accumulate productive knowledge by developing the capacity to produce a larger variety of products of increasing complexity. Therefore, according to Hausmann et al. 2013, economic complexity is expressed in "the composition of a country's productive output and reflects the structures that emerge to hold and combine knowledge".

Evidence of macroeconomic instability can be perceived from Ghana's monthly exchange rate depreciation trajectory for the period 2000:1 to 2016:12 that suggests significant volatility as shown in Figure 1.1. This trend can be attributed to some confluence of factors both external and domestic. On the external front, Ghana has had its fair share of periodic bearish/bullish prices of global commodities that affect commodity-exporting countries. Hence, depending on where the pendulum swings, the domestic currency will either appreciate or depreciate. Coupled with this is the fact that under the highly indebtedness poor country (HIPC) debt relief initiative, Ghana benefited significantly from debt forgiveness for the period 2000 to 2007, which resulted in a considerable decline in volatility in the foreign exchange market.

Subsequently, events of the global financial crisis which commenced around 2008 and lasted for some years contributed partially to the increased volatility over the period.

**Figure 1.1: Monthly Exchange Rate Depreciation (Cedi/\$) Jan 2000- Dec 2016**



Source: Bank of Ghana and author's calculations

On the domestic front, factors relating to some unorthodox monetary policies and the political business cycle have collectively reinforced the path of exchange rate developments. For instance, in the early part of 2014, the Bank of Ghana introduced some exchange control measures with the view to stemming the pace of exchange rate depreciation. As a result, the domestic currency depreciated cumulatively by 26.7 percent by the first half of 2014, but due to the relatively improved external conditions in the second half of the year, the domestic currency depreciated cumulatively by 31.2 percent by the end of the year, suggesting a relatively slower pace of depreciation in the second half of the year. Similarly, there was a rebound in the pace of deterioration of the exchange rate in the first half of 2015, which saw the Cedi depreciating cumulatively by 26.1 percent, but with improved second half external conditions, the pace of depreciation moderated to end the year at 15.7 percent, a reduced pace



From Figure 1.3, though the growth of Ghana's export is generally on the upward trend, export performance has consistently fallen short of its import needs creating a persistent trade deficit. This condition is threatened by the fact that the country relies on few products for export. As far back as 1920, a concern was raised on this export concentration shortly after the slump in cocoa prices following the cocoa boom. This is aptly encapsulated in the following quote:

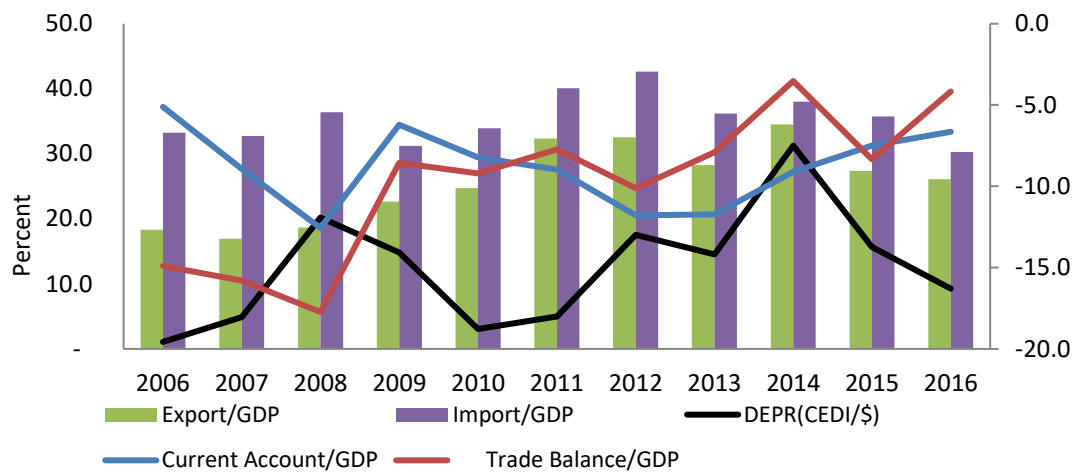
*“if the cocoa boom has done us harm, it will anyway have done one good thing if it has made everyone realise the danger of depending entirely on one main article of produce. In 1920, 83 per cent of our export consisted of cocoa. Again and again, we have talked of ‘all the eggs in one basket’”, (Guggisberg, 1930 p. 1).*

After engaging in international trade for some substantial number of years, Ghana has hardly succeeded in closing the trade gap despite the recent modest improvements<sup>2</sup>. This could be attributed to a plethora of factors; amongst them are the high concentration of export, the nature of export products and Ghana's status as a small country, and possibly exchange rate uncertainties and anti-export bias exchange rate policies<sup>3</sup>. For instance, for the period 2006-2016, the country posted an average trade deficit of 9.8 percent of GDP, consistent with an average current account deficit of 8.8 percent of GDP, as Figure 1.3 presents. These developments have often resulted in declining and irregular flows of receipts in the form of international reserves, causing periodic jolts to the exchange rate, manifesting either in the form of excessive depreciation of the domestic currency or indirectly causing an overshoot of key macroeconomic targets.

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<sup>2</sup> The improvement can be attributed to Ghana's maiden oil production from 2011.

<sup>3</sup> Total exports are divided into traditional export and non-traditional export. The traditional export comprises Cocoa Beans, Natural Resources (gold, bauxite, manganese, diamond and crude oil) and others (timber, electricity etc); and non-traditional export comprising Cocoa products, Aluminum and other export

**Figure 1.3: Evolution of Ghana's Trade and Current A/c Deficits (2006-2016)**

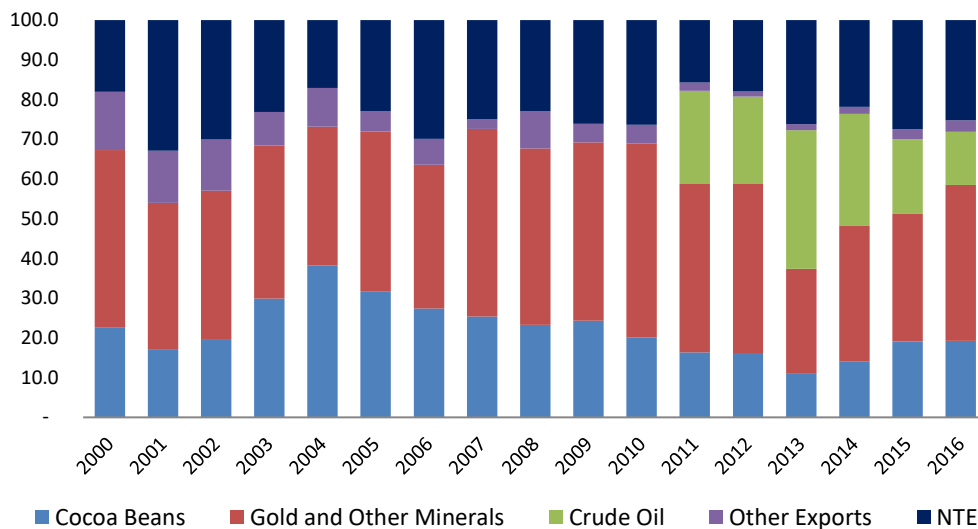
Source: Bank of Ghana and Author's calculations

For instance, in the year 2013, the exchange rate depreciated by 14.5 percent and the inflation rate target of 9.0 percent and budget deficit target of 9.0 percent of GDP were missed with outcomes of 13.5 percent and 10.1 percent of GDP, respectively. The real GDP growth target of 8.0 percent was also missed, registering a real growth of 7.1 percent. Similarly, in the following year 2014, a relatively higher exchange rate depreciation was registered, with the results that apart from the softening economic growth performance of 4.0 percent against a target of 7.1 percent, the inflation rate target of 13.5 percent and the budget deficit of 8.8 percent of GDP were missed, posting 17 percent and 10.3 percent of GDP respectively. It could also be suggested from the prolonged trade deficit trajectory (figure 1.3) that the incentive structure has continuously been in favour of import activity as opposed to export promotion.

As alluded to earlier, another critical issue worth considering is Ghana's continuous over-reliance on just three primary commodities as the major source of foreign exchange earnings, notwithstanding years of export diversification attempts, rekindled under the Economic Recovery Programme of 1983, (Jebuni, et al 1992). Together, cocoa, gold, and oil constituted an average of 73 percent of total export earnings for the period 2013 to 2016 as shown in Figure

1.4<sup>4</sup>. This situation exposes the country to external vulnerabilities in the face of terms of trade shocks, which are reinforced at times by the perennial shocks in cocoa production related to unfavourable weather conditions and ineffective husbandry practices affecting cocoa pods developments.

**Figure 1.4: Distribution of Ghana's Total Export, 2000-2016**



Source: Bank of Ghana and author's calculations

The country's natural resources (gold and oil) may offer the opportunity to raise the financial resources to boost the critically needed infrastructural expansion to embark on any transformation agenda when effectively and efficiently managed. However, these natural resources are susceptible to vulnerabilities and exhaustion. Sachs and Warner (2001) argue that resource-rich countries tend to suffer from the resource curse, sometimes in the form of Dutch disease, causing them to miss out on export-led growth due to the generally high price regime. These raise the urgent need for Ghana to accentuate the drive to diversify its export base to minimize the exposure to external vulnerabilities and enhance the benefits of engaging

<sup>4</sup> -Gold and Other minerals: The other minerals are Manganese, Bauxite and Diamond which constitutes about five percent of total minerals

-NTE: is made up of other non-traditional export, cocoa products and Aluminum alloy

-Other Export: Comprises electricity and timber and timber products

in international trade. Jebuni et al., (1992) argues that a case for export diversification in Ghana is largely grounded on two factors. The first issue is about the inherent weakness of the world markets for Ghana's traditional export as well as the tendency to over-supply putting downward pressure on real prices in those markets in the long run. The other issue concerns the adverse effect of export instability, due to commodity export concentration, on the growth of the economy. With the emerging significance of the non-traditional export sector (NTEs) as presented in Figure 1.4, opportunities and prospects abound in this sector such that redirecting the national focus towards promoting such exports will help to minimise the concentration on the few primary commodities.

The evidence adduced so far covering the period 2000 to 2016, point to unstable macroeconomic conditions, distorted incentives structure in favour of imports and significant trade concentration. In other words, the narratives on the macroeconomic conditions with a specific focus on exchange rate developments for the period 2000 to 2016, does not point to conditions of stability, and neither does the evidence on the composition of Ghana's export gives much hope regarding improvement in export diversification.

The general theory that underpins this research is that export growth thrives on stable macroeconomic conditions, appropriate incentive regime and conditions that enhance export diversification. Focusing on Ghana, it is therefore imperative to examine the main drivers of export volumes and some of the fundamental constraints that have undermined its export diversification effort. In assessing the determinants of export volumes, our concern relates to assessing the extent to which risk and uncertainties routed through exchange rate volatility due to shifts in both global and domestic conditions affect export performance. At the same time, consistent with the study of Darku (2012) that trade liberalization in Ghana has resulted in growth in imports outpacing that of export, it would be important to investigate whether the

incentive structure embedded in exchange rate movements due to domestic exchange rate policies has been shaping this trade pattern. In the specific case of distortion in the incentive structure, reference is made to Bhagwati (1988) who argues that “it is worth stressing that the concept of export promotion or outward orientation relates to trade incentives (direct trade policies or domestic or exchange rate policies that affect trade)”. He further emphasized that the success story of export growth of the developing countries that quenched the perception of export pessimists during the postwar era was propelled by domestic policies, rather than through mere mechanical linkages to the expansion of industrial countries’ income.

On the concerns about the composition of Ghana’s export basket, the focus is how to exploit the economic complexity construct to assess Ghana’s current collective know-how, in terms of its productive capabilities, as to how it has either been an enabler or a constraint to efforts at expanding the current variety of products that it exports. With Ghana’s quest to diversify its export base there is the need to identify the products and sectors where given its current productive capabilities it can easily gain some relative comparative advantage. At the same time, these products and sectors should offer opportunities for further improvement in the collective know-how of the country and enhance sustainable economic growth.

The relevance of the above enquires can be justified on varied grounds. The non-traditional export component plays a key role in this export diversification agenda. Hence the need to be guided by concerns of non-traditional exporters regarding how macroeconomic uncertainties can affect the returns on their investment (Elbadawi, 2001). Exporters normally wish to minimise the uncertainties and risks associated with their business which have a direct bearing on their income.

Indeed, Ghana has made efforts to boost the performance of non-traditional export under a National Export Strategy Programme tied to its long-term growth objective.<sup>5</sup> The strategic document was launched in 2012 and the implementation was to span 2013 to 2017. This was motivated by Ghana's improved performance over the years in both traditional and non-traditional exports as well as the desire to diversify its export base in the light of the dominance of the cocoa and natural resource sectors. Aside from the benefits Ghana stands to gain from diversification in terms of minimizing its vulnerability to external shocks, opportunities will be created for more decent jobs and inclusive growth as Ghana establishes itself in the middle-income group. The Ghana National Export strategy had as its target that the total value of non-traditional export would be US\$5 billion by the end of the implementation year of 2017. To achieve this target the following planned strategic outputs were supposed to be delivered: (i) Policies to reduce impediments, uncertainties, risks and costs in production and conducting of export business (ii) Measures to enhance export value chain infrastructure and support services delivery (iii) Improve on the capacity of Ghana Export Promotion Council (GEPC), Metropolitan and, Municipal and District Assemblies to promote export so that every district can develop at least one significant export product preferably from the priority product list (iv) and finally to strengthen and expand institutional capacity for export-oriented human capital and resource development to enable exporters to stay abreast with modern trends, best practices, and demands of the contemporary international market.

Evidence from Table 1.1 presented above suggests that as at the end of 2017 the target of US\$ 5 billion has not been achieved. From the level of US\$2.44 billion in 2013, total non-traditional export increased to US\$2.56 billion by the end of 2017, suggesting a slowdown in the pace of growth.

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<sup>5</sup> Ministry of Trade and Industry (2013): Ghana National Export Strategy for the Non-Traditional Sector

**Table 1.1: Non-Traditional Export Performance by Sector (US\$)**

YEAR	AGRICULTURAL	PROCESSED & SEMI-PROCESSED	HANDICRAFT	TOTAL (NTE)
1987	18,788,749	9,113,217	61,892	27,963,859
1988	27,059,691	15,228,972	57,803	42,346,466
1989	21,169,660	13,354,025	195,849	34,719,534
1990	28,781,084	33,106,618	454,667	62,342,369
1991	33,929,926	27,741,732	879,436	62,551,094
1992	22,059,421	44,887,571	1,471,059	68,418,051
1993	26,134,032	42,989,221	2,576,467	71,699,720
1994	39,193,224	77,790,486	2,327,262	119,310,972
1995	27,383,777	130,207,985	2,073,809	159,665,572
1996	50,274,097	223,039,029	2,922,524	276,235,650
1997	57,404,937	266,937,406	4,719,268	329,061,611
1998	77,803,323	317,519,433	6,387,576	401,710,333
1999	84,502,880	313,252,183	6,655,791	404,410,854
2000	74,539,389	321,142,636	4,977,655	400,659,679
2001	81,983,710	362,727,128	14,892,584	459,603,423
2002	85,730,637	407,210,266	11,310,850	504,251,753
2003	138,137,263	446,577,083	4,167,969	588,882,315
2004	159,850,767	540,375,136	5,202,935	705,428,838
2005	138,447,729	617,942,453	7,597,765	763,987,947
2006	177,499,537	710,887,791	4,490,389	892,877,717
2007	197,237,890	963,477,776	3,796,463	1,164,512,129
2008	187,621,229	1,149,999,125	3,324,941	1,340,945,295
2009	150,859,274	1,061,907,600	2,274,023	1,215,040,897
2010	164,934,111	1,461,483,989	2,780,380	1,629,198,480
2011	296,975,451	2,122,789,963	3,575,253	2,423,340,667
2012	276,386,041	2,083,905,792	4,098,666	2,364,390,499
2013	323,709,596	2,110,030,455	2,462,262	2,436,202,313
2014	340,687,719	2,169,656,190	3,475,514	2,513,819,423
2015	396,915,338	2,120,504,351	4,266,836	2,521,686,525
2016	371,135,747	2,086,488,768	5,220,895	2,462,845,410
2017	440,955,283	2,105,427,962	10,411,290	2,556,794,535

Source: Ghana Export Promotion Authority/Data Processing Department

Since the national export strategy promised to deliver on policies that will minimise risk and uncertainties, yet from 2012 to 2016, the evidence as adduced in figure 1.1 above suggests a lot of volatility in the exchange rates, it becomes imperative apart from eliciting responses from non-traditional exporters to find out the likely reasons for the missed performance, to also establish the role of risk and uncertainties as related to exchange rate volatility on their performance.

It is equally true that since this policy target was not achieved, the intended policy objectives in terms of jobs and inclusive growth would be compromised. Hence a critical assessment of the performance of non-traditional export, both in terms of what the extant literature adduces

as the key drivers of export as well as the expected roles of relevant government institutions, and the major constraints encountered will help in fine-tuning future policies.

The relevance of this thesis is further grounded on its expected contribution to the academic literature on the importance of export growth from the dimensions of volume and composition effects and for policy discussions. Though many studies have explored the relationship between exchange rate volatility and international trade flows, few have focused on non-traditional export. This is consistent with the argument of Helleiner (2001) that the definition of non-traditional export is quite ambiguous, conceptually reflecting specific country interest, concerning what it aspires to achieve with diversification. Although other studies have investigated the potential association between exchange rate volatility and NTEs, they failed to examine the relative responses of the other components of total export to exchange rate volatility in tandem (Elbadawi, 2001; Musonda, 2008; Obeng, 2017). Therefore, the policy implication of the relative responsiveness of the components of total export (such as cocoa beans, minerals or natural resources and non-traditional export) to exchange rate uncertainty could not be appropriately assessed. Hence, this study intends to use export data at a relatively disaggregated level to derive heterogeneous elasticities, signaling the responses of the various components of total exports to exchange rate volatility. This intends to enhance policy focus and addresses the issue of the ‘fallacy of composition’ (what is true for total export may not necessarily be true for the components).

Besides, in the early stages of trade liberalisation and reforms in Ghana, specifically in the latter part of the 1980s, the concern for research was about export supply response to the incentives from trade policies, (Jebuni et al. 1992). After liberalising both trade and the capital accounts, issues of exchange rates volatility and the associated risks and uncertainties feature prominently in the academic discourse. This is one of the points of difference between the

current thesis and that of Jebuni et al. (1992) where apart from extending the study period of the later, explicit account is taken of the link between exchange volatility and NTEs. In addition, a survey on a sample of NTEs firms was conducted not only to update current knowledge on their key constrains but also firm-level response to macroeconomic uncertainty.

In recent times, two studies focusing on Ghana by Iyke and Ho (2017) and Obeng (2017) have contributed to the literature on the response of export activities to exchange rate volatility. While Iyke and Ho (2017) examined the relationship between exchange rate development and trade balance, without considering the issue of exchange rate volatility, Obeng (2017) focused on non-traditional export performance and exchange rate uncertainty by applying the ARDL approach. However, the data used in both studies were annual and thus failed to take cognisance of the generally held view that most trade contracts are executed within 90 days, thus exchange rate risk as related to relatively higher frequency data may be of more concern to exporters. In this regard, this thesis seeks to improve on both studies on grounds of data frequency and the level of disaggregation of export. Quarterly data is used, which is consistent with the argument that high frequency data are more likely to capture exchange rate volatility concerns for exporters, (Wang and Barrett, 2007). Furthermore, the thesis makes use of a measure of exchange rate policy, the anti-export bias concept, pioneered by Bhagwati (1988) to assess how export performance responds to policy incentives. It is worth noting that after the study by Jebuni et al., (1992) that calculated anti export bias ratios to assess the extent to which export was supported or otherwise, not much studies have been done in this area. Hence, the current study also seeks to test the hypothesis that anti export bias policies hurt export performance. The use of the anti-export bias measure is another key contribution of this thesis on the grounds that such a measure of exchange rate policy seeking to demonstrate the relative effects of

exchange rate policy on export performance through distortions in the incentive structure has rarely been used.

Another value addition of this thesis is to contribute to the literature on economic complexity and product space by adopting the underpinning concepts to identity, based on the 2016 export basket, the products that Ghana has revealed comparative advantage (RCA), the level of sophistication of these products and their position in the global technology frontier as well as the prospect for increasing Ghana's average level of complexity with prospects for a more diversified economy.

This thesis also seeks to contribute to informed policy formulation and implementation. This could be viewed in the sense that if exchange rate volatility hurts both the traditional export and NTEs consistent with the dominant doctrine, then policymakers would be guided as to the imperative for ensuring stability in the exchange rate movements. This would effectively complement other efforts at encouraging export diversification to minimise external imbalances and enhance economic growth both in the short-run and long-run. In this regard, the claim by Auboin and Ruta (2013) that "revisiting the question of the trade impact of exchange rates is, therefore, a useful exercise to help policy-makers distinguish perceptions or prejudices from more systematic effects embedded in the theory and the empirical evidence" becomes relevant. Through the export models and the micro-level survey, this thesis highlights some of the key drivers of export growth and the major constraints to Ghana's diversification agenda. Specifically, this will assist policymakers to avoid the pursuit of policies which are contradictory and mutually opposing.

Besides, the inflation-targeting monetary policy framework of Bank of Ghana, cast within the preview of the trinity impossibility theorem, predisposes the domestic currency to a lot of fluctuations in the presence of both internal and external imbalances. In such an environment, any strategy by the government to promote export trade requires a comprehensive understanding of how highly a volatile exchange rate impacts Ghana's NTEs performance and the resultant effects on the economy at large.

## 1.2 Research Questions

The research questions that emerge from the above discussions are the following:

- What are the key drivers of Ghana’s export performance at the macro level? What is the specific role of exchange rate volatility (as a measure of macroeconomic uncertainty) and exchange rate policies (as a measure of incentive structure)? Is the relationship between exchange rate volatility and export performance linear or non-linear?
- Does it matter what Ghana exports? Has Ghana’s engagement in global trade at the level of export allowed it to boost its capabilities to improve its level of economic complexity? Can Ghana leverage on its current level of economic complexity to expand its average level of complexity to aid its structural transformation agenda in achieving a more diversified export base?
- What are the key predictors of Ghana’s export performance at the firms’ level (focusing on NTEs)? Does macroeconomic uncertainty with a specific focus on exchange rate volatility have any role to play? What are the major constraints to NTE's performance? Are there institutional challenges accounting for the suboptimal performance of NTEs as envisaged under the Ghana National Export Strategy Plan (2013-2017)?

## 1.3 Research Objectives

Based on the questions raised above, the main objective of this thesis is to investigate the effect of exchange rate volatility and exchange rate policies on the performance of the components of total export in Ghana with special emphasis on NTEs performance, over the period 2000 to

2016<sup>6</sup>. The thesis also examines the constraints to Ghana's export diversification drive by focusing on the nature of the products that Ghana exports. The specific objectives of this thesis, for which each one is going to constitute a basis for an empirical enquiry, are as stated below:

- (1) to investigate into the role of exchange rate volatility and exchange policies in the performance of export activities in Ghana with a focus on non-traditional export. Under this objective, the thesis further investigates whether there is non-linearity in the relationship between exchange rates volatility and NTEs performance.
- (2) to investigate into the fundamental constraints of Ghana's export diversification drive by using the concepts of Economic Complexity and Product Space.
- (3) to investigate into the key predictors of firm-level export performance and the role of macroeconomic uncertainty as related to exchange rate volatility. This thesis also seeks to examine the institutional constraints of some of the various governmental agencies charged with ensuring the diversification of Ghana's export base.

#### **1.4 Thesis Structure**

This thesis is structured into seven chapters. Following this introductory chapter is chapter 2 that presents an overview of the evolution of exchange rate policies in Ghana and provides the historical context for exchange rate volatility and export performance in Ghana. To this end, two historical perspectives are considered. The first period, pre-2000 era, presents a historical analysis of both the pre and post exchange rate reforms, from the year 1958 to 2000 that witnessed the transition from the fixed exchange rate regime to the flexible exchange rate

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<sup>6</sup> This period 2000q1-2016q4 is selected based on the availability of reliable data and to enable a quarterly frequency data to be used.

regime and their consequences for export performance. Specifically, the exchange rate reforms undertaken when Ghana had to resort to the IMF and World Bank-sponsored programmes (ERP and SAP) to address the problem of overvaluation of the domestic currency till the end of 2000 where macroeconomic conditions necessitated another key IMF and World Bank intervention under the HIPC initiative and the implications for export performance are examined. The second period, the post-2000 era presents the policies pursued commencing with the HIPC initiative and subsequent regulatory reforms within the context of a floating exchange rate regime and the associated export performance. Part of the chapter is devoted to highlight some of the operations of institutions charged with the responsibility of promoting export in Ghana. Chapter 3 presents the comprehensive literature on the three empirical chapters (4, 5 and 6) generated from the objectives of this thesis. Firstly, it presents both the theoretical and empirical literature on the discourse of export response to exchange rate volatility and exchange rate policies. Secondly, it presents both the theoretical and empirical literature on the concepts of economic complexity and product space and their implications for the diversification of an economy. Finally, the chapter presents some theoretical and empirical literature surveys on the determinants of export performance at the firm-level. Chapter 4 presents the empirical analysis on the first objective of this thesis. Chapter 5 presents an empirical examination of the second objective of this thesis. Chapter 6 presents an empirical assessment of the third objective of this thesis. Chapter 7 presents the overall conclusions and policy recommendations of this thesis, the contribution of the thesis, its limitations as well as areas for future research are highlighted.

## CHAPTER TWO

### AN OVERVIEW OF EXCHANGE RATE AND TRADE POLICIES AND DEVELOPMENTS IN GHANA AND EXPORT PERFORMANCE<sup>7</sup>

#### 2.0 Introduction

This chapter presents the evolution of exchange rate policies and their impact on exchange rate developments and relates the same to export performance in Ghana. These discussions are cast in two historical perspectives. In the first period, the pre-2000 era, we present a brief historical account of the fixed exchange regime that Ghana pursued, which witnessed some episodes of devaluations and the continuous overvaluation of the domestic currency due to governments' inability to address fundamental macroeconomic issues<sup>8</sup>. We also analyse the effects of the reforms (Economic Recovery Programme (ERP) and Structural Adjustment Programme (SAP)) which ushered in a flexible exchange rate regime. To compare exchange rate developments in this period and export performance, we decouple trends in exchange rate developments into the period 1980 to 1991, covering the exchange reforms era, and the period 1992 to 2000, covering the initial period of Ghana's constitutional rule. For the second period, 2000 and beyond, we examine how reforms in the legal and regulatory regimes relating to foreign exchange transactions affected exchange rate developments and export performance. We also devote part of this chapter to highlight the operations of some of the institutional structures responsible for the promotion of export in Ghana.

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<sup>7</sup> Export Performance is measure by Total Export/GDP ratios

<sup>8</sup> The pre 2000 era presents developments covering both the pre and post reforms eras up to the end of 2000 where deteriorating macroeconomic conditions necessitated Ghana taking advantage of the HIPC initiative under the auspice of IMF and World Bank Multi-donor debt relief initiative.

## 2.1 Pre 2000 Era

Ghana's exchange rate policy in the immediate aftermath of independence could be traced to July 14, 1958, where Ghana issued its first currency with the parity rate consistent with the West African Pound. This was within the context of a fixed exchange rate regime, enforced as a component of the Sterling Area arrangements. Under this arrangement, variations in the country's foreign assets reflected in variations in the country's money stock, which exposed domestic inflation to developments in the sterling area, (Bawumia, 2010).

The ambitious development agenda of Nkrumah's regime, which was challenged by both domestic and external resources availability, caused the government to embark on some distortionary policies, such as the imposition of sectoral credit ceilings, and interest rates and exchange rate controls which eventually resulted in the overvaluation of the domestic currency. Available evidence suggests that Ghana's net reserve position dwindled from a position of US\$269 million to negative US\$39 million between 1957 and 1966, (Bawumia, 2010). The domestic currency was overvalued in the absence of the government's commitment to devalue the exchange rate. Thus, in the view of Leith and Söderling (2000) the overvaluation of the domestic currency resulted in a distortion of the incentive structure that impacted adversely on export performance to the extent that export as shares of GDP dropped from 30 percent in 1957 to 18 percent in 1965.

It was therefore not surprising after the overthrow of the Nkrumah regime that the National Liberation Council (NLC), the successor regime, opted for an International Monetary Fund (IMF) programme, which had a devaluation of the overvalued currency as one of its key components. Indeed, the Busia government, which took over from the NLC had to devalue the domestic currency by some 42 percent in December 1971, in response to the slump in cocoa prices. The domestic currency did not recover from the forces of overvaluation due to the macro-economic malaise that characterised the period of Ghana's military adventurism

spanning 1972 to 1983. To recap the macroeconomic developments in Ghana for the period 1965 to the early 1980s, Bawumia (2010) stated that

*“the period between 1965 and the early 1980s had economic and political instability as its hallmark. Frequent military coup d’état, and significant price distortions emanating from price controls, interest rate controls, negative real interest rates, direct credit, high reserve requirements, fixed nominal exchange rate, high fiscal deficits, and a resort to monetary financing of the deficit which led to high monetary growth rates”.*

These events culminated into the acceptance of an IMF and World Bank rescue package in 1983, within the context of the Washington Consensus, which had as one of its key components the need to keep a unified exchange rate system at a competitive parity rate that is capable of stimulating the growth of non-traditional export<sup>9</sup>. This was reinforced with reforms aimed at liberalising trade by way of removing all quantitative restrictions and relying more on price instruments such as tariffs. To lend support to the exchange rate reforms, the Provisional National Defense Council (PNDC) Budget in 1983 signaled a significant devaluation of the domestic currency. Specifically, the gap between the official exchange rate and the parallel market rate was some 2100 percent before the commencement of the Structural Adjustment Programme in 1982. To address the huge overvaluation of the official exchange rate, there was a phased adjustment in the parity rate from ₵2.75/ U.S\$ in 1983 to ₵90.0 /US\$ by January 1986, (Kapur, 1991).

Subsequently, a two-window exchange rate system was established in September 1986. The purpose of the first window was to serve official transactions regarding debt service payments, importation of drugs and petroleum products, with the parity rate fixed at 90.0/US\$. On the other hand, the second window was to cater for all other transactions within the context of trade

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<sup>9</sup> The Economic Recovery Programme (ERP) of IMF and the Structural Adjustment Programme (SAP) of the World Bank

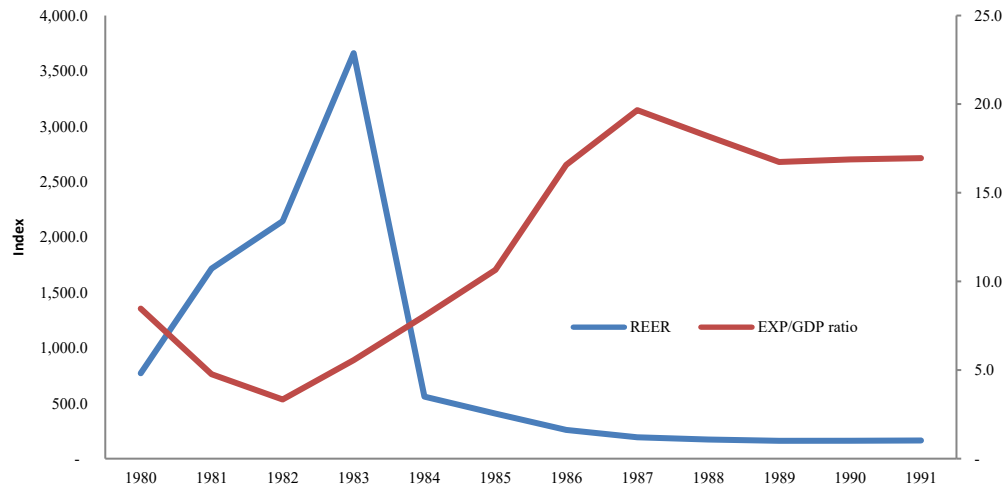
liberalisation where all special import licenses were abolished. The two exchange rate windows were subsequently collapsed and constituted into a unified system in February 1987 at an official parity rate of 150/US\$. This commenced with an initial retail auction system with a limited role for market participants and later moved into a wholesale auction system to start market-making opportunities. To remove the wedge between the parallel market and official parity rates the foreign exchange bureaus were established in February 1988. Available evidence suggests that, after the unification, the volumes of transactions in the Bureaus jerked up to about US\$21 million in a month, representing some 65 percent of the volume of transactions in the auction system. And to gradually deepen the interbank foreign exchange market, the surrender of foreign exchange proceeds from the export of goods and services except cocoa and gold was moved to the commercial and development banks by the end of June 1991, (IMF, 2002).

Hence, the period 1984 to 1991 witnessed some semblance of stability in the foreign exchange rate market. The domestic currency experienced a relatively managed paced of nominal exchange rate depreciation, from 40 percent in 1984 to 11.7 percent in 1991. This outcome could be attributed to the reforms in the exchange rate system coupled with the myriad of other structural reforms, efforts to improve the infrastructural base of the economy to facilitate export growth as well as a restored monetary constraint and fiscal discipline,

Ghana's macroeconomic conditions went into a relapse when the country transitioned into the constitutional regime from 1992. Fiscal profligacy, lack of monetary control and mounting external debt placed macroeconomic management on a precarious course. These were due to both adverse external conditions relating to slump in cocoa prices in 1991 and domestic conditions relating to election expenditure in the face of weak revenue mobilisation effort. A similar scenario played out in the 1996 elections, though for this time largely due to domestic

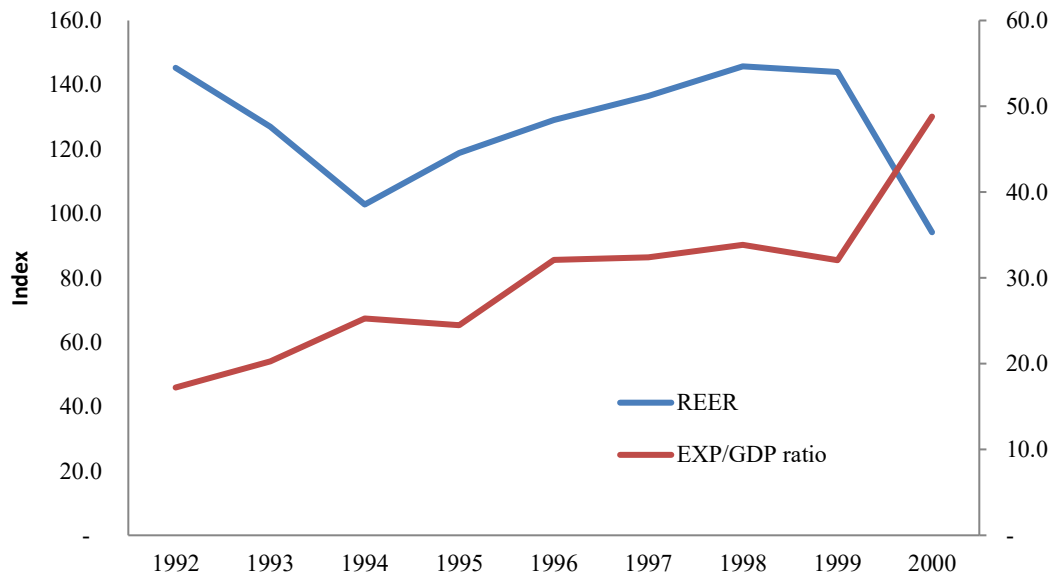
adverse conditions, resulting in a fiscal deficit as a percent of GDP for both election years of 9.5 percent separately. These suggest that election years are generally prone to fiscal excesses. The failure of policymakers to take advantage of the improvement in terms of trade for the period 1994 to 1998, to build enough foreign exchange reserves, predisposed the economy to severe external vulnerabilities. As a result, the combined effects of the terms of trade shock in 1999/2000 largely due to the plummet of the prices for Ghana's two major export, cocoa, and gold, rising crude oil prices, and excessive fiscal expansion in the run-up to the 2000 presidential and parliamentary elections cumulatively gave rise to a steep loss in the value of the domestic currency by the end of December 2000. The Cedi lost about 50 percent of its value vis-à-vis the US dollar (Bawumia, 2010; IMF, 2009)<sup>10</sup>.

**Figure 2.1: Export Performance and Evolution of Real Effective Exchange Rates, 1960-1991**



Source: World Development Indicators. 2019 and Author

<sup>10</sup>The 2002 IMF report on Ghana suggests that, in 1999, the world prices of cocoa and gold fell by 30 percent and 5 percent and the price of petroleum almost doubled. There was also a contraction of the net foreign assets of Bank of Ghana by some US\$98 million instead of a programmed buildup of US\$50 million.

**Figure 2.2: Export Performance and Evolution of Real Effective Exchange Rates, 1992-2000**

Source: World Development Indicators, 2019 and Author

Figures 2.1 and 2.2 present a comparison of developments in the real effective exchange rates for the period 1980 to 1991, covering the ERP and SAP reforms, and the period 1992 to 2000 covering the initial years of the return to constitutional era with the evolution of export performance measured by the total export to GDP ratios for these respective periods.

The increase in real effective exchange rate index (REER) suggests an appreciation in the domestic currency. From the evidence in both periods, the graphs are generally mirroring each other (except for the period between 1994-1998), suggesting that periods of real appreciation undermined export performance, whilst improved export outcomes mirror periods of real effective depreciation. Additionally, in the period 1994 to 1998 where the real effective exchange rate was largely stable (less perceived volatility), the export performance was equally stable. The steep real depreciation of the domestic currency for 1999 to 2000 effectively boosted export performance as portrayed in figure 2.2. However, this performance could not be sustained since the real effective depreciation was not based on a reduction in domestic

prices but rather nominal exchange rate depreciation due to monetary accommodation in the face of fiscal imprudence in an election year.

## **2.2 Post 2000 Era**

After the major reforms in the exchange rate system under the SAP, the focus of exchange policy from 2000 and beyond was to reform the legal and regulatory regime to address emerging vulnerabilities and facilitate smooth external transactions. The context for such reforms was provided with the change in political power in the 2000 elections. Therefore, faced with the huge external debt burden, the then government opted for the HIPC relief initiative under the IMF and World Bank. This was meant to bring some respite to countries under debt distress. Thus, the thrust of the policy then, as enshrined in the Ghana Poverty Reduction Strategy (GPRS 1), was that of maintaining macroeconomic stability to propel economic growth.

As part of the process of deepening the financial system, the Financial Sector Adjustment Programme (FINSAP) reforms which commenced in the 1980s and 1990s have as components comprehensive reviews of the legal regime governing foreign exchange transactions. In the process, there were the promulgation of numerous acts, amongst them, was the Foreign Exchange Act 2006, which apart from bringing some clarity in the complex exchange rate system also ensured that the policy direction of the government was consistent with existing statutes. The Act was passed to replace the Exchange Control Act of 1961. One of the motivations for the Act was to ensure that in the light of the significant flow of capital across borders, Ghana's exchange rate system must be consistent with the global financial system and at the same act as a precursor to Ghana joining the common currency arrangement under the West Africa Monetary Zone (WAMZ). Consistent with Ghana's quest to become an

international financial hub in the West Africa sub-region, a reform of the legal regime governing the exchange rate was equally necessitated.

The foreign exchange Act 2006 marked the commencement of the liberalisation of the capital account of the country and under the Act, all foreign exchange transactions are permitted unless otherwise prohibited by the Bank of Ghana (This was previously the responsibility of the Minister of Finance). Besides, the Act ensures that both exporters and their foreign counterparties use their respective corresponding banks as the only medium of transacting their activities to ensure transparency and easy monitoring by the Bank of Ghana. Failure to do so amounts to a breach. And except for cocoa and gold where there are surrender requirements, other exporters have the right to use their export proceeds consistent with their operations. As far as the Act is concerned there is no inhibition in terms of foreign exchange flows into the country for investment purposes and residents contracting foreign loans, with the only caveat that non-residents are only allowed to hold domestic instruments of the tenor of three years or more provided these instruments are held for at least two years.

Thus, the combined effects of the benefits from the HIPC initiative which had as its cornerstone fiscal and monetary restraint and a multiplicity of reforms in the legal regime within the financial sector greatly moderated the pace of exchange rate volatility for the period 2001 to 2008. However, the resurgence of macroeconomic imbalances which could be traced to the following developments: global financial crisis in 2007 and 2008, energy crisis, expenditures related to the celebration of Ghana's fiftieth anniversary, 2008 presidential and parliamentary elections and Ghana's discovery of oil in commercial quantities and the associated capital investments, as well as decline in foreign exchange inflows, resulted in about 50 percent depreciation of the domestic currency against the dollar during 2008 and half of 2009. But in 2009, the IMF suggested the need to develop the role of the private sector in the foreign

exchange market in anticipation of increased turnover with the start of oil production, (IMF, 2012).

After some semblance of tranquility has been achieved in the exchange rate market from the second half of 2009 to 2011, the domestic currency suffered other bouts of nominal depreciations in the first five months of 2012. Evidence from the Bank of Ghana suggests that the domestic currency depreciated cumulatively by 3.1 percent, 4.9 percent, and 17.5 percent, by the end of 2010, 2011 and 2012, respectively. It costs the central bank some US\$1.1 billion in terms of reserves drawdown, in its attempt to stem the tide. The cause of the depreciation was traced to inflation differentials and high current account deficits. Some measures invoked by the Bank of Ghana to address the troubling currency were the reintroduction of Bank of Ghana bills at different tenor to facilitate effective management of excess liquidity, a reduction in the banks maximum net open position and the requirement that mandatory reserves on foreign currency be held in the Cedi rather than foreign currency, which was meant to increase the availability of foreign exchange to the market (BoG, 2014).

Frustrated by its inability to contain the continuous volatility in the exchange rate market, the Bank of Ghana on 5th of February, 2014 revised the rules on the operation of foreign exchange accounts (FEA) and foreign currency account (FCA) meant to control the quantity of foreign currency usage in the economy, though the monetary authorities mentioned that these rules were intended to streamline the operations of these accounts and bring about clarity and transparency in their operations. The specific revised rules were the following:

- No cheques or cheque books shall be issued on the FEA and FCA.
- Cash withdrawals over the counter from FEA and FCA shall only be permitted for travel purposes outside Ghana and shall not exceed US\$10,000.00 or its equivalent in convertible foreign currency, per person, per travel.

- Authorised dealers shall not sell foreign exchange for the credit of FEA or FCA of their customers.
- Transfers from one foreign currency denominated account to another are not permitted.
- All transfers outside Ghana from FEA and FCA shall be supported by relevant documentation.
- Foreign exchange purchased for the settlement of import bills shall be credited to a margin account which shall be operated and managed by the bank on behalf of the importer for a period not exceeding 30 days.
- No bank shall grant a foreign currency-denominated loan or foreign currency linked facility to a customer who is not a foreign exchange earner.
- All undrawn foreign currency-denominated facilities shall be converted into local currency with the coming into effect of this Notice. However, existing fully drawn foreign currency-denominated facilities and loans to non-foreign exchange-earners shall run until expiry. (BoG, 2014b).

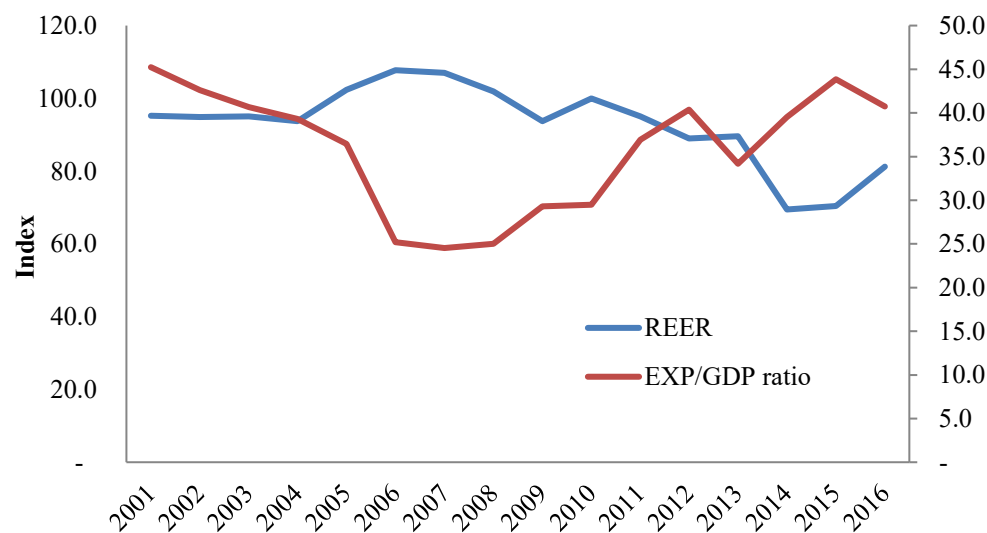
The extent of distortions generated by the announcement of these measures, the accelerated pace of the depreciation of the domestic currency and the lack of capacity by the Bank of Ghana to effectively police the implementation of these measures resulted in their subsequent withdrawal, (IMF, 2015). Therefore, in early March 2015, the Bank of Ghana defined a fixed set of rules to compute a daily reference foreign exchange rate for the domestic currency against the major trading currencies based on market transactions for immediate implementation. It was expected that these rules would fully unify the Bank of Ghana and the interbank foreign exchange rates (IMF, 2016).

Still in the spirit of deepening the participation of the private sector in the foreign exchange market, the Bank of Ghana, in 2016, successfully commenced the implementation of the first stage of eliminating the surrender requirements for gold and cocoa export proceeds as well as

strengthening of rules on repatriation of export proceeds (IMF, 2017). Though some concerns have been raised regarding the initial implementation of these policy measures, the Bank of Ghana was encouraged to forge ahead, because it would be building on the success achieved in 2016 by eliminating the surrender requirements for gold and cocoa export proceeds. This was expected to establish a coherent and transparent foreign exchange policy consistent with an effective inflation targeting framework (IMF, 2017).

The narrative above underpinned the real effective exchange rate trajectory and the corresponding export performance measure presented in Figure 2.3 for the period 2001 to 2016. In general, periods with real effective appreciation have witnessed a weak performance in export (like 2004 to 2006), whilst periods with relative real effective depreciation have seen some recovery in export performance (i.e. 2008 to 2011).

**Figure 2.3: Export Performance and Evolution of Real Effective Exchange Rates (2001-2016)**



Source: World Development Indicators, 2019 and Author

A similar pattern played out for the periods 2012 to 2016. This evidence could lend some credence to the importance of exchange rate developments in assessing export performance in Ghana.

In the next section, we examined some of the institutional structures implemented by the government in collaboration with both local and foreign actors to address some of the risk factors and existing financing constraints confronting NTE firms with the view to boosting their activities.

## **2.3 Institutional Structures responsible for Promoting Export**

### **2.3.1 Ministry of Trade and Industry (MoTI)**

In general, the government of Ghana acknowledges the narrowness of its domestic market and the need to increase domestic efforts by leveraging the opportunities offered by international trade. To this end, trade policy measures are designed to support the broad developmental objectives of export-led industrialization and strategy, and a domestic market-led industrialization strategy based on import competition, (Ministry of Trade and Industry, 2018). MoTI is the key government agency responsible for implementing these trade policies. It also offers strategic direction for industrial development, private sector growth, and trade facilitation. In this regard, MoTI is charged with the responsibility of formulating and implementing policy initiatives that promote growth and development in both domestic and international trade as well as industry. Indeed, MoTI is the lead government agency that negotiates Ghana's international trade relations with all friendly nations in line with the World Trade Organisation (WTO) rules on the most favoured nation basis. Consistent with its strategic objective to develop an export-led economy, MoTI promotes non-traditional export to ensure the diversification of markets and commodity export<sup>11</sup>. There are some other state

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<sup>11</sup> (source: <http://moti.gov.gh/about.php>)

agencies under MoTI which assist in implementing its policies. We, therefore, highlight the activity of some of these agencies.

### **2.3.2 Ghana Export Promotion Authority (GEPA)**

The Ghana Export Promotion Authority was established by Act 396 in 1969 with the mandate of developing and promoting Ghana's export. The primary focus of GEPA is to ensure the diversification of the export base of the economy from traditional products such as gold, cocoa beans, and timber. GEPA is currently focusing on over 383 non-traditional products that are categorized into agricultural, processed/semi-processed and handicrafts, though the export of services has recently been included<sup>12</sup>.

With the Economic Recovery Program (ERP) launched in 1983 and subsequently the Structural Adjustment Programs (SAP), efforts have been made to sustain the immediate gains<sup>13</sup>. These policies reflected the combined effects of prudent fiscal policies and monetary restraint coupled with measures to abolish price and interest rate controls as well as the deregulation of the financial market and liberalization of trade by floating the domestic currency, among others. The effective implementation of these policies resulted in an improvement in the incentive structure and a significant increase in both traditional and non-traditional export. For instance, Buatsi (2002) suggests that the government of Ghana through MoTI embarked on a 3-year export development plan for the period 1988-1990. This resulted in a sterling performance in non-traditional export (NTE) such that the sector witnessed an increase in the value of export from US\$1.91 million in 1984 to US\$62.34 million in 1990. This performance led to a rejuvenation of the Ghana Export Promotion Council<sup>14</sup>.

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<sup>12</sup> (source: <http://moti.gov.gh/agencies.php>)

<sup>13</sup> the key policy measures were consistent with the Washington Consensus aimed at correcting distortions in the macroeconomic indicators and the incentives structure

<sup>14</sup> Now Ghana Export Promotion Authority

Apart from minimising the external vulnerabilities of the economy, the renewed strategic focus of the GEPA was to ensure that through diversification of the export base, the benefits of economic reforms were translated into opportunities for the increasing mass of labour force in terms of job and wealth creation, (Addo & Marshall, 2000). By identifying the NTE sector as one of the key strategic sectors to achieve the objectives of the Ghana Vision 2020, the role of GEPA was given a further boost, (GNPC, 2000). More especially with the significant performance of the NTE sector, after moving from a value of US\$ 119.3million in 1994 to US\$ 404.4 million in 1999, (Buatsi, 2002). Although the performance of NTEs has continued to experience improvement in values, moving from US\$459.6 million in 2001 to US\$2.42 billion in 2011, a slower pace of growth was witnessed subsequently that led to registering US\$2.51 billion, US\$2.52 billion, US\$2.46 billion and US\$2.56 billion for 2014, 2015, 2016 and 2017 respectively. The slack in the pace of growth resulted in the failure of the sector to achieve the target of US\$5 billion set for the end of 2017.

The GEPA discharges its mandate by offering the following ranges of services to exporters: export training, international market research, trade fairs and market missions, personal advisory services, and driving national export awareness.

Motivated by the key objective to provide the needed tools to make exporters more competitive on the international markets, the authority has trained over 10,000 businessmen in export and international trade over the years. These were executed through the Export School curricular where participants covered the following courses: trade-related courses in export management, product, and market development; specialised workshops; and tailored seminars for export companies, trade facilitators and businesses.

In the area of international market research, the authority guides exporters to the right markets and supports them in making informed decisions. Acknowledging the need for exporters to be armed with up-to-date market information to make decisions on export, the authority through

its Research Division constantly undertakes research and publishes up to date and value-added market reports and video animations on its website.

In recent times, GEPA has facilitated the participation of exporters to over 50 international trade shows and exhibitions in more than 20 different markets across the globe. This has enabled the authority to secure continuous and sustainable business contacts between Ghanaian exporters and foreign buyers. GEPA facilitates the following service: tailored matchmaking, assistance in negotiations, tastings and sampling, country branding & promotion, coaching ineffective trade fair participation and follow-up and evaluation. Besides, the GEPA delivers over 50 personal advice daily on export-related matters. These include market information, market requirements, product quality, standards issues and certification, and referral services. The authority leverages on the provision of the above services to create awareness among the business community to get involved in international trade<sup>15</sup>.

In addition, the government of Ghana also offers some incentives to promote and encourage the development of export growth. Export incentives available to exporters in Ghana include the following:

- An Export Proceeds Retention Scheme in operation allows exporters to exchange all (i.e. 100%) foreign exchange proceeds from non- traditional export into Cedis at competitive rates negotiated with the exporter's bankers or keep them in their foreign exchange accounts.
- A Corporate Tax Rebate, which allows any manufacturer or any person, engaged in agricultural production, exporting part or all his production, to claim tax rebate between 40% and 75% of his tax liability.

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<sup>15</sup> (source: <https://www.gepaghana.org/about-us/our-services/>).

- A Custom Duty Drawback that allows exporters to draw back up to 100% of duties paid on material imported to produce goods for export.
- A Bonded Warehousing that allows manufacturers to seek Customs license to hold imported raw materials intended for manufacturing for export in secured places without payment of duty.
- Up-front Duty Exemption, which operates alongside the duty drawback system enables exporters to enjoy 100% duty exemption on imports intended to go into production for export (Source: GEPA).

### **2.3.3 Ghana Export-Import Bank (GEXIM)**

The issue of enough and timeously availability of funding to support export activity is very crucial and has been a key constraint to export performance for a long time. The performance of the NTEs sector notwithstanding, the ability to further prop up this sector to meet the broader national objective of expanded international trade activity to provide sustainable and decent jobs largely hinges on the availability of funding (Buatsi, 2002), Governments, both past and present have initiated one scheme or another seeking to address this recurring challenge but to no avail. Apart from other funding arrangements by governments and donors, three main financing schemes have been implemented. Firstly, the Export Finance Company (EFC) which was established in 1989 as a Non-Traditional Export Special Purpose Vehicle (SPV) to provide financial and other related support to NTEs exporters. Secondly, Exim guaranty Company Limited, which was established in 1994 to provide credit guarantees and general financial risk management solutions to SMEs. Lastly, Export Trade, Agricultural and Industrial Development Fund (EDAIF) which was established in 2002 under Act 582. Export Development and Investment Fund (EDIF) was set up to provide financial resources to export-oriented activities especially non-traditional products. The Act was amended in 2011 to Act

823 as EDAIF, to extend financial resources to support the development and promotion of agriculture-related activity such as agro-processing industries to add value to products from the agricultural sector. In 2013, Act 823 was further replaced with Act 872 by extending the mandate of EDAIF to include the provision of resources for industrial development.

Notwithstanding the establishment of the following structures to address the funding constraints encountered by small and medium enterprises (SMEs) in general and exporters in particular, some research works have raised concerns about the persistence of this problem and to some extent the inadequacies hindering these agencies from meeting their intended purpose, (Abor and Quartey, 2010; Buatsi, 2002).

To refocus the activity of these institutions, the Ghana EXIM Bank was established by consolidating these three state-owned institutions – Export Trade Agricultural and Industrial Development Fund (EDAIF), Export Finance Company Limited and Eximguaranty Company Limited). The Bank was set up by Act 911 in 2016 mainly to address the funding constraints associated with the country's international trade and support capacity development and competitiveness in the international marketplace. The Bank is tasked with its 5-year strategic goals (2017-2022) to ensure that the government achieves the target of US\$5 billion export value for NTEs. Besides, the Bank is charged to develop crops such as avocado and cashew into major export products, oil palm and cassava; apparel manufacturing; reduce the nation's import bill for poultry by US\$ 300 million; to become a key finance partner for effective implementation of government's initiatives such as One District One Factory (1D1F), and to support exporters in Pharmaceutical manufacturing<sup>16</sup>. The Bank also offers the following products and services: Pre-shipment credit, post-shipment credit, contingent liabilities, export

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<sup>16</sup> (source: <https://www.eximbankghana.com/5-year-strategic-goals>)

development finance, cross-border investment, project export, and research & advisory services<sup>17</sup>.

#### **2.3.4 Ghana Standards Authority (GSA)**

One of the key activities involved in exporting is to ensure that the products meet internationally accepted standards in terms of health, measurement, and other specifications. To this end, the Ghana Standards Authority was established by the Standards Decree, 1967 (NLCD 199) and subsequently replaced by the Standard Decree, 1973 (NRCD 173). In addition, GSA oversees the Weights and Measures Decree (NRCD 326, 1975). Armed with these legislations the authority is mandated to undertake activities such as National Standards development and dissemination; testing services; inspection; product certification scheme; calibration, verification and inspection of weights, measures and weighing and measuring instruments; pattern approval of new weighing and measuring instruments; destination inspection of imported high-risk goods; promotion of quality management systems in industries; and advices MoTI on standards and related issues<sup>18</sup>.

#### **2.3.5 Ghana Free Zones Board (GFZB)**

Consistent with the desire of the government of Ghana to boost its export-induced growth agenda, an Act of Parliament, Act 504 in 1995 was promulgated to establish free zones in Ghana. The GFZB is charged with the responsibility of promoting economic development within the enclave and equally ensure the effective regulation of the operations of the activity in the free zones and other incidental issues. Within the free zones, Export Processing Zones (EPZs) are established to meet the objectives of the free zones programmes to promote the

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<sup>17</sup> (source: <https://www.eximbankghana.com/>)

<sup>18</sup> (source: <http://moti.gov.gh/agencies.php>)

processing and manufacturing of goods. As part of its remit, the GFZB is to encourage the development of commercial activities at the seaports and airport areas<sup>19</sup>.

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<sup>19</sup> (source: <http://moti.gov.gh/agencies.php>)

## **CHAPTER THREE**

### **LITERATURE REVIEW**

This section of the thesis presents a comprehensive review of both the theoretical and empirical literature for the three empirical studies undertaken for this thesis. The section is in three segments. The first segment presents both the theoretical and empirical literature on the relationship between exchange rate volatility, exchange rate policies and export performance. The second segment also presents both the theoretical and empirical literature on issues of export diversification and how the concepts of economic complexity and product space can be used to inform the discourse on constraints to export diversification. The last segment presents both the theoretical and empirical literature on the key determinants of firm-level export performance.

#### **3.1 The Exchange Rate Volatility and Exchange Rate Policies, and Export Performance nexus**

##### **3.1.1 Theoretical Literature**

The theoretical debate on the relationship between exchange rate volatility and international trade flows is normally cast within a partial equilibrium framework with few studies attempting a general equilibrium approach. In general, this relationship is based on the theory of choice under uncertainty, where the expected outcome of a decision is not predictable. In this case, the economic agent is not certain of the profitability of the current decision due to the potential future risk. This ultimately affects the allocation of productive resources between the tradable and the non-tradable sectors of the economy (Chit, 2008).

From the perspective of the partial equilibrium framework, most of the macroeconomic interactions that affect trade are held constant. To this end, the prime focus is on how exchange rate volatility affects trade. Some of the theoretical models based on the partial equilibrium

framework assume perfect competition, absence of risk-mitigating mechanisms and the role of the currency in which the exported goods are invoiced. The models are also conditioned on the relative risk aversion of the economic agent and at the same time consider adjustment costs implications, (Chit, 2008).

On the other hand, the general equilibrium models accommodate interactions among macroeconomic variables. In this regard, the models reflect a complete picture of the complex dynamics and the mutually interactive shocks to the economy, exchange rates and trade flows, (Chit, 2008).

### ***3.1.1.1 Partial Equilibrium Analysis***

Some of the pioneering studies, seeking to inquire into the effects of exchange rate uncertainty on trade flows were undertaken by Hooper and Kohlhagen (1978) and Cushman (1983), among others. Both studies employ a variant of the portfolio choice analysis but only differ in terms of the exchange rate indicators used. The former study uses the nominal exchange rate to generate the volatility indicator for the analysis, whilst the latter incorporates the concept of the real exchange rate for the analytical discourse on exchange rate volatility. The theories for these studies conclude that there is an inverse relationship between exchange rate volatility and export performance which is due to the risk-averse nature of economic agents. From this perspective, the impression is created that under conditions where agents are risk-neutral, exchange rate volatility may not count in the firm's decision making. However, Auboin and Ruta (2013) submit that by relaxing some of the key assumptions, such as that of perfect competition, the role of the currency in which the exported goods were invoiced, the high aversion to risk, the absence of imported inputs and the absence of exchange rate hedging using financial instruments, the relationship between exchange rate volatility and trade becomes inconclusive.

The study by De Grauwe (1988) advances some theoretical basis that tends to challenge the conclusions of the studies Hooper and Kohlhagen (1978) and Cushman (1983). The study demonstrates that the assumption of risk aversion is not enough to establish a negative relationship between exchange rate volatility and export activities but depending on the relative concavity or the convexity of the utility functions of the risk-averse person, the decision under conditions of exchange rate uncertainty may either lead to an increase or a decline in trade flows. This sets the context for the discussions on the ambiguity regarding the relationship between exchange rate variability and international trade flows.

In fact under the assumption of risk-neutral, Caballero and Corbo (1989) conclude that exchange rate uncertainty can have a positive impact on export activities. Their argument is based on the assumptions of perfect competition, the convexity of profit functions to real exchange rate and predetermined level of capital. They argue that when exchange rate volatility is favourable, firms produce more but with possibly suboptimal capital stock. However, under unfavourable real exchange rate volatility conditions firms produce less by possibly underutilizing installed capacity. They further argue that the profit lost because of using suboptimal capacity in the favourable real exchange rate conditions is more than the loss incurred in the unfavorable situation where there is excess capacity. Hence, under conditions of uncertainty, profit maximising firms are likely to increase their capital accumulation and export more.

The studies by Broll and Eckwertt (1999), Dellas et al. (1993), and Franke (1991) have advanced further theoretical basis to support the proposition that international trade flows can respond positively to exchange rate volatility. Dellas et al. (1993), employ a conventional asset portfolio model to argue that the outcome regarding a positive or negative impact of increased exchange rate variability on trade flow largely depends on the risk aversion parameter of the model. Thus, if the parameter of relative risk aversion is less than one, then increased exchange

rate variability can result in depressed trade. However, a relative risk aversion parameter greater than one can lead to increased exchange rate volatility having a positive impact on export volumes. By adopting a framework similar to that of options pricing, Broll and Eckwertt (1999), and Franke (1991) argue that exporting activity can be likened to an option that is exercised if profitable. In this respect, an increase in exchange rate volatility may increase the profitability of the option and consequently result in an increased volume of export. According to Broll and Eckwertt (1999) this works well for firms with the capabilities to react flexibly to exchange rate volatility and re-allocate their products among domestic and external markets respectively.

Auboin and Ruta (2013) challenge the assertion that the presence of forward markets with financial hedging opportunities against risk can decrease the potential adverse effects of exchange rate volatility on trade. According to them, firms' access to hedging facilities may be disproportionate, as such, the behaviour of exporters may be informed by the side of the hedging position assumed. To this end, Viaene and De Vries (1992) argue that importers and exporters find themselves on the opposite side of the forward market consistent with their respective exposure towards exchange rate volatility. Hence, the outcome of trade flows because of exchange rate volatility depends on the sign of the aggregate net foreign currency exposure and the aggregate measure of risk aversion. In contributing to this discussion, Cote (1994) argues that there may be several reasons why firms cannot or choose not to resort to forward contracts as an exchange rate risk-mitigating mechanism. In the case of developing countries, forward exchange markets may either be non-existence or very prohibitive. For relatively developed countries, the decision to hedge against risk may be linked to the planning horizon of the firm. Short term exchange rate risk can probably be hedged in the forward exchange rate market. It may rather be quite difficult to do the same for long term exchange rate risk, which may be associated with more uncertainties on the horizon.

One of the assumptions of the earlier studies supporting the proposition that exchange rate volatility has adverse effect of on trade is that firms are unable to adjust their production and factor inputs in line with exchange rate fluctuations. However, Auboin and Ruta (2013) argue that this assumption has been relaxed in recent studies. Thus, depending on the relative risk aversion towards profit uncertainty, firms may adjust factors of production upwards and downwards to reflect world prices. Following from this, the more risk-averse firms are less likely to export more in the light of higher profit variance due to exchange rate uncertainty. But the less risk-averse firms are more likely to sell more in the light of profit uncertainties since the possible gains from price variability may offset the uncertainty.

### ***3.1.1.2 General Equilibrium Analysis***

According to Chit (2008), partial equilibrium analysis has come under attack by some economists on the basis that the relationship between exchange rate volatility and trade flow is established by assuming that other predictors of international trade are considered constant. In addition, by holding both demand and cash functions constant, any potential mutually dynamic interactions with exchange rate uncertainties triggered by changes in the economy are ignored. Furthermore, the dynamic interactive process between exchange rate volatility and trade volumes, which can potentially affect the exchange rate through other macroeconomic channels are ignored because exchange rate volatility is assumed to be determined by exogenous shocks. In effect, macroeconomic shocks are characterised by a complex web of mutually interactive macroeconomic variables in a dynamically reinforcing process.

Advancing arguments in support of a general equilibrium framework in relation to the link between exchange rate volatility and trade flows, Bacchetta and Van Wincoop (2000) argue that the fundamental drivers of exchange rate fluctuations, that are, monetary, fiscal and productivity shocks equally affect overall macroeconomic risks that firms and households

encounter. As a result, there is the need for a more comprehensive analysis of different exchange rate systems rather than limiting the analysis to exchange rate uncertainty. Thus, they put forward a stochastic two-country general equilibrium framework to examine the mechanism through which exchange rate stability impacts both trade and welfare. Apart from the fact that the model is micro founded, it equally has both an explicit welfare metric and considers the utility of economic agents. The key propositions of the model are that; conditional on preferences and the monetary policy rules pursued under alternative exchange rate regimes (fixed or floating), the volumes of trade may either response positively under both regimes, or may not. Similarly, the welfare implications of the alternative exchange rate regimes depend on the preferences of consumers and the monetary policy rules. Hence, in the presence of technological and fiscal shocks, the welfare implications under the different exchange rate regimes depend on the degree of flexibility in the monetary policy response under a floating regime. For instance, monetary policy under a flexible regime that stabilises employment results in less trade than under a fixed exchange rate system, but the welfare effect is not clear. Finally, Bacchetta and Van Wincoop (2000) argue that there is no one-to-one relationship between the levels of trade and welfare across exchange rate systems. In other words, different outcomes are possible for trade and welfare under the same or alternative regimes. This is because the key drivers of welfare, which are the variance of consumption and leisure as well as their co-variance under non-separable preferences are quite different from the factors that determine the level of trade, which are the variance of revenue and labour costs relative to the foreign market. These propositions are raised to refute the idea that exchange rate stability can lead to more trade.

Contributing to this debate, Clark et al. (2004) argues that the drivers of the exchange rate volatility can influence other macroeconomic variables in the economy, which can in turn impact trade flows. Hence the need for a comprehensive perspective, to cover the interactions

among the various macroeconomic variables engendered by shocks to the system. This will portray a complete picture of the relationship between exchange rate volatility and trade flows. Drawing on the argument above, Koren and Adam (2003) highlight the interactions amongst macroeconomic variables by arguing that what is important as far as the relationship between exchange rate volatility and trade volumes is concerned is how the exchange rate volatility interacts with other key variables within the model. Thus, their discussion focuses on the relative impact of exchange rate uncertainty either on the firm or on the consumers, by either moderating or magnifying the risk on the costs and demand conditions they encounter, respectively.

Although the general equilibrium framework appears more elegant and offers deeper appreciation of the intricate nexus between exchange rate volatility and trade on one hand and the macroeconomic interactions and dynamics on another hand with the feedback loops, the fundamental questions regarding the ambiguities embedded in the relationship between exchange rate volatility and trade flows as regards the direction and magnitude of impact remains outstanding.

Another strand of the debate appears to cut across the partial and general equilibrium dichotomy and places much emphasis on explaining the relationship between exchange rates development and trade flows with nonlinear models within the context of asymmetric effects. The lack of clarity on the casual direction between exchange rate volatility and export performance in previous discussions has been attributed partially to the undue weight placed on linear techniques of analyses. Some of the advocates of this position are Arize et al. (2017); Bahmani-Oskooee and Fariditavana (2016); and Verheyen (2013).

One of the theories that seeks to explain the possible asymmetric response of export performance to exchange rate volatility is grounded on the hysteresis theory, (Baldwin and Krugman, 1989; Dixit, 1989). The theory refers to the state of a sluggish pace of withdrawal

of the effects of a phenomenon after a moderation in the initial force of shock. Admittedly, the process of establishing a new venture can be resource intensive. Significant sunk costs must be incurred to develop new products, maintain market shares, and invest in key infrastructure, among other things to enable the business to survive. Amid these facts, any disturbance to the exchange rate can impact on a firm's sunk and exits costs and the firm must decide whether to exit the business or stay to recover the resources invested. Thus according to Arize et al. (2017, p. 316),

*“Hysteresis tends to cause firms to hesitate in their decision making and to accept increasing costs when the domestic currency appreciates, creating an asymmetric competitive effect and, thus, asymmetric exposure. Therefore, firms no longer can cherry-pick their investments. Moreover, exporters hold foreign- currency prices constant to avoid endangering ‘sunk costs’ or consumer allegiance through current pricing practices”.*

The above quotation reinforces the position that the relationship between exchange rate uncertainty and trade flows may not be symmetric. Another strand of the literature takes into account the asymmetric effect and nonlinearities due to the general downward stickiness of prices, (Ball and Mankiw, 1994; and Naghdi and Kaghazian, 2015). In this case, firms are perceived to be biased on the upside for a price adjustment when they are faced with increased costs pressures than the other way around. This theoretical view is consistent with the neo-Keynesian doctrine about nominal rigidities and frictions in markets resulting in such behaviour and equally translating into varied responses to exchange rate volatility.

The role of central banks to intervene in the foreign exchange market to achieve some desirable parity level has also been cited as a potential source of igniting asymmetry effects, (Arize et al., 2017). This is prevalent where there are coordination problems regarding divergence incentives between the central banks and exporters. Under this condition, potential

uncertainties are plausible if the central bank decides to intervene in the exchange rate market to contain the depreciation of the domestic currency. The ensuing uncertainties can create varied responses, due to the varied developments in the exchange rate, in a disproportionate manner.

In a related development, the lack of consensus among market participants and economic players as regards the true level of the equilibrium exchange rate and the degree of misalignment, possibly due to information barriers and government policy can equally precipitate asymmetric responses to exchange rate movements.

All the arguments raised in support of the possible presence of nonlinearity in the relationship between exchange volatility and trade flows lend credence to the fact that it might be quite restrictive to assume homogeneous exchange rate volatility parameters in an export function (Verheyen, 2013). As mentioned above one may have to appeal to empirical literature to assess the veracity of these assertions for which this study seeks to explore.

### **3.1.2 Empirical Literature**

The emergence of the flexible exchange rate regime in the light of the collapse of the Bretton Woods system in 1973 has stirred up a lot of studies on the potential effect of exchange rate volatility on export performance. Like the theoretical discussions above, the empirical studies so far have not succeeded in offering clear guidance to unravel the ambiguities relating to the exact causal relationship between exchange rate volatility and export performance. In general, some studies have found a negative association between exchange rate volatility and trade, whilst others have established a positive relationship. Other studies did not find any relationship, whilst others identified a non-linear relationship between exchange rate risk and trade flows.

The study by Hooper and Kohlhagen (1978) is considered as one of the pacesetters for the numerous academic enquiries into establishing the link between exchange rate volatility and international trade flows. The study, covering the period 1965-75, explores how both bilateral and multilateral trade flows among developed countries respond to conditions of exchange rate uncertainty. Exchange rate uncertainty, in this study, is represented by the standard deviation of nominal exchange rate fluctuations. The study finds a statistically significant and direct link between the exchange rate volatility and foreign prices, but no evidence is adduced to support a significant relationship between exchange rate volatility and trade volumes.

To further explore the exchange rate volatility and trade nexus, Cushman (1983), unlike his predecessor uses the concept of real exchange rate instead of nominal exchange rate volatility and adopt the four-quarter moving standard deviation of the real exchange rate as the measure of exchange rate volatility. The study finds a negative relationship between exchange rate risk and the volume of trade. In a similar study, Cushman (1986) introduced into the analysis the concept of 'third country effect'. This concept suggests that the effect of exchange rate risk on bilateral trade flows depends on the trade relations with other countries. Countries tend to substitute trade relationships with a partner for another partner when exchange rate risk between the country and the initial partner increased, thus moderating the net effect of exchange rate risk. A study by De Grauwe (1988) examines export responses to exchange rate volatility relating to a sample of 10 industrialised countries using a seemingly unrelated regression estimation. The study finds evidence to support a negative association between exchange rate volatility and trade flows, and the relationship is statistically significant.

Asseery and Peel (1991) argue that the failure of previous studies to establish any significant response of variations in trade flows to exchange rate volatility may be attributed to the non-stationarity of the variables involved. Hence by applying an error correction framework and data on five OECD countries for the period 1972 to 1987, the study finds a long-run positive

and statistical significant relationship between real exchange rate volatility and the volume of export for all the countries except the United Kingdom. A similar study by Kasman (2005) applies the Johansen's co-integration techniques on quarterly data for the period 1982-2001 and uses the moving standard deviation of the growth of real effective exchange rate as the measure of exchange rate volatility. The study finds the trade effect of exchange rate volatility to be significantly positive in the long-run and concludes that firms in small economies like Turkey have limited option in containing increased exchange rate risk.

Doroodian (1999) uses data on India, Korea, and Malaysia for the period 1973Q1-1996Q3 and applies an OLS estimator to investigate export response to exchange rate volatility. By using a measure of exchange rate volatility from the ARCH family, the study finds evidence to support the position that exchange rate risk adversely affects the volume of export and the relationship is significant. Findings from another study by Altintaş et al (2011) suggest that the direction of impact of the exchange rate volatility on export is conditioned by the type of exchange rate measure used, i.e., whether you use a real or nominal measure and the time frame. In the long run, the real exchange rate volatility is identified to have a significantly negative association with Turkish export. However, in the short-run nominal exchange rate volatility rather have a positive association with the volumes of export. The study draws this conclusion by using quarterly data for the period 1993Q3 -2009Q4 and a multivariate co-integration error correction model technique.

By using a panel data approach, Sauer and Bohara (2001) find the trade effects of exchange rate uncertainty to be more harmful in developing countries than developed countries. The results remain unchanged when different measures of uncertainty, different specifications of the export equation and different estimation techniques are employed. Similarly, Chit, et al (2010a) applies a panel data approach to examine the relationship between exchange rate uncertainty and the volume of export for a sample of five emerging East Asian economies, for

the period 1982Q1- 2006Q4. The findings for both the fixed and random effects regressions suggest that there is a significantly negative link between the bilateral exchange volatility and bilateral export. This outcome is robust for all the sample periods and the different measures of exchange rate volatility.

Bahmani-Oskooee and Harvey (2011) investigate the possible impact of exchange rate volatility on trade flows disaggregated by type of industry between Malaysia and the U.S using data for the period 1971-2006. By employing the ARDL model, the study fails to find any association between exchange rate volatility and total export volumes. However, at the disaggregated level of the total export figures, exchange rate volatility exerts a significantly negative impact on most of the commodities exported. Srinivasan and Kalaivani (2013) find exchange rate volatility to have a pernicious impact on the volumes of export both in the short-run and long-run, and the effects are statistically significant. This finding is the outcome of using annual time series data spanning 1970 to 2011 and employing the ARDL bounds testing procedure. The study also confirms a co-integration relationship between real export and the other predictors: real exchange rate, gross domestic product, and foreign economic activity.

Empirical results from other studies support the claim of nonlinearity in the relationship between exchange rate volatility and export activities, Bahmani-Oskooee and Aftab, (2017); Baum, Caglayan, and Ozkan Neslihan, (2004); Verheyen, (2013). Baum et al. (2004) use monthly data on bilateral export for 13 countries for the period 1980- 1998 and employ both a standard deviation measure of exchange rate volatility and a flexible distributed lag structure estimation technique. In general, the study find the total effect of exchange rate volatility on trade flow to be positive. However, there is a non-linear effect operating through interaction with foreign income volatility.

Other studies, like the studies by both Verheyen (2013), and Bahmani-Oskooee and Aftab (2017) apply the NARDL (Non-linear Autoregressive Distributive Lags) technique to

investigate the non-linearity in the relationship between exchange rate volatility and trade flows<sup>20</sup>. Verheyen (2013) argues that assuming linearity in export demand functions may be too restrictive. Given that about 50% of the cases investigated tend to support the position of nonlinearity in the relationship between exchange rate volatility and export activity, it is plausible to use a model that decouples the effect of exchange rate volatility into appreciation and depreciation. In situations where the trade effect of exchange rate volatility is detected to be nonlinear, it is apparent that export responds less to appreciations than to depreciations. The study uses monthly bilateral export for 12 EMU countries to US for the period 1988 to 2012. A similar study by Bahmani-Oskooee and Aftab (2017) conclude that the effects of exchange rate volatility on trade flows can be asymmetric. The study attributes this to possible hysteresis effect. Using monthly data from 54 Malaysian industries that export to the US and 63 Malaysian industries that import from the US, the study finds short-run and long-run asymmetric effects in almost one third of the industries.

Within the context of Africa, empirical evidence on the impact of exchange rate volatility on trade flows is quite scanty, especially on non-traditional export. A study by Sekantsi (2007) uses monthly data on the bilateral trade flow between South African and the US for the period 1995 Jan - 2007 Feb to investigate a possible causal relationship with exchange rate volatility. By applying the ARDL bounds testing procedure, the study finds a significantly negative relationship between exchange rate volatility and South Africa's export to the U.S both in the short-run and the long run. A similar conclusion is reached for both the short-run and the long-run by Onafowora and Oluwole (2008) studying the relationship between exchange rate volatility and export growth of Nigeria to the US. The study uses a Vector Error Correction Model (VECM).

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<sup>20</sup> NARDL: Non-linear Autoregressive Distributive lags

Omjimate and Akpokodje (2010) undertakes a study on a comparative analysis relating to the impact of exchange rate volatility on the export of non-CFA countries and the CFA countries in Africa. The study uses different econometric techniques: OLS, Fixed effect, difference-GMM, and systems-GMM. The result from the system GMM is superior to all the other results in terms of its statistical properties. The study finds that exchange rate volatility exerts a significantly negative impact on both panels; however, the relative impact is larger for non-CFA countries. A similar study by Musila and Al-Zyoud (2012) that focuses on Sub-Saharan African countries used the gravity model on annual data for the period 1998 to 2007. The study equally finds exchange rate volatility to impact negatively on the volume of trade at conventional significance levels. In the same vein, Senadza and Diaba (2017) investigate the response of trade to exchange rate volatility for 11 Sub-Saharan Africa economies. The study uses data spanning 1993 to 2014 and applies the pooled mean-group estimator of dynamic heterogeneous panel technique. The study suggests that export responds negatively to exchange volatility in the short run, but the relationship is positive in the long run.

Apart from the study by Obeng (2017) that examines the relationship between exchange rates volatility and non-traditional export (NTEs) as alluded to under chapter one, the study by Musonda (2008) is amongst the few that have also focused on the impact of exchange volatility on NTEs. Using data on Zambia for the period 1965 to 1999 and the Johansen co-integration techniques, the study finds exchange rate volatility to depress NTEs and the relationship is significant both in the short run and the long run.

After a survey of the empirical literature, Cote (1994) concludes that “Despite the widespread view that an increase in volatility will reduce the level of trade, this review reveals that the effects of volatility are ambiguous.” Ozturk (2006, p.86) also submits that “the overall evidence is best characterised as mixed, as the results are sensitive to the choices of the sample

period, model specification, proxies for exchange rate volatility, and countries considered (developed vs developing)”.

Indeed using meta-regression analysis, Ćorić and Pugh (2010), and Bouoiyour and Selmi (2016) concludes that as far as the empirical literature is concerned the potential impact of exchange rate variability on international trade flows is conditioned on a plethora of factors, key amongst them are<sup>21</sup>:

- the model specification, (Utility maximisation approach, gravity, ECM or co-integration)
- trade flows, (sectoral, aggregate, and bilateral trade data)
- sample period, (whether a long or short period and also the frequency of the data)
- time horizon, (short and long relationships)
- country characteristics, (in terms of the degree of financial development, the exchange rate regime adopted, the monetary policy, the trade policy, natural resource dependence and whether a developed or developing country)
- measures of exchange volatility, (using standard deviation measures or GARCH measures)
- type of exchange rate, (Nominal exchange rate, nominal effective exchange rate, real exchange rate, and real effective exchange rate)
- estimation technique, (Cross-section, panel strategies or times series analysis, and either to use linear or non-linear estimation techniques).

Hence this thesis re-examines the functional relationship between exchange rate volatility and export activities to ascertain more insight into the plausible outcomes. This is done by using a

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<sup>21</sup> Meta-regression is used to explain the factors behind the heterogeneous results observed by various studies regarding the exchange rate variability and trade nexus.

partial equilibrium framework employed by De Grauwe, (1988) to inform the theoretical framework underpinning the econometric model.

The next issue concerns how export activity responds to exchange rate policies. Here, our interest is to consider how the distortionary effects emitting from exchange rate policies can translate into anti-export bias measures, which has the potential to adversely impact on export performance as espoused by Bhagwati (1988). The study is anchored on the argument of export promotion verses import substitution strategies in the era of export pessimism rooted on protectionist policies. He argues that export performance thrives on domestic incentives that do not discriminate against exports in support of import substitution. To this end, policies such as tariffs and quotas that prop up net protection in favour of the importable sector (anti-export bias polices) undermine export performance. Tyler (1983) argues that the profitability of export and import activities largely hinges on both prices and economic policy<sup>22</sup>. Exchange rate policies affect the domestic currency prices of export and importables. Thus, to the extent that the balance of domestic incentives from exchange rate policy either deliberately or unintentionally tilts in favour of importables, export activities may suffer. This position is supported by evidence from a study on Brazil that suggests export growth to be positively responsive to policy changes that minimise the extent of anti-export bias. This suggests that an increase in import protection measures may invariably increase anti-export bias effects that may tend to undermine export performance. The study by Abeyratne (1993) on the Sri Lankan manufacturing observes that both the direct and indirect protections emanating from the trade liberalisation policies demonstrate that on the net basis exporting activity is adversely affected because of the seeming protection offered to the importables. This conclusion is consistent with the study by Tokarick (2007) that seeks to assess the impact of anti-export bias policies on export performance of some developed and developing countries. The study suggests that any attempt by governments

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<sup>22</sup> Anti-export bias measures are sometime used to proxy the effects of trade liberalisation policies.

to use trade liberalisation policies to encourage both import substitution firms and exporting activity may be counterproductive. This is because, in most cases the export sector is disadvantaged by the protection accorded to the import substitution sector. Therefore, some selective application of policies to preserve real incomes and to discourage rent-seeking activities related to importations must be encouraged.

Chapter four of this thesis employs the Autoregressive Distributive Lags (ARDL) technique to assess the responsiveness of export growth to exchange rate volatility and exchange rate policies in Ghana. This is done to take advantage of the benefits that the ARDL technique has over other econometric techniques in terms of its efficiency with small observations, handling endogeneity issues and in situations where macroeconomic variables are of a different order of integration. Furthermore, the Non-linear Autoregressive Distributive Lags technique is employed to investigate nonlinearity in the response of Ghana's export to exchange rate volatility. This is also done to establish whether in the case of Ghana negative and positive exchange rate volatility emit the same or diverged effects on export performance and the policy implications.

### **3.2 Literature Review on Economic Complexity, Product Space and Export Diversification**

This section of the thesis is in two segments. Firstly, there is a brief overview of the classical trade theories where issues of export diversification are muted and the new trade theories where some of the emerging theories, especially those on the economic complexity and product space theories accord some prominence to issues of export diversification. The next segment is to review the empirical literature on export diversification to ascertain the key drivers and constrains.

### **3.2.1 Theoretical Literature**

According to Carpenter and Dunung (2012), international trade theories can be classified into two categories - classical country-based theories and modern firm based theories. Under the classical country-based theories, the main strands are the Mercantilism, Absolute advantage, Comparative advantage, and Heckscher-Ohlin (H/O) theories. For the modern firm-based theories, the main strands are Country Similarity, Product Life Cycle, Global Strategic Rivalry, and Porter's National Competitive Advantage theories.

According to Adam Smith in the eighteenth century, the basis of improved global welfare is free trade, where countries specialised in the production of the products they have absolute advantage. This is in sharp contrast to the mercantilists, who support protectionism. The theories of comparative advantage developed by David Ricardo and the Heckscher-Ohlin (H/O) are both extensions and improvements on the core theories of absolute advantage. To explain why countries specialize in the production of different products, the proponents of the theory of comparative advantage stress on cost-efficiency in the production of a particular product; whilst the H/O model highlights on countries that use their abundant resources more intensively (which may be cheaper) in the production process to boost export activity. These theories fail to highlight the number of products that countries can produce (reflecting the diversification of countries) or the number of countries that can produce a particular product (reflecting the ubiquity of products) as well as the relationship between them, (Hausmann and Hidalgo, 2010).

Firm-based trade theories emerged after World War II to address the expansion of either Multinational Corporations (MNCs) or intra-industry trade in the presence of product differentiation and love for varieties, (Krugman, 1979b). These theories postulate that trade is largely driven by innovation and technology aimed at enhancing the competitive advantage of firms against each other in the same industry. These also happen in situations where trade takes

place extensively among countries with similar per capita income as espoused in the gravity models (Bergstrand, 1985; Carpenter and Dunung, 2012; Tinbergen, 1962). Though the new trade theories touch on the concept of diversification, in particular by introducing the idea of economies of scale and the fact that countries with large markets are able to amortize their fixed costs, which tend to facilitate diversification, not much attention is paid to the intrinsic characteristics of the goods produce in terms of their embedded level of sophistication and the potential to promote increased level of complexity of a country's export basket to enhance further diversification, (Hausmann and Hidalgo, 2010).

A related aspect of this discourse is that most of the new trade theories are motivated by the key assumptions underpinning the production function postulated by Dixit and Stiglitz (1977). To overcome the difficulties in modelling the desirability of product variety, which is absent in the classical trade theories, Dixit and Stiglitz (1977) suggest a situation where production is conducted within the context of a continuum of goods, where all goods are assumed to be symmetrical. Some of the implications of this assumption are that the cost of product development does not depend on the characteristics of the product and that the previous production history of a country and its relationship with a product does not have any role to play in terms of the cost of developing the product.

On the contrary, Hausmann and Hidalgo (2010, p.6) highlight the need to consider the nature or characteristics of a product and the potentials it offers for the development of countries as reflected in the quote below,

*“If products are just different combination of capital and labour, or if they are just arbitrary varieties in some otherwise homogeneous space, then the composition of output should not matter and the mix of products produced or exported by countries should not have serious implications for economic development. Yet products seem to matter”.*

They further argue in support of this position by appealing to the argument of Adam Smith that manufactured goods are bound to be more dynamic than agriculture goods because they allow for more division of labour as well as a complex system of interactions. This also resonates well with the view that manufactures require far more set of capabilities than agriculture and these capabilities find expression in different combinations reflecting in a larger set of alternative products.

Melitz (2007) argues within the context of heterogeneous firms and stresses the importance of international trade in promoting inter-firm reallocations of productive resources within the industry. The study demonstrates that when firms are exposed to trade, the more productive ones can export, whilst the least productive firms are forced to exit. A dynamic process of increased productivity ensues with the exit of the least productivity ones, which is complemented by efforts to reinvest profits. In a related trade theory, Kremer (1993) argues that the process of production consist of identical multiple tasks, which must be completed under the conditions that firms are unable to substitute several low-skill workers for one high-skill worker. Thus, suggesting that higher-skill workers are more likely to use complex technologies embedded with more tasks, which tend to have a direct impact on their wages. This may explain why household products and small firms dominate industrial organisations in developing countries, reflecting a direct relationship between firm size and the level of wages, because the developing countries can hardly afford the wages of higher-skilled workers. Though the model makes predictions about the magnitude of wage and productivity differences between developed and developing countries, the predictions fail to establish that these developed countries produce diverse products.

Consistent with the discussions above, Hausmann and Hidalgo (2010) argued that the process of production involves a combination of specific subsets of non-tradable productive inputs referred to as capabilities. The capabilities that countries possess as well as the capabilities

require to produce products are quite different. Hence, countries produce only goods for which they have the required capabilities. In addition, they argue for the prevalence of capabilities complementarity, because a country's existing capabilities will determine the extent of diversification possible, which can lead to new capabilities. To reinforce the above argument, the authors make reference to a concept called 'quiescence trap' that refers to a situation where countries with few capabilities are not incentivised to accumulate extra capabilities as these are unlikely to be effectively used because of the absence of complementary capabilities. This phenomenon drives industrial development of different countries in the direction of divergence, rather than convergence in the light of increased complexity of products countries produce.

Drawing on some parallels between their trade theory and that of Weitzman (1998), Hausmann and Hidalgo (2010) argue that Weitzman (1998) supports the view that all innovations are based on the utilisation of existing stock of knowledge in a cumulatively interactive process. In the light of this, Weitzman (1998) propose a production function based on the fact that new knowledge is a recombination of old knowledge. However, the point of departure is that in the case of Hausmann and Hidalgo (2010), the stock of old knowledge or existing capabilities is considered not only relevant for current production but also future production and the future level of structural transformation and economic development.

Within the framework put forward by Hausmann et al. (2007) and Hidalgo and Hausmann (2009), the major obstacle to enhanced diversification hinges on resolving the coordination problem. That is the requisite capabilities must be present before one can produce a product. Invariably, the initial demand for capabilities tends to be zero, because the marginal benefit to gain from accumulating any new capability is close to zero, since the product that required them are not being produced. Therefore, for a new product to be produced, gaps in existing capabilities will render the provision of any extra missing capabilities of no use. Indeed, the coordination problem is accentuated when the numbers of missing capabilities are substantial.

Hidalgo et al (2007) and Hidalgo (2009) introduce the concept of Product Space to address the coordination problem within the context of the quiescence trap alluded to earlier. This also stresses the fact that economic growth is generally path dependent. Within the product space, depending on how many capabilities are required by different products, the products can be either nearer to or further from a country's current export basket. In the short to medium term, it becomes quite easier to solve the coordination problem for products which are within proximity, because the capabilities deficit is limited and can be easily coordinated with the demand for them. If countries produce products which have capabilities that could easily be translated into the production of other products, these products are classified as being close within the product space. Within this context, structural transformation is facilitated because countries are not overstretched in terms of resource demands. This point becomes more important in the situation where the adjacent products are classified as complex and of higher strategic value to enhance the path of further structural transformation.

### **3.2.2 Empirical Literature:**

There appears to be some consensus in the empirical literature that increased export performance propels countries' economic growth, more especially where the outcome reflects structural transformation, leading to a more diversified export basket. However, concentration on few products is likely to cause a country to be vulnerable to external shocks and income instability. Consistent with the reasoning above numerous studies have examined this export diversification phenomenon in terms of the drivers and the challenges thereof. One such study by De Pineres and Ferrantino (1997) examine the relationship between export diversification and economic growth. They construct several indicators of diversification and structural changes reflecting three years of Chilean experience. The study provides evidence to support the view that in the long-run export diversification facilitated the economic growth of Chile far more than it would have ordinarily attained under conditions of product concentration.

However, this was not because of a deliberate policy to promote export diversification, but rather periods of severe structural changes which addressed core issues like the overvaluation of the currency and trade liberalisation. A similar study by Hesse (2008) using data on some 99 countries for the period 1965-2000 and applying the system GMM estimator finds a positive link between export diversification and per capita income growth. The relationship is rather nonlinear, in the sense that developing countries benefit more from less concentration whilst advanced countries benefit more from specialisation.

To explore the key drivers of export diversification given the preponderance of evidence in favour of export diversification as a key component in propelling economic growth, Bebczuk and Berrettoni (2006) investigate the main drivers of export diversification for 56 countries covering the period 1962 to 2002. The study finds that enhanced macroeconomic performance supports export concentration, contrary to the notion that increased economic performance should be associated with increased diversification. In a related study, Amurgo-Pacheco and Denisse (2008) focus on the patterns of export diversification in developing countries. The study uses disaggregated trade data spanning the period 1990 to 2005 to investigate the extensive and intensive margins of diversification. The study employs the gravity trade model and establishes that export at the intensive margin constitutes the major share of overall trade growth. In addition, geographic diversification rather than product diversification is more important at the extensive margin. A similar study by Balavac (2012) investigates the determinants of export diversification at the intensive margin for 27 transition economies. The study uses unbalanced panel data for the period 1996-2010 and the system-GMM estimator. The study finds market entry cost to be negatively associated with diversification at the extensive margin, while moderation in trade costs support diversification at the intensive margin. Besides, foreign aid for enhancing the productive capacity is identified to have a significantly positive impact at the extensive margin and reduces export concentration. Sector-

specific aid for propping productive capacity equally promotes diversification at the extensive margins, at the level of the sectors.

Agosin et al (2009) embark on a study to deepen our knowledge on the key determinants of export diversification by focusing on a significant number of countries and use data for the period 1962-2000. The study adopts three indicators of export diversification and applies a system GMM estimator. The study finds evidence that the main drivers of export diversification are financial development, capital accumulation and positive terms of trade in the presence of higher education. However, trade openness, exchange rate overvaluation and increasing remoteness tend to support export concentration. Kim (2012) on the other hand uses descriptive statistics to highlight Korean's export diversification experience. He suggests that foreign trade plays a key role in the success story of Korea's economic growth achievement. An examination of the long-term pattern of Korean's export reveals that the strategy for export diversification relates to exploring new foreign markets and increasing the variety of export products. These are driven by the competitiveness of the exporting firms coupled with deliberate government interventions.

Noureen and Mahmood (2014) investigate the determinants of export diversification by examining the contributions from country-specific factors. To achieve this, the study focuses on some selected ASEAN and SAARC member countries with a panel dataset covering the period 1986 to 2012. By using the fully modified ordinary least square co-integration estimator, the study finds evidence that direct investment, domestic investment, competitiveness, financial sector development, and institutional strength have a significantly positive association with export diversification in both regions.

All the studies examined so far failed to examine the role product characteristics play in the product diversification process. Though mention is made of the importance of export diversification and its potential contribution to economic growth as well as some of the key

drivers of export diversification, none of the studies above highlight the issue of the number of countries that can produce a particular product due to the sophisticated nature of the products they produce. Hence, these studies do not reflect the combined effects of a country producing relatively less ubiquitous products reflecting its level of complex sectoral interactions as well as the extent of diversification of its export basket on its structural transformation agenda with prospects for growth.

Consistent with standard trade theory, the impression is created that changes in the export base of a country are just a passive consequence of varying comparative advantage by way of improving factor accumulation. Equally apparent is the impression created that the adjustment costs in transiting from one product to the other are either linear or moderate. However, the adjustment costs can be exponential, more especially when dealing with heterogeneous products in the presence of factor specificity. Also absent in the classical theories discussions is the presence of externalities and potential for market failure.

Hence, recent strands of empirical works in the literature champion by Hausmann et al. 2007, Hidalgo and Hausmann (2009), Hausmann and Hidalgo (2010) and Hausmann et al. (2013) exploit the information content of the relationship between products and a country that produces them, to gauge both the stock of capabilities embedded in the country and how these capabilities are deployed to produce other products. All these are executed within the context of the economic complexity construct, reflecting the density of productive knowledge (capabilities) embedded in the economy that finds expression in the complex network of interactions, leading to the production of diversified and uncommon products, with consequences for economic development. Following directly from the above discourse is the product space construct that demonstrates how economic complexity evolves to engender structural transformation. In line with this argument, a study by Hausmann et al, (2010) use the concept of product space on the Algerian economy to highlight the issue of factor specificity

which is largely associated with resource-rich countries thus making it difficult to deploy acquired capabilities to other sectors; hence, undermining the export diversification efforts of some oil-exporting countries like Algeria.

To demonstrate the information density of the economic complexity indicators, Hausmann et al. (2013) examine a comparison between the relative contribution to both current and prospective economic growth by using the economic complexity construct and other indicators, which included measures of governance and institutional quality, education-based measures of human capital, measures of competitiveness and measures of financial depth. The study concludes that the complexity indicators are superior to all the other measures as far as the information content for both current and prospective economic growth is concerned. In a related study, Hartmann et al. (2017) use a combination of econometrics technique, network science, and economic complexity, to establish that countries that export more complex products as measured by the economic complexity index exhibit relatively lower levels of income inequality compared to those that produce ubiquitous products. This is made possible due to the co-movement of a country's mix of exported products with multiple complex factors varying from institutions to education, which facilitates inclusiveness in the economy. In effect, the study establishes that the productive structure of a country is relevant not only for improving incomes and economic growth but also the extent of income distribution.

According to Hausmann and Hidalgo (2010), the economic complexity index differs from other measures of diversification, such as the Herfindahl-Hirschman Index and the Entropy Index because, apart from incorporating the concept of ubiquity which reinforced the diversification dimension with the number of countries that possess the capabilities to produce the diverse products, it also offered the opportunity to project the growth prospects of a country. The economic complexity and product space frameworks have been used for several country studies, (Chandra and Rodarte 2009; Hausmann and Jasmina, 2015; Hausmann and Klinger,

2008; Hausmann et al. 2010). Chandra and Rodarte (2009) argue that the crux of development lies in achieving a critical balance between efficiency-improving reforms and economic diversification. Therefore, they undertake a study that use data on Burkina Faso and the economic complexity and product space concepts to demonstrate that in the short to medium term efforts at export diversification should focus on the agricultural sector where some capabilities have been developed. However, the long-term strategy for structural transformation must be for the country to latch on products with higher levels of sophistication. A study by Hausmann and Klinger (2008) use the economic complexity concept to explain the perceived lag in the structural transformation effort of South Africa. The study compares the sophistication of products with the density of the products (referring to the closeness of the product to the country's current export basket and the likelihood of being produced for export by adopting existing capabilities)<sup>23</sup>. The study finds that the agricultural sector in South Africa continued to have the potential to drive the structural transformation effort. The study further finds that labour intensive export activity is quite distanced from South Africa's current structure of production. In a similar study, Cruz and Riker (2012) use the product space tools to highlight the pattern of Brazil's export as well as the prospects for future export diversification given the current mix of export. The study concludes that the measure of distance in the product space is key in predicting changes in each country's comparative advantage and that resource constraints and measures of product ubiquity should be considered in predicting comparative advantage. Using a logit model to predict the probability of gaining comparative advantage in new products, the study further suggests that Brazil gained comparative advantage in agriculture and mineral products.

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<sup>23</sup> The product sophistication reflects its strategic value pointing to its contribution to structural transformation agenda of a country

The concept of product space is further employed by Abdon and Felipe (2011) to illustrate the evolution of sub-Saharan Africa's structural transformation and the prospects for growth and diversification. The evidence points that most of the SSA countries are caught in a "low product" trap where their current export mix reflect less sophisticated products largely in the periphery of the product space and at the same time observes that the products close to their current export basket offer less strategic value for structural transformation. In the case of Rwanda, Hausmann and Jasmina, (2015) apply the product space methodology to identify export products that have the potential to surmount its key constraints in terms of land and natural resources, and transportation costs due to its land-lock location as well as offer the opportunity to improve its average level of sophistication. The study finds more than a hundred new products that are consistent with these strategic criteria and further shows that opportunities abound in processed agriculture products, specialized textiles, footwear and garments and relatively simple manufacturers. In a related study, Abdon and Felipe (2011) argue that products with low-income elasticity of demand are largely found in the periphery of the product space with limited prospects for economic progress.

It is worth noting that Ghana's export diversification strategy is advanced with a focus on NTEs as the key drivers. Hence, it is imperative to examine on a more granular level the types of products Ghana should seek to promote using the concepts of economic complexity and product space. This is intended to shed some light on how the products within Ghana's current export basket either pose as enablers or constraints to its diversification effort. Such an assessment will offer deeper insight into the characteristics of products currently identified for focus as per the country's export diversification drive and the opportunities for promoting Ghana's structural transformation effort and effective diversification of current export base for sustainable economic growth with implications for wealth creation.

### **3.3 Literature on Determinants of Firm-level Export Performance**

#### **3.3.1 Theoretical Literature**

From the theoretical perspective, the factors that influence export performance at the firm-level are generally categorised into two. These are the internal (controllable/firm-specific) factors and external (uncontrollable/environment-specific) factors, (Beleska-Spasova, 2014 and (Pineda et al., 2017). These two key categories are based on two main theories. The internal factors are explained by the resource-based view (RBV) whilst the external factors are explained by the industrial organization theory (Beleska-Spasova, 2014; Pineda, Manuel, Hurtado and Manuel, 2017). The basic assumption underlying the RBV is that the factors influencing export performance are subject to the control of the firm and its management. The original proponents of this theory is Penrose (2009), who perceives a firms as bunch of resources but not of products, as a result, growth of a firm is a product of the dynamic and creative interaction between the available resources and market opportunities, and Barney (1991) and Birger (1995) who examine how a firm's resources can be used to secure sustained competitive advantage. Accordingly, the proponents argue that the ability of a firm to effectively exploit the diverse and accumulated stock of capabilities secured over the years can be translated into improved export performance. In other words, firms can take advantage of their own resources (natural, human and capital) and capabilities to achieve efficiency and competitive advantage in production and create value, (Barney et al, 2001 and Kraaijenbrink et al. 2009). On the other hand, the external factors hinge on the industrial organization theory which is also consistent with the contingency theory. In this case, the proponents argue that the survival of a firm largely depends on its ability to adapt to environmental pressures with an appropriate strategic response to an external impulse, (Beleska-Spasova, 2014, Calantone et al. 2006, and Pineda et al. 2017). In other words, the theory highlights a firm's ability to redefine its strategic focus in the light of evolving environmental and technology conditions, by creating

new strategies or innovative policies to take advantage of the challenges and opportunities emerging, to keep the business afloat.

To shed more light on both the internal and external drivers of firm-level export performance, some conceptual issues must be considered. These border on the fact that both the export performance construct, as well as the determinants, are complex and multidimensional. As such, the connotation and denotations of these constructs continuously evolve and are largely context driven. Hence, the expected relationship between export performance and the determinants, in terms of the impact and direction, is subjected to the particular indicators selected to represent both export performance and/or its determinants (Carneiro et al. 2011).

### ***3.3.1.1 Internal Determinants of Export Performance***

In the literature, the internal determinants or firm controllable characteristics find expression in various dimensions. In some instances, the firm controllable characteristics may reflect management's perception of risk, tolerance for ambiguity, organizational culture, proximity to scarce resources as well as managerial commitment and competence, (Carneiro et al. 2011). Closely related to the above is the firm's export strategy, comprising its competitive strategy, use of intermediates, product mix, product development, pricing, and promotional activity. The internal factors can equally be classified as the characteristics of an organisation (size, international experience, competitive advantage, etc), manager's characteristics (age, formal education, experience, knowledge of foreign language, etc), and manager's expectations (both positive and negative), (Aaby & Slater, 1989; Carneiro et al., 2011, and Zou and Stan, 1998). To provide a consistent and summarized perspective of the internal determinants of firm-level export performance, Nazar et al (2009) develops a synthesised model for the firm-level controllable factors based on previous studies. This is meant to provide a broader understanding of the behaviour of exporters, mainly of SMEs that affect their performance. Accordingly,

three broad subjective categorizations are identified. These are management characteristics, firm's characteristics, and export marketing strategic capabilities. Under the broad concept of management characteristics that suggest that export performance is a product of management's effort, the diverse characteristics constituting the internal determinants are further categorized as, attitudinal characteristics, skill-based characteristics, and behavior characteristics. Regarding the attitudinal characteristics, some of the indicators are management's international orientation, management's export commitment, management's perception about export advantages, barriers, and competitiveness as well as management's customer orientation. Likewise, the skilled-based characteristics capable of stimulating export performance are the manager's experience, educational level, and foreign language proficiency. In the same vein, some of the key indicators that are considered as behavioural characteristics with potential to affect export performance are the manager's involvement in export sales planning, export sales presentation, and adaptive selling and sales support.

The next broad categorisation of the internal determinants of export performance is the firm's characteristics. Some of the indicators that are linked to this are the firm's size, technology level, foreign contacts and networking, firm export market knowledge and export planning.

The final broad category that is considered is the export marketing strategic capabilities that demonstrates the firm's ability to respond to varying marketing conditions to achieve its objectives. Here, a sub-categorisation is also considered. These are the capabilities of the firm to utilise international marketing research (through segmentation and targeting), product capabilities (with indicators like product strength/uniqueness, product adaptation, warranty and customer services), pricing capabilities (ability to adapt the prices and to offer low prices), distributional capabilities (where the key indicators are direct channels, channel relationship, distribution adaptation and delivery time) and promotional capabilities (with also indicators such as advertising, sales promotion, personal selling, promotions adaptation and use of export

promotion programmes), (Aaby and Slater, 1989; Paul et al. 2017; Setegn Bekele, 2018; Sterlacchini, 2001; and Zou and Stan, 1998).

### ***3.3.1.2 External Determinants of Export Performance***

Donaldson (2001) uses the theory of structural contingency to shed some light on the external determinants of export performance. He argues that organisations adapt to changing environmental conditions that affect their operations by redefining its future course of actions with implications for success. This view is consistent with the position of other researchers who assert that these external determinants are largely outside the domain of the firms and may find expression either at the macro environment level in terms of political, economic, social, and technological and geo-climate factors or some micro conditions emanating from suppliers, competitors, intermediaries, and customers (Calantone et al., 2006, and Dragnic, 2014). Roxo et al. (2014) summarise the external conditions that may affect a firm's performance into; foreign market characteristic (legal regulation, cultural dynamics, local business conventions, channel accessibility, and market competition), foreign environmental characteristics (political and legal aspect, global economic/financial condition) and domestic market characteristics (export assistance and other enabling macro-environmental conditions). But for empirical work, some composite indices are created to represent such constructs. Other studies have suggested that sound macroeconomic framework supported by quality institutions can create the enabling conditions to contain costs as well as attract foreign direct investment with potential for positive spillover effect on domestic productive activity to boost export performance (Brancati et al., 2018 and Kalaj, 2015).

In contributing to the discussions on the external determinants of export performance, Jamshidi and Moazemi (2016) examine these constructs in three perceptives (market turbulence, technological turbulence, and competitive intensity). Under the market turbulence, it is suggested that changes in the general market conditions may pose a serious threat to the firm's

operations, which may necessitate some variations in the operational strategies to improve and sustain the export activity. Likewise, in the case of technological turbulence, it is argued that the pace of technological advancement may be such that it may render the firm's productive capacities obsolete and cause the firm to lag the technological frontier. This situation may inspire the firm to innovate in terms of its products and production processes to improve performance and stay in business. Furthermore, in the event of stiff competition in both the foreign and domestic markets, the firm may have to explore costs minimizing mechanisms and ways of improving the quality of products through signaling systems to distinguish itself from its competitors to ensure the survival of the export venture.

Some other researchers have examined how external conditions influence firm-level performance within the context of agglomeration economies, (Chen, 2009; Cohen and Paul, 2005; Liao, 2010; Lin, Li, and Yang, 2011; and Zeki, 2017). Under this condition, the gains to be secured from agglomeration economies emanate from locational factors, which encompasses clustering of firms within an industry and the opportunities for engaging in mutually beneficial interactions including competitive imitations, knowledge and technological spillovers as well as urbanisation factors that make available the pool of skilled and unskilled labour, social infrastructure and effective market among other factors to boost performance.

On the specific role of exchange rate volatility in influencing export performance at the firm-level, the conclusions of the literature as reviewed under section 3.1 at the macro level still apply. The crux of the debate is that the relationship is inconclusive, depending on the assumptions made about the nature of the risk preference of the economic agent. At this juncture we only seek to reinforce earlier discussions with arguments from research works on the relationship between uncertainties and the pace of investment with ultimate impact on firm performance, (Bernanke, 1983; Caballero, 1991; Zhang, 2017). There are various dimensions

and conditions under which uncertainty impacts adversely on investment decisions which can extend to underperformance. Caballero (1991) argues that the combined effects of risk aversion, incomplete markets, and asymmetric adjustment costs can render the relationship between uncertainty and irreversible investment negative. It is equally suggested that uncertainty emanating from the macroeconomic environment can potentially constrain the ability of executives to predict firm-specific information relating to relevant parameters for considering appropriate investment decisions resulting in slack in the pace of investment. Furthermore, it is argued that uncertainty can undermine the prediction of cash flow, an important factor for corporate finance. At the same time, it can affect the risk perception of creditors, inducing them to call for more compensation for risk exposure, leading to increasing costs of financing investment and ultimately retard the pace of investment growth, Zhang (2017) and Bernanke (1983) argue that in a state of flux, where new information keeps evolving, determining the optimal current level of investment is no more a function of long term expected return, underscoring the role of uncertainty. All these arguments support the position that macroeconomic uncertainty (in this case exchange rate volatility interacting with domestic and external deteriorating economic conditions) is likely to lead to firms adopting a wait and see attitude toward investments, resulting in a loss in output due to suboptimal investment as well as overall stunted performance.

### ***3.3.1.3 Conceptualization and Operationalization of the Export Performance Construct***

In general, the export performance construct is an indicator that measures the success or otherwise of the cumulative effects of management effort with regards to the utilization of available resources and the strategic decisions undertaken as well as the contribution of public policy, (Beleska-Spasova, 2014). Though several researchers have attempted to study the subject matter of export performance, the issue of the conceptualization and operationalization

of this construct is still contentious. This can partly be attributed to the complex and multidimensional nature of the export performance construct that makes it difficult to be effectively captured by a single metric. Related to the above is the possibility of conflict amongst measures to be selected to represent this construct, which can lead to a situation where any assessment to be made may be a matter of degree, instead of a straightforward binary outcome. This issue is further complicated by the lack of an appropriate and consistent reference framework and the fragmentation of research findings, resulting in heterogeneity both in research designs and terminologies. However, it has been stressed that the need to identify a reliable and valid metric of export performance is paramount to the assessment of the success of any exporting activity, (Carneiro et al., 2011; Kahiya et al., 2010; and Pineda and Manuel, 2017).

To contribute to this discourse, Katsikeas and Morgan (2000) analyse export performance by using a three-prong perspective, (effectiveness, efficiency, and adaptiveness). The efficiency aspect deals with how the outcome of a firm's policies compare to the resources at its disposal and invested in the process of production. Under the effectiveness dimension, a closer look is taken at the firm's achievements compare with its competitors, whilst the adaptiveness aspect examines how the firm responds successfully to external impulse. Within this context, measures of export sales are used to assess the effectiveness of performance outcomes, whereas export profitability measures are used to assess efficiency in export performance. At the same time, the ability of the firm to innovate in terms of products and production processes in the light of changing environmental conditions is linked to adaptability, (Carneiro et al., 2011; and Katsikeas and Morgan, 2000).

All three dimensions are equally analyzed by using a frame of reference consisting of four-pointers. Firstly, export performance assessment is undertaken by comparing the firm's success with its domestic competitors. Secondly, the firm's success is situated in the context of the

industry within which it operates and thirdly an assessment is made of the extent to which the firm achieved its pre-determined targets and goals. Lastly, for each of the three dimensions of export performance, a temporal perspective is undertaken.

In seeking to operationalise the export performance construct, it emerges that whilst the objectives for the strategic decisions and choices that reflect in export performance vary amongst firms, industries, and policymakers, there are also time dimensions. Hence, attempts at operationalising the export performance construct has resulted in various categorisation schemes being employed under some of the following nomenclatures: objective and subjective measures as well as economic/ financial and non-economic/ non-financial measures,(Beleska-Spasova, 2014; Katsikeas and Morgan, 2000; and Zou and Stan, 1998).

In general, the use of the objective/subjective assessment is to indicate the type of values used to represent export performance. Thus, the objective indicators are measured in absolute terms (such as export sales volume, export profit margin, export market shares, etc.) whilst the subjective indicators are largely perceptual (such as manager's perception of success, satisfaction with export among others). Furthermore, the indicators of export performance are broadly grouped into three: the economic indicators which are largely sales, profit, and market-related, non-economic indicators which are generic in nature and product-related, and miscellaneous indicators that are composite, (Beleska-Spasova, 2014; Pineda and Manuel, 2017; and Sousa, 2004). Examples of the economic indicators are export intensity, export sales growth, export sales return on investment, export market shares, the rate of new market entry, among others. For the non-economic indicators, one can mention export success, meeting expectations, overall performance, and other such indicators. Finally, for the miscellaneous indicators, one can mention, the achievement of objectives regarding response to competitive pressure, building awareness and image, customer satisfaction, product/service quality compare to competitors, (Beleska-Spasova, 2014).

Carneiro et al., (2011, p. 5) aptly summarized the discussions above in the quote below that:

*“In the particular case of the performance construct, since many dimensions and indicators are relevant to measure success (or failure thereof), it may be wise to have an indicator that consolidates several aspects of the construct. For example, overall firm performance vis-à-vis competitors or attainment of objectives, or perceived success, or satisfaction with the results as a whole are indicators that seem to capture a larger picture and simultaneously incorporate several important aspects, other than just those covered by economic or market indicators alone. Such aggregated metrics explicitly or implicitly weigh and consolidate other indicators.”*

Indeed, after some extensive review of the existing literature, Carneiro and Alberto Hemais (2005) conclude that the plethora of indicators used so far to capture the export performance construct lack internal consistency and collective exhaustion due to the complex and multi-dimensional nature of the construct. Other studies have gone further to criticise the use of economic indicators on the basis that it is quite difficult for one to disentangle the attributes of export performance to demonstrate price induced effects, promotion induced effects and short-term strategy to gain experiential knowledge which may reflect in a less than optimal performance, among others, (Beleska-Spasova, 2014; and Chetty and Hamilton, 1993). Thus giving credence to the need to use composite indicators to capture the various dimensions of export performance, (Carneiro et al., 2011). It is worth noting that some firms, especially the Small Medium Enterprises (SMEs) are reluctant to divulge data that borders on economic/financial indicators. In this respect, it would be expedient to use indicators that are non-economic and tend to be perceptual. Hence, this thesis employs a subject measure of export performance by eliciting firm-level data. This is meant to address the problem where SMEs are

reluctant to divulge objective information and to encourage improved responses to the survey to be conducted.

### **3.3.2 Empirical Literature**

Based on the theoretical literature discussed above, numerous empirical studies have been conducted to ascertain the predictors of export performance at the firm-level in different jurisdictions. Sterlacchini (2001) conducts a study on Italian manufacturing firms to ascertain why some firms export more than others. After controlling for factors such as the size of the firm, the nature of the industry, the propensity to take on work subcontracted by other firms affiliation with a business group, and geographical locations among others, the study finds that only within the sub-sample of small firms did size have a positive impact on export intensity. For large firms, the relationship is u-shaped. Large firms take advantage of affiliation with business groups to improve operations, though they suffer depression of their performance due to the intensity of subcontracting. The study also finds innovations to be a key driver of export performance for small firms relying primarily on the product rather than process innovations. Also, in investigating the determinants of export performances of manufacturing firms in Indonesian, Dijk (2002) finds the impact of firm size to be u-shaped, suggesting economies of scale helps firms enter foreign markets but only up to a certain threshold. In the same study foreign ownership of firms is also found to have a positive impact on the propensity to export. Another study by Bekele and Kaur (2018) investigates key predictors of export performance amongst exporting firms in Ethiopia. It is established from the study that firm demographics such as firms' size and age as well as the export managers' overseas experience, years of overseas business and the firm's capital ownership have positive and significant effects on export performance. This is consistent with the findings of Wolf (2007) on the determinants of propensity to export by non-traditional exporters in Ghana, where in line with scale economies,

size is identified as one of the key determinants, however, the effect of size becomes negative once firms enter the export market. In the same study, the age of the firm does not have any significant impact on export intensity.

Though a study by Ayan and Percin (2005) find export marketing strategies (product differentiation, promotion, distribution channels, and price strategy) and managerial characteristics to have positive and significant impact on export performances of Turkish firms, environmental factors and demographic factors (size, age, and export experience) do not have significant impact on export performance. Depending on the indicators used to represent firms' size and the level of experience, Kahiya et al. (2010) found the impact of firm size and the level of experience on export performance to be either positive or negative on New Zealand exporters. The positive relationship applies largely to international new ventures that have overcome the liability of newness and smallness, which also endorses the theories of experiential learning. However, the negative relationship applies in a situation where conventional exporters compromise on agility, alertness, and flexibility. This can also happen in situations where they take advantage of technology and sophisticated networks to improve performance without increasing employment.

Brancati et al., (2018) conducts a study to examine the firm-level drivers of export performance and the external competitiveness of Italian exporters. The study finds that structural characteristics, such as firms' size and productivity have a positive and significant impact on export performance. Additional factors that boost the firm's internationalisation are innovations and R&D, where the same factors also affect external competitiveness both directly and via productivity improvements.

Njikam (2017) undertakes a study on sub-Saharan Africa countries to explore the linkages among several export-market destinations and export performance. The study further examines the relative difference between exporters and non-exporters in terms of performance and self-

selection. Evidence emerged from the study that size, foreign ownership, and past export experience enhance the propensity to export. At the same time, continuing exporters outperform switching ones. The study also establishes that export destination matters and that whilst exporting to South Africa depresses capital intensity, exporting to the USA improves enterprise performance. Also, exporting to China and India improves total factor productivity, labour productivity, and wage rate whilst the same does not hold for exporting to sub-Saharan Africa, suggesting a big challenge for promoting intra-regional trade in Africa.

On the other hand, Boubakri et al. (2013) examine how the perception of export stimuli influence the export performance of industrial firms in Tunisia. The study finds that proactive stimuli reflecting the deliberate propensity of the firm to export tends to have a positive impact on export performance. According to them, the export stimuli comprise: the existence of special managerial interest, identification of better opportunities abroad, possession of exclusive information on foreign markets and favourable exchange rate. A study by Anand et al. (2016) on South Africa's export performance finds that contrary to the view that exchange rate depreciation encourages export performance, this relationship is impaired by the existence of structural factors such as electricity bottlenecks, limited product market competition, and labour market constraints. However, firms that diversify their export activity benefit from currency movements.

Fugazza (2004) suggests in his study that whilst for the South East and Pacific regions both internal factors (related to supply constraints) and external factors (largely related to foreign market access) collectively influence their export performance, the sub-Saharan African countries, on the other hand, have their export performance largely influenced by external factors. However, the study by Niringiye and Tuyiragize (2011) on Uganda's manufacturing exporters suggests that apart from business environmental factors, other internal factors, such as firms' size, capital-labour ratio, Asian ownership, agro-based firms, and chemical firms are

found to have high influence on export propensities. Also, by using a Tobit model to study the determinants of export success in Ghana's horticultural export industry, factors such as the export manager's level of education, experience and training, as well as entrepreneurial orientation, presence of export department, product diversification and government support are identified as having direct influence on the intensity of export success, (Egyir et al. 2012). However, export barriers and constraints in accessing working capital negatively influence the intensity of export success.

The role of export promotion programmes, as an essential component of governments' industrial policy to prop up export performance has been highlighted in the literature, (Helleiner, 2001). Freixanet (2012) undertakes an evaluation of the collective effects of export promotion programmes on export performance by considering a variety of impact dimensions, whilst at the same time differentiating their respective effects on each program. Critical among some of the dimensions examined are: the use of sponsored foreign trade shows, trade missions, foreign trade offices and information programs; degree of program adaptation to company needs; perception about usefulness of the programs depending on manager's ethical origin; costs and benefits analysis of the export support system; mismatch between company needs and government's assistance priorities based on manager's perceptions; and the level of company's international involvement. At the general level, a positive relationship between export promotion programs usage and export diversification as well as several intermediate outcomes are established. However, the study does not find any significant relationship between export promotion programs and export performance. A similar result is found by Wolf (2007) who investigates into factors that influence export performance of the horticultural industry in Ghana. The study attributes this finding to the possibility of the low quality of the services provided. However, Munch and Schaur (2015) finds that in the case of small exporters, export promotion activities boost export performance, raise value addition, employment and

productivity. This is a study conducted to examine the effects of Denmark's export promotion programmes on firm-level export performance.

In general, there seems to be paucity of research studies on the role of macroeconomic uncertainty with a focus on exchange rate volatility on firm-level export performance. Some references can be made to a study by Garret and Andrea (2016) on the effects of exchange rate uncertainty on firms' investment plans using Swiss Survey data. They argue that a sudden erratic movement in the exchange rate does not only result in a first-moment effect but also results in a substantial increase in uncertainty about the future exchange rate. As a key determinant of foreign market prices, the uncertainties evoked by movements in the exchange rate can affect the firm's investment decisions directly. Conditioned on the real-option theory, the study finds uncertainty to hurt irreversible investments in equipment and machinery. It also finds uncertainty to have an immediate effect, which leads to a downward adjustment of firms' investment plans in equipment and machinery.

The current research is similar to the work of Sraha, Raman, and Crick, (2017) in terms of exploring the predictors of the performance of NTEs in Ghana. However, the points of divergence emanate from the different methodologies applied and the role of macroeconomic uncertainty as a key predictor of export performance at the firm-level in Ghana. The former study uses the Partial Least Square Structural equation modelling whilst this research uses the Ordered Logistic modelling for analysis. Also, whilst the role of macroeconomic uncertainties is absent in the former study, it is the focal point for this study.

In concluding this review a quote from Beleska-Spasova (2014, p. 63) may offer some summary of the current state of the literature:

*“Following a comprehensive literature review undertaking in this study the current state of the export performance literature could be summarized as (i) methodologically fragmented in that there is a variety of analytical and*

*methodological approaches, (ii) conceptually diverse, a large number of determinants have been identified as having direct or indirect influence on the firm's export performance, and a large number of indicators have been used to conceptualise and operationalise the export performance measures, and (iii) inconclusive, the studies have produced inconsistent results of the impact of different determinants on export performance”.*

## CHAPTER FOUR

### GHANA'S EXPORT PERFORMANCE: THE ROLE OF EXCHANGE RATE VOLATILITY AND EXCHANGE RATE POLICIES

#### 4.0 Introduction

This chapter presents the empirical analyses of the role exchange rate volatility and exchange rate policies play in the export performance of Ghana. The chapter is organised as follows. Section 4.1 presents the theoretical and econometric models used for investigating the nexus between exchange rate volatility, exchange policies, and export performance. Section 4.2 presents the empirical results and some analysis of the results. Section 4.3 provides conclusions.

#### 4.1 Methodology and Model Specifications

The study of De Grauwe (1988) is used to motivate the econometric model estimated to address the objective of this study. The study is selected because it traces out the theoretical basis and the channel through which exchange rate uncertainty impacts on export performance. However, there is a modification to one of his assumptions. This is further strengthened by the argument of Dellas et al. (1993) that previous studies that perceived as odd or perverse a positive relationship between exchange rate volatility and trade flows, may not be theoretically grounded.

According to De Grauwe (1988) a firm can produce either for the domestic market or the foreign market. This firm has a given amount of resources  $N$ , which can be allocated to both activities. In domestic value terms, the firm is confronted with risk because the foreign price to be obtained is to be converted at an exchange rate, the outcome of which is uncertainty. Therefore, the total net revenue (profit) from the two activities can be stated as:

$$\tilde{\pi} = (\tilde{P}_f q_f - w n_f) + (P_d q_d - w n_d) \quad 4.1$$

where a tilde  $\sim$  on top of the variable indicates a random variable.

$\tilde{P}_f$  - is the price of output sold in the foreign market measured in domestic currency

$\tilde{P}_f = P^* \tilde{\epsilon}$  where  $\tilde{\epsilon}$  is the exchange rate (a random variable) and  $P^*$  is the foreign price of the output sold in the foreign country

$P_d$  - is the price of the output sold in the domestic market

$q_f$  - quantity produced for the foreign market

$q_d$  - quantity produced for the domestic market

$n = n_f + n_d$  where  $n$  is assumed to be fixed

$n_f$  - amount of resources (labour) used in producing for the foreign market

$n_d$  - amount of resources (labour) used in producing for the domestic market

$w$  - the unit resource cost (assumed to be the same, even though the assumption can be relaxed)

where  $q = (\cdot)$  is the firm's production and  $q(0) = 0$

$$q_f = q(n_f)$$

$$q_d = q(n_d) \quad 4.2$$

Using equation 4.2, one can rewrite equation 4.1 as

$$\tilde{\pi} = P^* \tilde{\epsilon} q(n_f) + P_d q(n - n_f) - w n \quad 4.3$$

The  $w n$  is assumed to be a constant in the original specification, which does not affect optimising behavior, thus equation 4.3 is stated as  $\tilde{Z}$  :

$$\tilde{Z} = P^* \tilde{\epsilon} q(n_f) + P_d q(n - n_f) \quad 4.4$$

However, this assumption is modified in this thesis. The crux of the model is that exchange rate,  $\tilde{\epsilon}$ , is a random variable. Assuming the firm is risk-averse and so has a strictly concave utility function,  $U(\tilde{\pi})$ , we can write its expected utility as:

$$\tilde{\pi} = EU_f \{ P_f \tilde{\epsilon} q(n_f) + P_d q(n - n_f) - w(n_d + n_f) \} \quad 4.5$$

Now the producer must decide to choose  $n_f$  that maximizes the expected utility of the total income  $\tilde{\pi}$ , that is:  $Max EU_f(\tilde{\pi})$

$$Max E \left\{ U_f \left( P_f \tilde{\epsilon} q(n_f) + P_d q(n - n_f) - w(n_d + n_f) \right) \right\} \quad 4.6$$

The first-order condition for optimisation then becomes

$$E \left\{ U'_f[\bullet] \left( P_f \tilde{\epsilon} q'(n_f) - P_d q'(n - n_f) - w \right) \right\} = 0 \quad 4.7$$

$$\text{where } [\bullet] = \left( P_f \tilde{\epsilon} q(n_f) + P_d q(n - n_f) - w(n_d + n_f) \right)$$

$$E \left\{ U'_f[\bullet] P_f \tilde{\epsilon} q'(n_f) \right\} = E \left\{ U'_f[\bullet] \left( P_d q'(n - n_f) + w \right) \right\} \quad 4.8$$

Since the expectation is separable, we can specify (4.8) as:

$$E \left\{ U'_f[\bullet] \right\} E \left\{ P_f \tilde{\epsilon} q'(n_f) \right\} = E \left\{ U'_f[\bullet] \right\} E \left\{ \left( P_d q'(n - n_f) + w \right) \right\} \quad 4.9$$

$$E \left\{ P_f \tilde{\epsilon} q'(n_f) \right\} = P_d q'(n - n_f) + w \quad 4.10$$

The optimal condition can be rewritten as

$$E\tilde{\epsilon} = \frac{P_d q'(n - n_f) + w}{P_f q'(n_f)} \quad 4.11$$

The next stage is to show how a “mean preserving” spread in  $\tilde{\epsilon}$  affects  $EU'_f \tilde{\epsilon}$ . If the variability of the exchange rate increases the expected marginal utility of income from export, then this increased variability will lead to an expansion in export activity. On the other hand, if a higher

spread of  $\tilde{e}$  leads to a lower expected marginal utility of export revenue, then the producer will reduce export activity.

In this respect, the point of contention now is whether  $U'_f \tilde{e}$  is convex or concave in  $\tilde{e}$ . A convex function suggests that the mean preserving increase in the spread of  $\tilde{e}$  will increase the expected value of the function  $U'_f \tilde{e}$ .

Twice differentiating the  $U'_f \tilde{e}$  function with respect to  $e$  will help establish the conditions to secure either a convex or concave outcome.

$$\frac{d^2 U'_f \tilde{e}}{de^2} = \frac{1}{e^2} [\sigma(1-\sigma) + \sigma'_f \tilde{\pi}_f] \quad 4.12$$

Where  $\sigma = \frac{U''_f \tilde{\pi}_f}{U'_f}$  is the coefficient of relative risk aversion and  $\tilde{\pi}_f = P_f \tilde{e} q(n_f) - wn_f$  is the export revenue.

If equation 4.12 is positive (negative), then the function  $U'_f \tilde{e}$  is convex (concave). The degree of risk aversion determines the convexity or concavity of the function. Assume that the coefficient of the relative risk aversion ( $\sigma$ ) is constant, then  $\sigma' = 0$ . From this, it can be deduced that convexity holds if  $\sigma > 1$ , and concavity holds if  $\sigma < 1$ . Therefore, for a sufficiently risk-averse producer,  $\sigma > 1$ , an increase in exchange rate volatility raises the expected marginal utility of export revenue and thus supports expansion in export activity. On the contrary, a producer with minimal risk aversion  $\sigma < 1$ , increase in exchange rate variability reduces the expected marginal utility of export revenue and therefore induces contraction in export.

The economic intuition is that very risk-averse individuals dread worse possible outcomes. They are therefore more likely to increase export activity to preempt steep reduction in export revenue. However, moderately risk-averse agents are least perturbed about extreme outcomes. Therefore, they are likely to constrain export activity now, since they find potential returns to

be less rewarding given the increase in risk. In other words, an increase in risk has both substitution and an income effect. The substitution effect is associated with a decline in exporting activity because of diminished expected returns, whilst the income effect is the reverse. If the positive income effect dominates the negative substitution effect, then the higher exchange rate variability will lead to higher export activity.

The results can now be generalised by dropping the assumption that  $\sigma' = 0$ .

Higher exchange rate risk then leads to more export if  $\sigma(1-\sigma) + \sigma'_f \tilde{\pi}_f < 0$  and to less export, if  $\sigma(1-\sigma) + \sigma'_f \tilde{\pi}_f > 0$ . If  $\sigma'$  is negative (i.e. if risk aversion declines with the level of revenue), a lower degree of risk aversion is required for export to be influenced positively. If  $\sigma'$  is positive, the degree of risk aversion that leads to more export is increased.

The above analysis implicitly assumes the absence of hedging opportunities; however, some studies have suggested that a relaxation of this assumption would not change the propositions established above. This is because hedging facilities may not be available to all exporters and that their respective behaviour towards such schemes can be different. Besides, the cost implications may be so prohibitive that it can increase export prices and discourage export activities (Cote, 1994; Obstfeld and Rogoff, 1998).

#### **4.1.1 Econometric Model for the Export Equations**

The econometric models for estimating the export models are designed to fit the theoretical model discussed above and are similar to those of Savvides (1992) and Musonda (2008). The models reflect standard “two-country” models of international trade. These models are adopted to ensure that the final export models to be estimated will control for both demand and supply conditions of export.

Hence, export demand is specified as a function of foreign income and relative prices (foreign):

$$EX^d = EX^d(Y^f, P_x^f) \quad 4.13$$

where  $EX^d$  is the demand for real export of a country,  $Y^f$  is the level of real foreign income,  $P_x^f = P_E/EP^f$  is the relative price of exportables abroad,  $P_E$  is the price of the exportables in domestic currency,  $E$  is the price of a unit of foreign exchange in domestic currency, and  $P^f$  is the foreign price level.

The export supply, on the other hand, is expressed as a function of domestic relative prices, exchange rate volatility, exchange rate policy, terms of trade and domestic income:

$$EX^s = EX^s(P_x, VOL, TOT, TB, Y^d) \quad 4.14$$

where,  $EX^s$  is the real supply of export;  $P_x = P_E/P$  is the domestic relative price of exportables;  $P$  is the domestic price level;  $VOL$  is the exchange rate volatility measure;  $TOT$  is terms of trade index;  $TB$  is anti-export bias, a measure to proxy exchange rate policies and the incentive structure embedded in the policies, in the spirit of Bhagwati (1988), and  $Y^d$  is domestic GDP to measure domestic productivity, in the spirit of De Grauwe (1988).

The relative price of exportables abroad can be expressed as:

$$P_x^f = P_x/Q, \quad 4.15$$

where  $Q = EP^f/P$  is the real exchange rate.

The functions (4.13) and (4.14) can be expressed in logarithm form (with lower case alphabets denoting natural logs, except for VOL) as:

$$ex^d = \phi_0 + \phi_1 y^f + \phi_2 p_x + \phi_3 q + \mu \quad 4.16$$

$$ex^s = \phi_0 + \phi_1 p_x + \phi_2 VOL + \phi_3 tot + \phi_4 tb + \phi_5 y^d + \varepsilon \quad 4.17$$

where  $\mu$  and  $\varepsilon$  are random error terms.

If we assume equilibrium in the market ( $ex^d = ex^s$ ), we can solve for  $p_x$  from (4.17) and substitute the results into equation (4.16) to obtain the reduced form for the volume of export in (4.18) as :

$$p_x = -\frac{\phi_0}{\phi_1} + \frac{1}{\phi_1} ex - \frac{\phi_2}{\phi_1} VOL - \frac{\phi_3}{\phi_1} tot - \frac{\phi_4}{\phi_1} tb - \frac{\phi_5}{\phi_1} y^d - \frac{1}{\phi_1} \varepsilon$$

$$ex_t^e = \frac{\varphi_0\phi_1 + \varphi_2\phi_0}{H} + \frac{\varphi_1\phi_1}{H} y^f + \frac{\varphi_3\phi_1}{H} q + \frac{\varphi_2\phi_3}{H} tot + \frac{\varphi_2\phi_2}{H} VOL + \frac{\varphi_2\phi_4}{H} tb + \frac{\varphi_2\phi_5}{H} y^d + \vartheta \quad 4.18$$

where  $H = \varphi_2 + \phi_1$  and  $\vartheta = \varepsilon + \phi_1 \mu / H$

Equation 4.18 can also be expressed as;

$$ex_t^e = \varpi_0 + \varpi_1 y_t^f + \varpi_2 q_t + \varpi_3 tot_t + \varpi_4 vol_t + \varpi_5 tb_t + \varpi_6 y_t^d + \vartheta \quad 4.19$$

$\varpi$  = coefficients

$\vartheta$  = error term

One can infer from equation 4.19 that variations in a country's equilibrium real export can be explained by variations in foreign real income, real effective exchange rate, terms of trade, exchange rate volatility, anti-export bias policies and domestic productivity. Increase in the home country's GDP ( $y^d$ ) is expected to have a positive impact on export performance, especially if it relates to removing domestic capacity constraints, like energy and imported inputs. Similarly, one would expect increases in real GDP of trading partners ( $y^f$ ) to have a direct impact on export. A real effective exchange rate depreciation ( $q$ ) may lead to an increase in export due to the relative price effect. In addition, it is expected that improvement in TOT may improve export performance, thus the a priori sign is positive. The response of export volumes to exchange rate uncertainties is not conclusive, for which reason this thesis seeks to investigate. TB is the ratio of import and export weighted real effective exchange rates (REERm and REERe) and will be used to proxy anti export bias, (where  $REERm > REERs$  is

anti-export bias;  $REER_m \approx REER_e$  is export promoting; and  $REER_m < REER_e$  is ultra-export-promoting, (Bhagwati, 1988))<sup>24</sup>.

#### 4.1.2 Data Sources

Quarterly data on real effective exchange rates are obtained from the Bank of Ghana (BOG). Total export figures including their various components, traditional and non-traditional (other export) are also obtained from the BOG. Bank of Ghana's definition of NTEs excludes Cocoa Products, however Ghana Export Promotion Authority (GEPA) defines NTEs to include Cocoa Products. Therefore, to get something close to the definition of GEPA, data on Cocoa products was extracted from the BoG data and added to that of the BoG definition of NTEs. Traditional exports like gold, manganese, bauxite and crude oil was constituted to form Natural resources for the purpose of this study.

Due to the issue of possible multicollinearity between export and GDP, a proxy for economic activity, constructed by the Bank of Ghana to gauge domestic activity is used as an alternative. This proxy is called the Real Composite Index of Economic Activity (RCIEA) comprising ten indicators. A new index comprising nine indicators is constructed to exclude export<sup>25</sup>. Industrial Production Index for advanced economies is used to proxy foreign income and this was accessed from the International Finance Statistics (IFS) 2018 of the IMF. A composite Industrial production index is constructed using the export share of some advanced countries constituting about 56 percent of total export. Exchange rate volatility is generated using, standard deviation and extensions of the GARCH models; TGARCH and EGARCH. Consumer Price Index (CPI) data from Ghana Statistical Service. The author also used the imports and

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<sup>24</sup> According to Bhagwati, (1988), effective exchange rate for export (EER<sub>x</sub>) apart from the exchange rates parity also includes any export subsidy, tax credits and special credits. Similarly, effective exchange rates for imports (EER<sub>m</sub>), constitute the exchange rate parity, import duty, import premium resulting from quantitative restrictions and other charges. Therefore we use real effective exchange rate for export (REER<sub>e</sub>) and real effective exchange rates for imports to proxy EER<sub>x</sub> and EER<sub>m</sub> respectively.

<sup>25</sup> We used the non-econometric method applied by Anguyo (2011) to construct a Composite Index of Economic Activity for Uganda. The same technique is used by the Conference Board to gauge economic activity

export weighted real effective rates generated by the Bank of Ghana to derive the anti-trade bias measure, as a proxy for exchange rate policy. A dummy variable was included to capture the period of the commencement of the production of Ghana's crude oil<sup>26</sup>.

#### 4.1.3 Estimation Technique for the Export Models

The thesis employs the Autoregressive Distributed Lag (ARDL) bounds testing approach to examine the impact of exchange rate volatility on export (both traditional and non-traditional) in Ghana. The ARDL is used to establish a potential cointegration between the exchange rate volatility and total export on one hand, and exchange rate volatility and the components of total export on the other hand. This is because most time series variables normally tend to be non-stationary. However, they may co-move overtime and ultimately share a common stochastic trend. The choice of the ARDL model is because macroeconomic variables in most developing countries like Ghana exhibit unit root and tend to be integrated of different orders<sup>27</sup>. The ARDL model is better placed to deal with such situations. Within the ARDL model, the dependent and independent variables are related not only contemporaneously but also the past values of the dependent and independent variables. This helps to address the problem of serial correlation. The approach was popularised by Pesaran and Shin, (1997) and further extended by Pesaran et al. (2001). The general ARDL ( $p, q_1, \dots, q_k$ ) model for estimation can be specified as:

$$\Psi(L)y_t = \alpha_0 + \alpha_1 t + \sum_{j=1}^k \beta_j(L)x_{j,t} + \varepsilon_t \quad 4.20$$

where  $y_t$  is the dependent variable and  $x_1, \dots, x_k$  are  $k$  explanatory variables,  $\varepsilon_t$  are the innovations,  $\alpha_0$  is a constant term, and  $\alpha_1, \psi, \beta_j$  are the coefficients associated with a linear

<sup>26</sup> Check appendix 4.A1 for details on variables construction

<sup>27</sup> ARDL will be ill suited in cases where the order of integration for variables is 2 or more

trend, lags of  $y_t$ , and lags of the  $k$  regressors  $x_{j,t}$  for  $j = 1, \dots, k$ .  $L$  denotes the lag operator,  $\psi(L)$  and  $\beta_j(L)$  as the lag polynomials defined as:

$$\Psi(L) = 1 - \sum_{i=1}^p \psi_i L^i \text{ and } \beta_j(L) = 1 - \sum_{l_j=1}^{q_l} \beta_{jl_j} L^{l_j}$$

Flowing from above, both the long-run relation and the short-run dynamics of equation 4.20 can be expressed in an unrestricted error-correction modeling form as:

$$\begin{aligned} \Delta \ln ex_t = & \theta_0 + \rho t + \sum_{i=1}^p \theta_{1i} \Delta \ln ex_{t-i} + \sum_{j=1}^a \theta_{2j} \Delta \ln y_{t-j}^f + \sum_{j=1}^b \theta_{3j} \Delta \ln q_{t-j} + \\ & \sum_{j=1}^c \theta_{4j} \Delta vol_{t-j} + \sum_{j=1}^g \theta_{5j} \Delta \ln tb_{t-j} + \sum_{j=1}^h \theta_{6j} \Delta \ln y_{t-j}^d + \theta_7 \ln ex_{t-1} + \\ & \theta_8 \ln y_{t-1}^f + \theta_9 \ln q_{t-1} + \theta_{10} vol_{t-1} + \theta_{11} \ln tb_{t-1} + \theta_{12} \ln y_{t-1}^d + \epsilon_t \end{aligned} \quad 4.21$$

where  $\theta_i$  are the coefficients and  $\epsilon_t$  are the independent and identically distributed innovations and the dependent and independent variables are as defined under section 4.1.1. The  $p, a, b, c, g, h$  represents ARDL ( $p, a, b, c, g, h$ ) are lags on first difference of explanatory variables selected in this case by using the SBC information criterion.

The next stage is to perform bounds test by using the joint F-statistics to test the long-run effect which is normalised on  $ex_t$  with the null  $H_0: \theta_7 = \theta_8 = \theta_9 = \theta_{10} = \theta_{11} = \theta_{12} = 0$ , against the  $H_0 = 0$  is not true. The computed F-statistics is compared with the two sets of critical values, categorised into upper bounds I (1) and lower bounds I (0). In the case where the computed F-statistics falls beyond the upper bounds I (1), the null is rejected in favour of the alternative of establishing a level long-run relationship. On the other hand, if the estimated value of the F-statistics falls below the lower bounds I (0), then the null is accepted and there is no cointegration. However, if the computed F-statistics falls between the upper and lower bounds, then the decision is not conclusive.

If the bounds test establishes a co-integration relationship, (a level relationship between export activity and its determinants), then a long-run equilibrium relationship as specified in equation (4.20) can be estimated in addition to the usual ECM as specified in the form (Giles, 2006):

$$\begin{aligned} \Delta \ln ex_t = & \xi_0 + \rho t + \sum_{i=1}^p \xi_{1i} \Delta \ln ex_{t-i} + \sum_{j=1}^a \xi_{2j} \Delta \ln y_{t-j}^f + \sum_{j=1}^b \xi_{3j} \Delta \ln q_{t-j} + \\ & \sum_{j=1}^c \xi_{4j} \Delta vol_{t-j} + \sum_{j=1}^g \xi_{5j} \Delta \ln tb_{t-j} + \sum_{j=1}^h \xi_{6j} \Delta \ln y_{t-j}^d + \Theta z_{t-1} + \epsilon_t \end{aligned} \quad 4.22$$

where  $\xi_i$ , are coefficients of the dependent variables and  $\Theta$ , is the coefficient of the error correction term  $z_{t-1} = (\ln ex_{t-1} - \bar{\omega}_0 - \bar{\omega}_1 \ln y_{t-1}^f - \bar{\omega}_2 \ln q_{t-1} - \bar{\omega}_3 vol_{t-1} - \bar{\omega}_4 \ln tb_{t-1} - \bar{\omega}_5 \ln y_{t-1}^d)$  and it is expected to be negative.

As has been suggested under the theoretical literature review, some economists attribute the apparent controversy regarding the relationship between international trade flows and exchange rate uncertainty to the use of linear models. They, therefore, advocate for the use of models that consider nonlinearity with the consequence that exporters may respond differently to increased and decreased exchange rates volatility. Therefore, to test for the hypothesis of the possible existence of nonlinear relationship between exchange rate volatility and total export (in particular non-traditional export) both in the short-run and long-run, the study adopts the approach used by Bahmani-Oskooee and Aftab (2017) and Bahmani-oskooee and Bahmani (2015) but credited to Shin, Yu, and Greenwood-Nimmo (2014) to decompose the movements in exchange rate volatility into its positive and negative partial sums as:

$vol = vol_0 + vol_t^+ + vol_t^-$ , where  $vol_t^-$  and  $vol_t^+$  are the negative (sum of decreased volatility) and positive (sum of increased volatility) movements in the exchange rate volatility representing the partial sum process. Specifically:

$$vol_t^+ = \sum_{j=1}^c \Delta vol_t^+ = \sum_{j=1}^c \max(\Delta \ln ex_j, 0), vol_t^- = \sum_{j=1}^c \Delta vol_t^- = \sum_{j=1}^c \min(\Delta \ln ex_j, 0)$$

Therefore, the non-linear version of equation 4.22 can be specified as:

$$\begin{aligned}
 \Delta \ln ex_t = & \theta_0 + \rho t + \sum_{i=1}^p \theta_{1i} \Delta \ln ex_{t-i} + \sum_{j=1}^a \theta_{2j} \Delta \ln y_{t-j}^f + \sum_{j=1}^b \theta_{3j} \Delta \ln q_{t-j} + \sum_{j=1}^c \theta_{4aj} \Delta vol_{t-j}^+ + \\
 & \sum_{j=1}^c \theta_{4bj} \Delta vol_{t-j}^- + \sum_{j=1}^g \theta_{5j} \Delta \ln tb_{t-j} + \sum_{j=1}^h \theta_{6j} \Delta \ln y_{t-j}^d + \theta_7 \ln ex_{t-1} + \\
 & \theta_8 \ln y_{t-1}^f + \theta_9 \ln q_{t-1} + \theta_{10a} vol_{t-1}^+ + \theta_{10b} vol_{t-1}^- + \theta_{11} \ln tb_{t-1} + \theta_{12} \ln y_{t-1}^d + \epsilon_t
 \end{aligned} \tag{4.23}$$

Similarly, the non-linear version of equation 4.23 can be specified as:

$$\begin{aligned}
 \Delta \ln ex_t = & \xi_0 + \rho t + \sum_{i=1}^p \xi_{1i} \Delta \ln ex_{t-i} + \sum_{j=1}^a \xi_{2j} \Delta \ln y_{t-j}^f + \sum_{j=1}^b \xi_{3j} \Delta \ln q_{t-j} + \sum_{j=1}^c \xi_{4aj} \Delta vol_{t-j}^+ + \\
 & \sum_{j=1}^c \xi_{4bj} \Delta vol_{t-j}^- + \sum_{j=1}^g \xi_{5j} \Delta \ln tb_{t-j} + \sum_{j=1}^h \xi_{6j} \Delta \ln y_{t-j}^d + \Theta z_{t-1} + \epsilon_t
 \end{aligned} \tag{4.24}$$

where  $z_{t-1} = (\ln ex_{t-1} - \varpi_0 - \varpi_1 \ln y_{t-1}^f - \varpi_2 \ln q_{t-1} - \varpi_{3a} vol_{t-1}^+ - \varpi_{3b} vol_{t-1}^- - \varpi_4 \ln tb_{t-1} - \varpi_5 \ln y_{t-1}^d)$

Accordingly, the bounds testing approach of Pesaran et al., (2001) can be used to evaluate the long run relationship between the dependent and the independent variables.

To make some determination regarding the extent of asymmetries association with the non-linear model, Bahmani-Oskooee and Maki-Nayeri (2018) spell out some criteria to follow. Firstly, to the extent that the lag order of  $Vol^+$  is different from that of  $Vol^-$ , there is evidence of short-run adjustment asymmetry, suggesting that export performance responds at varying speed to an increase in exchange rate volatility compare with a decrease in exchange rate volatility. Secondly, short run asymmetric effects of changes in exchange rate volatility is established in a situation where given a lag order such as  $j=1$ , the estimate of the coefficient  $\theta_{4a}$  in equation 4.23 differs from that of  $\theta_{4b}$ . In addition, stronger short-run cumulative or impact asymmetric effects will be established if we reject the null hypothesis of  $\sum_{j=1}^c \theta_{4aj} = \sum_{j=1}^c \theta_{4bj}$ . The Wald's test is commonly used to test this hypothesis. Finally, to establish long run asymmetric effects of exchange rate volatility, we must reject the null hypothesis of  $\theta_{10a} / -\theta_7 = \theta_{10b} / -\theta_7$ .

The proponents of the ARDL approach argue that it is superior to the conventional type of cointegration techniques because it is endowed with some advantages bereft of the other techniques. Some of the essential qualities of the approach are:

1. Its ability to handle small sample size study, Pesaran et al, (2001).
2. It can be used to estimate the short- and long-run components of the model simultaneously by removing problems associated with omitted variables and autocorrelation
3. The standard Wald or F statistics used in the bounds test has a non-standard distribution under the null hypothesis of a no-cointegration relationship between the examined variables, irrespective of whether the underlying variables are  $I(0)$ ,  $I(1)$  or fractionally integrated.
4. This technique generally addresses the issue of endogeneity and provides unbiased estimates of the long-run model as well as valid t-statistics, Harris and Sollis (2003), Inder (1993) and Pesaran and Shin (1997) have shown that the inclusion of the dynamics may correct the endogeneity bias.

#### **4.1.4 Exchange Rate Volatility**

There seems to be a consensus among economists that exchange rate uncertainty can be represented by exchange rate volatility. However, there is no consensus in the literature on the best technique by which exchange rate risk can be appropriately quantified, (Mckenzie and Melbourne, 1999). This thesis estimates exchange rate volatility by using the TARARCH and EGARCH models. The TARARCH and EGARCH models are used because they allowed for asymmetric effect in terms of the relative impact of bad and good news in the financial system. The normal GARCH model suggests that volatility changes with both the lagged innovations and the momentum of the system and the impact is symmetric (Carter et al, 2011). Thus,

following the TARARCH model, the log difference of the exchange rate is assumed to follow a random walk process with drift as:

$$e_t = \alpha_0 + \alpha_1 e_{t-1} + \mu_t \quad 4.25$$

where  $\mu_t \sim N(0, h_t)$ , and the conditional variance is specified as:

$$h_t = \delta + \theta_1 e_{t-1}^2 + \gamma d_{t-1} e_{t-1}^2 + \beta_1 h_{t-1} \quad 4.26$$

$$d_t = \begin{cases} 1, & e_t < 0 & (\text{bad news}) \\ 0, & e_t \geq 0 & (\text{good news}) \end{cases}$$

where  $\gamma$  is known as the asymmetry/leverage term. If  $\gamma=0$ , the model reduces to the standard GARCH model. For a positive shock (good news) the impact on volatility is  $\theta_1$ , but for a negative shock (bad news) the effect on volatility is measured by  $\theta_1 + \gamma$ . Thus, if  $\gamma$  is positive and significant, the effect on  $h_t$  (the measure of volatility) is steeper. A variant of this volatility measure, EGARCH, where the leverage term is exponential instead of the quadratic leverage term for the TARARCH measure is also considered. According to Sjö (2012), in estimating the EGARCH, the parameters are forced to be positive, consistent with modeling of variance. Also, it allows for an asymmetric effect in the response to negative and positive shocks in the error term. In the EVIEWS help manual 2015, the EGARCH (1,1) is specified as:

$$\log h_t = \omega + \beta_1 \log h_{t-1} + \alpha_1 \frac{|\varepsilon_{t-1}|}{\sqrt{h_{t-1}}} + \gamma_1 \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} \quad 4.27$$

but the output comes out as

$$\log h_t = c(2) + c(3) \frac{|\varepsilon_{t-1}|}{\sqrt{h_{t-1}}} + c(4) \frac{\varepsilon_{t-1}}{\sqrt{h_{t-1}}} + c(5) \log h_{t-1} \quad 4.28$$

In this form, if  $c(4)$  is significant, then there is an asymmetric effect. Also, if  $c(4)$  is negative, then negative shocks increase volatility. The parameter  $c(5)$  measures the persistence in shocks. Therefore, in the next section, we shall use ARDL and NARDL techniques to estimate both the linear and non-linear export equations generated above and equally estimate the exchange rate volatility variables.

## 4.2 Empirical Results and Analysis

This section of the thesis presents the results on a test for stationarity of the variables as well as the diagnostic statistics of the models. Subsequently, the results of the empirical models, their analysis and the policy implications of the outcomes are presented.

### 4.2.1 Unit Root Test

As mentioned earlier, most macroeconomic variables of developing countries are either non-stationary or integrated of different orders which tend to justify the use of the ARDL model for analysis.

**Table 4.1: Results of Unit Root Test**

Variables	Augmented Dicker Fuller (ADF) Test					Phillip-Perron (PP) Test				
	None	Intercept	Constant & Trend	First Difference	Order of Integration	None	Constant	Const & Trend	First Difference	Order of Integration
LRNTE	[0.6510]	[0.8140]	[0.0024]	[0.0017]	I(0)***	[0.3675]	[0.3314]	[0.0011]	[0.0000]	I(0)***
LRCOCBEA	[0.5559]	[0.6658]	[0.0275]	[0.0000]	I(0)**	[0.0000]	[0.0000]	[0.0001]	[0.0000]	I(0)***
LRNATURES	[0.5434]	[0.6052]	[0.6148]	[0.0303]	I(1)**	[0.7877]	[0.6635]	[0.0282]	[0.0000]	I(0)**
LREXP ( <i>ex</i> )	[0.9653]	[0.9035]	[0.7538]	[0.0000]	I(1)***	[0.9650]	[0.8321]	[0.1244]	[0.0000]	I(1)***
LREER ( <i>q</i> )	[0.5977]	[0.3158]	[0.5617]	[0.0000]	I(1)***	[0.5905]	[0.2661]	[0.5103]	[0.0000]	I(1)***
LRCIEA ( <i>y<sup>d</sup></i> )	[1.0000]	[0.7445]	[0.6731]	[0.0000]	I(1)***	[1.0000]	[0.6912]	[0.7890]	[0.0000]	I(1)***
LIPEX_A ( <i>y<sup>f</sup></i> )	[0.8285]	[0.2749]	[0.5089]	[0.0001]	I(1)***	[0.7835]	[0.1089]	[0.2303]	[0.0000]	I(1)***
LIPEX_C ( <i>y<sup>f</sup></i> )	[0.8838]	[0.0520]	[0.0353]	[0.0232]	I(0)**	[0.9344]	[0.0018]	[0.0040]	[0.0001]	I(0)***
LTRADBIAS	[0.2408]	[0.3205]	[0.6208]	[0.0000]	I(1)***	[0.1980]	[0.2264]	[0.5026]	[0.0000]	I(1)***
VOL1	[0.0001]	[0.0000]	[0.0000]	[0.0000]	I(0)***	[0.0001]	[0.0000]	[0.0000]	[0.0001]	I(0)***
VOL2	[0.0001]	[0.0000]	[0.0000]	[0.0000]	I(0)***	[0.0001]	[0.0000]	[0.0000]	[0.0001]	I(0)***
VOL3	[0.0780]	[0.0000]	[0.0000]	[0.0000]	I(0)***	[0.0011]	[0.0001]	[0.0004]	[0.0000]	I(0)***
VOL4	[0.0000]	[0.0000]	[0.0000]	[0.0000]	I(0)***	[0.0000]	[0.0000]	[0.0000]	[0.0001]	I(0)***
VOL5	[0.0549]	[0.0000]	[0.0000]	[0.0000]	I(0)***	[0.0000]	[0.0000]	[0.0000]	[0.0001]	I(0)***

Note: The values in the square brackets are p-values, \*\*\* & \*\* are 1% and 5% levels of significance.

A unit root test is conducted to check the order of integration of the time series variables to be used. We use both the Augmented Dickey-Fuller (ADF) and Phillips and Perron (PP) methods of unit root tests and report the results in table 4.1. For each of the series, either under the ADF

test or the PP test, we consider whether there is a trend or difference stationarity<sup>28</sup>. Under the first three columns of table 4.1 each test considers trend stationarity with the following options: includes a constant, a constant and trend or none in the test equation. The fourth columns then consider the difference stationarity. The results from table 4.1, suggest that the series are of different orders of integration<sup>29</sup>. Some are stationary at levels, whilst other variables are stationary after first differencing as confirmed by both test statistics. This situation confirms the necessity for using the ARDL framework to establish a cointegration relation amongst the variables. The descriptive statistics of the variables are presented in appendix 4.A2.

#### **4.2.2 Bounds Tests for Long-run Co-integration (Linear technique)**

In this section, equation (4.19) is estimated for the real total export and all its components (Non-traditional export, Cocoa Beans and Natural resources) using a maximum lag of 6 on each first differenced variable after employing the Schwarz Information Criterion to select the optimal model. The results from the estimated equations are used to verify whether there exist a long run relationship between total export and its components and the key drivers. The results are presented in Table 3. To find out the long-run relationship between total export and the components and the determinants, F-statistics are computed and compared with the critical values bound on Table 4.2 to establish the nature of the relationship as espoused by Pesaran et al.2001.

Except for the model for cocoa beans (RCOCOBEA), all the computed F-statistics values for the other models exceeded the upper bounds of the critical values at the 1% percent level of

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<sup>28</sup> According to Baldev (1989) for macroeconomic variables that are difference stationary, any short-run shocks have effect on the level of the variable permanently. However, if the variable is trend stationary, then short-run shocks have transient impact on the long run evolution of the series.

<sup>29</sup> Full description of the series is presented in the appendix 4.A1, however LRNTE is log of real non-traditional export; LRCOCOBEA is log of real cocoa beans; LRNATURES is log of natural resources; LREX is log of real total export; LREER is log of real effective exchange rates; LIPEX\_A is log of industrial production index for advanced countries; LIPEX\_C is log of industrial production index for selected countries; LRCIEA log of real composite index of economic activity; LTRADBIAS if the log of trade bias measure; finally the measures of exchange rate volatility

significance, suggesting the existence of a clear level long-run relationship between the respective dependent variables and their explanatory variables. The null hypothesis is rejected.

**Table 4.2: ARDL bounds test for linear models**

Null Hypothesis: No long-run relationship									
	RNTE		RCOCOBEA		RNATURES		REXP		
F-Statistic	9.47		2.74		15.79		4.65		
	Critical Value		Critical Value		Critical Value		Critical Value		
	Bounds		Bounds		Bounds		Bounds		
10%	2.26	3.35	2.26	3.35	2.12	3.23	2.12	3.23	
5%	2.62	3.79	2.62	3.79	2.45	3.61	2.45	3.61	
2.5%	2.96	4.18	2.96	4.18	2.75	3.99	2.75	3.99	
1%	3.14	4.68	3.14	4.68	3.15	4.43	3.15	4.43	

For the Cocoa beans model, since the computed F-statistics falls within the calculated critical values, at the 5% level of significance, the decision is not conclusive. The estimation of the short-run error correction model will help us to establish whether there is a cointegration relationship by examining the sign of the error correction coefficient (if it is negative) and the level of significance.

#### 4.2.3 Diagnostic Analysis (Linear technique)

To ensure that the models are robust and reliable for the necessary statistical inferences to be drawn, the necessary diagnostic tests are conducted. In other words, there is a need to validate the models to ensure that they fit the data well. Some of the key diagnostic tests considered here are normality, serial correlation, and heteroscedasticity tests. It will be noted that the presence of serial correlation suggests that standard errors are no longer unbiased and as such

hypothesis tests may be invalid. The absence of normality, on the other hand, suggests some of the data points influence more than other data, thus rendering the regression coefficient to be less reliable. In addition, the presence of heteroscedasticity in a model causes the regression coefficient to be less reliable and makes it difficult to forecast true standard error, hence making the confidence interval of the regression coefficient large. The results of the diagnostic tests are presented in Table 4.3. For all the models the high R-squared values suggest that they have high explanatory power. Besides, for all cases, the Ramsey Reset tests suggest that the models are well specified to reflect the desired functional form, whilst the LM tests confirm the absence of serial correlation.

**Table 4.3: Diagnostic Test for the Various Models**

	RNTE		RCOCOBEA		RNATURES		REXP	
	Values	P-Values	Values	P-Values	Values	P-Values	Values	P-Values
Ramsey RESET	1.6057	0.2103	1.4407	0.2354	0.0124	0.9117	0.2915	0.5920
$\chi^2N$	0.2236	0.8942	1.1696	0.5572	0.6960	0.7061	0.0846	0.9586
$\chi^2SC$	1.5856	0.4526	0.0890	0.9565	0.8650	0.6489	0.0722	0.9645
$\chi^2AR$	0.3360	0.5621	0.0499	0.8232	0.0000	0.9974	0.0917	0.7620
$\chi^2W$	41.0490	0.5562	59.3433	0.2555				
$\chi^2H$	10.7318	0.2174	13.8629	0.1273	29.7276	0.0554	4.7736	0.9992
R-Squared	0.9064		0.7552		0.9719		0.9778	

Note:  $\chi^2N$ ,  $\chi^2SC$ ,  $\chi^2AR$ ,  $\chi^2W$ , &  $\chi^2H$  are the tests for normality, serial correlation, and Arch, White and Breusch Pagan Godfrey tests for heteroscedasticity

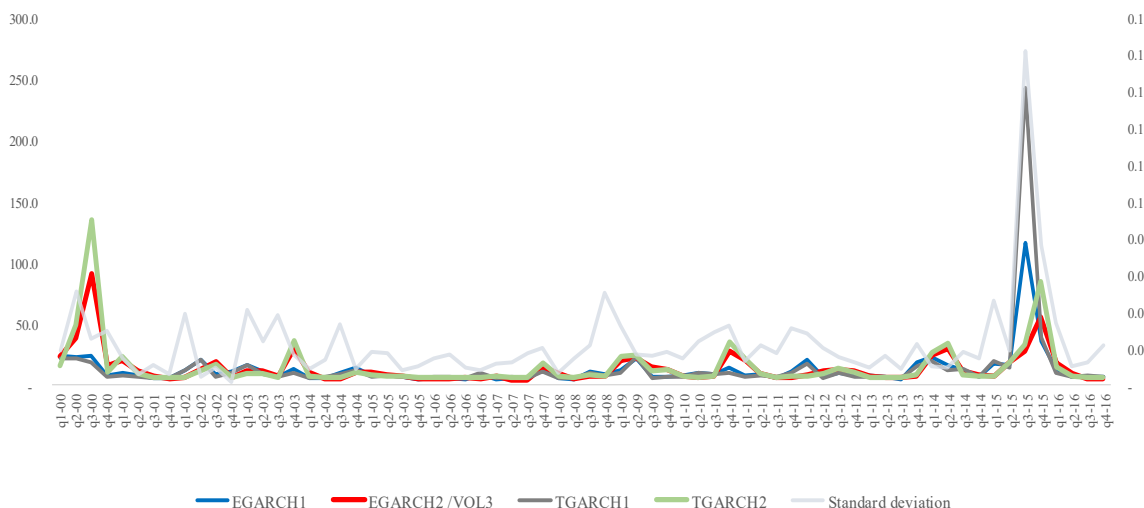
Furthermore, the models pass the normality test and equally survive the various tests for heteroscedasticity. Finally, to check the stability of the means and variances, the cumulative sum (CUMSUM) and CUMSUMQ tests respectively are conducted for all the models. The results are displayed on figure 4.A1 under appendix A, which supports the position that almost all the models are stable except the real natural resources model which had an issue with the stability of the variance, even though the mean is stable.

In summary, we have established through the bounds testing procedure that there is a long term relationship between the various dependent variables (real NTEs, real natural resources, and real total export) and the explanatory variables, except the real cocoa beans model, where the outcome is inconclusive and needs further analysis to conclude. We also establish the robustness of the models by conducting all the necessary diagnostic checks.

#### 4.2.4 Results on Exchange Rate Volatility

Following section 4.1.5, figure 4.1 reports on the various exchange rate volatility measures derived for this study. Although the measures of exchange rate volatility are defined in the appendix, suffice to say that the exchange rate volatility measure, VOL3 (generated from the EGARCH process) tend out to yield superior diagnostic test statistics. Hence, it is used for analysis.

**Figure 4.1: Measures of Ghana’s Exchange Rate Volatility, 2001Q1-2016Q4.**



Source: Authors Calculations

Consistent with the exchange rate development narrative espoused under the introduction chapter, the periods either preceding, coinciding or immediately after election years in Ghana

(especially 2000, 2008, 2012, 2016) were generally associated with deteriorations in the macroeconomic conditions which coincide with most of the peaks in the exchange rate trajectory. But for 2014, the exchange volatility witnessed was largely linked to inconsistent monetary policy measures as adduced under chapter one.

#### **4.2.5 Analysis of results on the short-run and long-run linear ARDL Export Models**

The existence of the long-run relationship among the variables suggests that we can proceed to estimate equation 4.20 to derive both the short run (the error correction model) and the long run relationships.

Table 4.4 presents the results for the various export models. Column 2 is the model for real NTE, column 3 is the real Cocoa Beans model, column 4 represents the real Natural Resource model and column 5 represents the Total Export model.

Table 4.4 (panel a) presents the short-run results and suggests changes in exchange rate volatility (VOL3) have a marginally positive impact on real non-traditional export, but the relationship is not statistically significant. Similarly, the relationships between exchange variability and changes in real cocoa beans, real natural resources, and real total export are positive but not statistically significant. However, in the cases of both the real natural resources and real total export models, there are some persistence and variations in the directions of the impacts of exchange rate volatility from the first lag to the fourth lag.

**Table 4.4: Results Short-run and Long-run ARDL Linear models**

Variables	Real NTE	Real Cocoa Beans	Real Natural Resource	Real Exports
<b>Panel A: Short-Run Estimates</b>				
D(LRCOCOBEA(t-1))		-0.1761 (0.2077)		
D(LRCOCOBEA(t-2))		-0.5256*** (0.1441)		
D(LRCOCOBEA(t-3))		-0.5124*** (0.1091)		
D(LTRADBIAS)	-3.8876*** (0.7330)	3.2692*** (1.0484)	-0.7077 (0.6037)	-0.3856 (0.4600)
D(LREER)	-0.8876* (0.3066)	-1.2433** (0.4718)	-0.3518 (0.4634)	-0.7790** (0.3605)
D(LREER(t-1))			-0.4340 (0.6236)	0.4035 (0.4789)
D(LREER(t-2))			2.0959*** (0.6253)	0.5969 (0.4938)
D(LREER(t-3))			-3.5093*** (0.4969)	-1.5300*** (0.3783)
D(LRCIEA)	1.20156*** (0.1455)	0.5574** (0.2195)	1.1670*** (0.1469)	0.6145*** (0.1046)
D(LIPIEX_C)	-0.6553 (0.7254)	1.0556 (1.0656)	-0.2913 (0.6900)	1.2531** (0.4837)
D(LIPIEX_C(t-1))			1.2187* (0.7117)	1.8398*** (0.5248)
D(LIPIEX_C(t-2))			1.2083* (0.6949)	
D(VOL3)	0.0002 (0.0024)	0.0037 (0.0056)	0.0049 (0.0036)	0.0028 (0.0027)
D(VOL3(t-1))			0.0185*** (0.0034)	0.0043 (0.0026)
D(VOL3(t-2))			-0.0063*** (0.0022)	-0.0050*** (0.0016)
D(VOL3(t-3))			0.0045** (0.0022)	-0.00001 (0.0017)
D(VOL3(t-4))			-0.0076*** (0.0024)	-0.0073*** (0.0018)
D(DUM1)			0.7421*** (0.1150)	0.3343*** (0.0922)
Ecm <sub>t-1</sub>	-0.9967*** (0.1079)	-0.9029*** (0.2486)	-1.0053*** (0.0844)	-0.6803*** (0.0960)
<b>Panel B: Long-Run Estimates</b>				
LTRADBIAS	-3.900*** (0.6132)	3.6207*** (1.1617)	-0.7039 (0.5920)	-0.5668 (0.6710)
LREER	-0.5361* (0.3045)	-1.3770** (0.5946)	1.1616*** (0.3838)	0.7721* (0.4169)
LIPIEX_C	-3.5726*** (0.7547)	1.1863 (1.1863)	-4.0286*** (0.7498)	-1.4605*** (0.4456)
LRCIEA	1.2054*** (0.0657)	0.6174*** (0.1260)	1.1608*** (0.1069)	0.9032*** (0.1152)
VOL3	-0.0065** (0.0030)	0.0041 (0.0063)	0.0042 (0.0071)	0.0151** (0.0075)
Constant	12.8061*** (3.2077)	-2.0484 (5.3258)	7.9710** (3.3508)	None
DUM1			0.7881*** (0.1031)	0.4914*** (0.1142)

Note: The Schwarz Information criteria was used to select the optimal models of ARDL(1,0,0,1,0,1), ARDL(4,0,0,0,0,0), ARDL(1,0,4,0,3,5) and (1,4,0,0,2,5) with maximum lags of 6, for the RNTE, RCOCOBEA, RNATURES and REXP models respectively. The values in the parenthesis are standard errors. \*\*\* indicates the coefficient is different from zero at 1%, \*\* at the 5% level, and \* at the 10% level.

For the natural resources model, the short-run relationship with exchange rate volatility is positive and statistically significant for the first lag but tends to be negative and statistically significant for the second lag and the fourth lag. It may be suggested that the short-term gains from exchange rate volatility by exporters of natural resources are temporary. The adverse effects of exchange rate uncertainty manifest in the subsequent periods. In the case of the total export model, apart from the first lag of exchange rate volatility which was positive but not

statistically significant, the second to the fourth lags are negative, but with the exception of the third lag, the other lags are statistically significant at 1percent level. Likewise, it may be suggested that the adverse effects of the exchange rate volatility on total export become apparent after some quarters.

The results further suggest that in the short-run changes in non-traditional export, natural resources export and total export respond negatively to changes in exchange rate policy proxied by the anti-export bias measure (LTRADBIAS). However, this relationship is only statistically significant at a 1% level for the case of non-traditional export. On the other hand, there is a positive and statistically significant relationship between anti-export bias and changes in the volumes of cocoa beans export. This could be explained by the inherent incentives imbedded in the marketing arrangement and other support schemes provided by the Ghana Cocoa Board to cocoa farmers. In essence, exchange rate policies that tilt net effective protection in favour of import substitution tend to hurt activities in the export sector especially the non-traditional export sector.

Consistent with the Mundell-Fleming model, the short-run results suggest that real appreciation in the real effective exchange rates discourage total export performance as well as that of its components. In order words, an appreciation in the real effective exchange rate (LREER) hurts export performance. This relationship is statistically significant at different levels for all the models except the natural resources model.

From the results, the measure of economic activity in Ghana as reflected in developments in the real composite index of economic activity (LRCIEA) has a positive impact on total export performance and all its components and the effect is statistically significant mostly at 1% and 5% levels. This may suggest that in the short-run, improvement in some supply constraints in terms of availability of electricity, improved port activity, increase in relevant imports

(intermediate and capital imports) among other improved economic conditions stimulate export activity.

Though real total export responds positively to the proxy for foreign economic activity (the trade-weighted index of industrial production: LIPIEX) in the short-run with a 5% level of significance, the components of total export respond differently. The real cocoa bean variable responds positively to foreign economic activity, but the relationship is not statistically significant. The other two components respond negatively to foreign economic activity and the relationship is equally not statistically significant.

In addition, the dummy variable that represents the commencement of oil production in Ghana in 2011 had a significantly positive impact at a 1% level on both the natural resources and total export volumes in the short-run. Finally, the error correction term which captures the dynamic adjustment to export in the event of any short-term disturbance to the models is statistically significant. The negative and high value of the coefficients for the real NTE model (-0.99) suggest that the pace of convergence to equilibrium is almost complete in a quarter (99%). The same can be said for the models for the real cocoa beans and natural resources export. However, in the case of real total export about 68% of the deviation in each quarter is corrected.

We now consider Table 4.4 (panel b) that presents the long-run results. The results show that real NTEs respond negatively to exchange rate volatility and this relationship is statistically significant at a 5% level, though the magnitude of the impact is minimal. This is consistent with the behaviour of a less risk-averse exporter, who may be less sanguine about export prospects due to increase in uncertainty. For exporters with such an attitude to risk, their expected marginal utility of export revenue diminishes with increased exchange rate uncertainty. In addition, the possible high costs of hedging against exchange rate risk may discourage producers of non-traditional export from taking advantage of this scheme, given their relatively small balance sheet. Another possibility is that short-run export contracts may

not be malleable to revisions. However continuous exchange rate volatility in the long run offers the opportunity to divert resources possibly into domestic activity, hence reducing the level of export activity. This result is consistent with Musonda (2008) and Obeng (2017) who found exchange rate volatility to depress non-traditional export for Zambia and Ghana respectively. The result is equally consistent with the assertion by Cote (1994) that most of the studies that explored the relationship between exchange volatility and trade flow tended to find an adverse effect, however, the magnitude of the impact is small. For both the cocoa beans and the natural resources models, although the long-run effects of exchange rate volatility are positive, the relationships are not statistically significant. In the case of cocoa beans this outcome might not be surprising due to the existence of the Ghana Cocoa Marketing Board (Cocobod) arrangement that offers guarantee prices to cocoa producers, invariably absolving them from the risk of exchange rate uncertainties. Therefore, the risk of exchange uncertainty may not enter directly into their utility function. Likewise, for the producers of natural resources, by virtue of the foreign ownership, and with both the technical know-how and the resources to invest in hedging activities to potentially guide against exchange rate risk, these producers may not be affected by exchange rate volatility.

The long-run effect of exchange rate volatility on total export is positive and statistically significant at 5%. This is consistent with the study by Olayungbo et al. (2011) who finds a similar positive relationship for ECOWAS countries. Since cocoa and natural resources export dominate the traditional export, where there are occasions for forward sales agreements, these may account for the marginal positive effects of exchange rate uncertainties on total export. This differential long-term impact of exchange rate volatility on total export and its components may lend credence to the fallacy of composition or the error of aggregation. In other words what is true for the whole may not be necessarily true for the components. Therefore, justifying the

need to examine the relationship between exchange rate volatility and export in terms of its constituent parts.

Anti-export bias exchange rate policies equally have a damping impact on non-traditional export in the long-run and this relationship is statistically significant at 1%. This suggests that policies to prop up non-traditional export must be sensitive to the incentive structure that tends to support the importable sector under the guise of import substitution or unbridled trade liberalisation to the detriment of export promotion. Such anti-export bias policies equally hurt the export of natural resources and total export in the long run, even though the relationship is not significant. The long-run impact of anti-export bias policies on cocoa beans export is positive and statistically significant at 1%. This is because the sector is highly protected even in the face of possible adverse distortions in the general incentive structure for export. Hence, cocoa producers may want to increase production to maximise their revenue given the guaranteed conditions that shields them from anti-export bias policies.

The long-run impact of exchange rate appreciation on non-traditional and cocoa export is negative and statistically significant at the 10% and 5 % levels, respectively. This outcome is similar to those by Jebuni et al. (1992), Elbadawi (2001) and Darku (2012) who find that real depreciation in the effective exchange rate stimulates export activities by increasing competitiveness and the reverse is true. Therefore, both exporters of NTEs and Cocoa beans are affected by the negative effect of appreciation in the real effective exchange rate that reflects reduced domestic incomes. Whilst for the non-traditional exporter this effect may be felt directly in terms of reduced domestic incomes, producers of cocoa beans experience indirect effects in the form of reduced bonuses and other incentives from the Cocoa Marketing Company<sup>30</sup>. A positive association is however established between real effective exchange rate appreciation and natural resource export, as well as total export. As already discussed,

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<sup>30</sup> Ghana Cocoa Board

most of the natural resource export revenues accrue to foreign companies. To that extent, an appreciation of the exchange may not affect their income in foreign currency terms, thus their motivation to increase export in the long run. For the positive long term effect of exchange rate appreciation on total export, in as much as this may appear puzzling, it may be suggested that the positive appreciation effect on natural resources dominate the negative effects on non-traditional export and cocoa beans export, hence the overall positive impact on total export in the long run.

Improved economic activity represented by the RCIEA has a significantly positive long-term impact on the volumes of export and all the components. The magnitude of the impact ranges between 0.62% for the cocoa beans model to 1.2 % for the NTEs model. This may suggest that government policies to prop up export growth must place much more emphasis on addressing structural bottlenecks such as the unreliable supply of energy and credit constraints among others that undermine sustained economic growth. Indeed, studies by Lu (2017) and Raza et al. (2016) have demonstrated that an increase in electricity consumption has a positive impact on economic growth.

Contrary to expectations, changes in the proxy for foreign activity do not have a positive long run impact on total export and its components, except in the case of cocoa beans export where the relationship is even not statistically significant. The negative relationship can be explained by the fact that most of Ghana's export are in their raw or primary form. Therefore, the relationship can be characterised as income inelastic or inferior products. This then raises concerns about the nature of products in Ghana's export basket and how they lend themselves for easy diversification which will be the subject matter of the second empirical paper of this thesis. In other words, if the country should diversify its export base, what are the opportunities and prospects available for Ghana within its current export basket?

#### **4.2.6 Analysis of results on the Short-run and Long-run non-linear ARDL Export Models**

The analysis so far on how the various components of export, especially the non-traditional export respond to exchange rate volatility has been based on a linear technique. However, in line with Verheyen (2013), it would be restrictive to assume homogenous coefficients for the effects of exchange rate volatility. Therefore, to assess the potential long-run and short-run asymmetries in the relationship between exchange rate volatility and export activities, we estimate equation (4.21). The result is reported in table 4.5 below.

The results on the long run cointegration relationships between total exports, the components and their determinants using the bounds testing approach are reported in appendix A table 4.A3. It is evident from the bounds test for the non-linear models that, following the optimal models selected, there are long-run level relationships between the dependent variables and their respective determinants. In addition, the models for total export and the components passed all the diagnostic tests, including the CUSUM and CUSUMQ tests for model stability which are reported in appendix A table 4.A4 and figure 4.A2, respectively. Specifically, the RESET statistics and the Lagrange Multiplier (LM) tests suggest the presence of appropriate functional specification and the absence of serial correlation, respectively. In addition, there is no evidence of heteroscedasticity as the various tests (Breusch-Pagan-Godfrey, White and ARCH tests) suggest and the adjusted R-squared likewise reflects good explanatory power.

**Table 4.5: Results on Short-run and Long-run ARDL Non-linear models**

Variables	Real NTE	Real Cocoa Beans	Real Natural Resource	Real Total Exports
<b>Panel A: Short -Run Estimates</b>				
D(LRCOCOBEA(t-1))		-0.071 (0.261)		
D(LRCOCOBEA(t-2))		-0.461** (0.174)		
D(LRCOCOBEA(t-3))		-0.480*** (0.119)		
D(LTRADBIAS)	-4.002*** (0.760)	3.564*** (1.122)	-0.214 (0.445)	-0.430 (0.506)
D(LREER)	-0.446 (0.317)	-1.207** (0.469)	0.016 (0.383)	-0.505 (0.415)
D(LREER(t-1))			-0.223 (0.504)	0.510 (0.615)
D(LREER(t-2))			1.044** (0.525)	0.139 (0.591)
D(LREER(t-3))			-2.798*** (0.454)	-0.784* (0.419)
D(LRCIEA)	1.458*** (0.233)	0.418 (0.277)	0.055 (0.482)	-1.023 (0.627)
D(LRCIEA(-2))				-0.790 (0.643)
D(LRCIEA(-1))				1.823** (0.812)
D(LIPIEX_C)	-0.981 (0.789)	0.7189 (0.511)	0.498(0.462)	1.754*** (0.607)
D(LIPIEX_C(t-1))				1.718** (0.671)
D(VOL3_N)	-0.013** (0.006)	0.003 (0.006)	-0.006 (0.007)	-0.018* (0.010)
D(VOL3_N(-1))			0.031*** (0.008)	
D(VOL3_N(-2))			-0.019*** (0.006)	
D(VOL3_N(-3))			-0.033*** (0.004)	
D(VOL3_P)	0.004 (0.005)	0.005 (0.006)	0.008* (0.004)	0.009* (0.005)
D(VOL3_P(-1))			0.008 (0.007)	0.019** (0.007)
D(VOL3_P(-2))			-0.012* (0.007)	-0.001** (0.004)
D(VOL3_P(-3))			0.013 (0.008)	0.006*** (0.003)
D(VOL3_P(-4))			-0.044*** (0.006)	
D(DUM1)			0.735*** (0.097)	0.480*** (0.111)
Ecm <sub>t-1</sub>	-1.012*** (0.111)	-1.040*** (0.321)	-0.825*** (0.085)	-0.877*** (0.135)
Variables	Real NTE	Real Cocoa Beans	Real Natural Resource	Real Exports
<b>Panel B: Long- Run Estimates</b>				
LTRADBIAS	-3.954*** (0.627)	3.426*** (1.018)	-0.259 (0.541)	-0.491 (0.590)
LREER	-0.440 (0.308)	-1.160* (0.569)	1.511 (0.469)	0.340 (0.421)
LIPIEX_C	-3.544*** (0.827)	0.691(0.564)	-2.478*** (0.401)	-1.427*** (0.416)
LRCIEA	1.441*** (0.193)	0.402 (0.282)	1.271*** (0.262)	1.395*** (0.237)
VOL3_N	-0.012** (0.006)	0.025 (0.006)	0.044** (0.016)	-0.020* (0.012)
VOL3_P	-0.015*** (0.006)	0.005 (0.006)	0.040** (0.017)	-0.027** (0.012)
Constant	11.014*** (3.684)	None	None	None
DUM1			0.890** (0.094)	0.547*** (0.099)

Note: The Schwartz Information criteria were used to select optimal models of ARDL(1,0,0,1,0,0,1), ARDL(4,0,0,0,0,0), and ARDL(1,4,1,1,0,4,5) for the RNTE, RCOCOBEA and RNATURES with maximum lags of 6, 4 and 6 respectively. However, the Akaike information criteria with 4 lags were used to select the optimal model for the REXP model as ARDL (1,4,3,0,2,0,4). The values in the parenthesis are standard errors. \*\*\* indicates the coefficient is different from zero at 1%, \*\* at the 5% level, and \* at the 10% level

It would be recalled that the results for the linear ARDL technique found exchange rate volatility not to have any significant impact on non-traditional export and total exports in the short run. Table 4.5, panel a, which presents the short-run non-linear ARDL model shows different results. The non-linear technique which splits the exchange volatility into positive and negative partial sums suggests that negative exchange rate volatility (more in the direction of depreciation) has a significantly negative impact on non-traditional export whilst the positive exchange rate volatility may not have any impact. Suggesting that short-run erratic depreciation of the exchange rate may not translate into an improvement in export activity. A possible reason may be that exchange rate volatility in Ghana is normally biased towards sharp sporadic depreciations. Exporters may have locked themselves into contracts or there may be supply constraint preventing firms to immediately take advantage of the unexpected depreciation condition. It is equally possible that the deep depreciation may affect adversely the import costs component of their inputs. Besides, such erratic exchange rate conditions elicit interventions by the central bank to attempt some restoration to normalcy, which may further worsen the uncertainty and the risk of taking any abrupt export decision. This argument can also be reinforced by the fact that the government's annual budgetary targets are set with some implicit real exchange rate path, and therefore failure to correct such exchange rate volatilities when they emerge can potentially displace the annual budget programme. These policy responses are likely to make the potential benefits from the sharp depreciation short-lived and potentially counterproductive. It is equally possible that interventionist policies as alluded to can evoke some uncertainty to the extent that market players may not be sure of the extent to which authorities can support the domestic currency. Similarly, the link between exchange volatility and total export volumes may not be present in the immediate short-run under the linear approach, however, the non-linear technique portrays that total exports respond negatively to negative exchange rate volatility and the relationship is statistically significant at 10% level.

At the same time, a positive exchange rate volatility has a positive impact on total export volumes and the relationship is statistically significant at 10% level. Exporters of natural resources respond positively to positive exchange rate volatility that is associated with a sharp appreciation of the domestic currency. Most of the owners of these natural resources are foreigners and to the extent that their incomes are generated in hard currency there is every incentive for them to respond favourably to positive exchange rate volatility.

The analyses above is based on observations. We now proceed to apply the criterion specified by Bahmani-Oskooee and Maki-Nayeri (2018) for establishing short run asymmetric adjustment as well as cumulative or impact asymmetric effect and long run asymmetric effect. Since the models for both total export and natural resource export have different short run lag order, they reflect short run asymmetric adjustment, suggesting that these exports respond at varying speed to either an increase or decrease in exchange rate volatility. However, the same cannot be said for the models for NTE and cocoa exports. By using the Wald's test, total export exhibits short run cumulative or impact asymmetric effect, though the components do not reflect same<sup>31</sup>.

The coefficient of the error correction term for the real NTE model is negative, with the absolute value more than one. This is consistent with the study by Narayan and Smyth (2006) with an absolute coefficient value of 1.2. This suggests that the error correction process fluctuates around the long-run value in a damping manner instead of directly converging monotonically to the equilibrium path. But convergence to the equilibrium path is rapid and possibly overshooting, once the initial process is complete.

In the long-run decoupling, the exchange rate volatility into positive or negative movements may not result in varied outcomes in terms of the direction of impact. Both heightened and

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<sup>31</sup> Check Appendix Table 4.A5.

benign exchange rate volatilities have a negative association with the performance of both real NTEs and real total export with relatively marginally higher coefficients for the positive exchange rate volatility. Whilst the negative exchange volatility is statistically significant at a 5% level for the real NTE, it is significant at a 10% level for the real total export model. However, for positive exchange rate volatility, the level of statistical significance is at 5% for both models. Hence exchange rate volatility, no matter the direction, has negative effect on the performance of non-traditional export and total export in the long run under non-linear ARDL analysis. On the contrary, the long-run relationship between real exchange rate volatility and total export under the linear technique was positive and statistically significant. Natural resources exporters respond positively to both negative and positive exchange rate volatility. The possible explanation for the above phenomenon could be that long-run exchange rate volatility is associated with greater uncertainty than the short-run exchange rate volatility. Since the owners of the natural resource are largely foreigners with the technical knowhow and financial capabilities, they can afford risk mitigating schemes such as forward sales and derivatives. However, with the largely small balance sheet of the owners of NTEs, this may be a luxury they may not be able to afford. As related to long run asymmetric analysis, neither total exports nor any of the components exhibit evidences of long-run asymmetric adjustment effect based on the long-run Wald test<sup>32</sup>.

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<sup>32</sup> Check Appendix Table 4.A5.

### 4.3 Conclusion

This thesis set out to investigate the main drivers of export growth in Ghana with a specific focus on the role of exchange rate volatility and exchange rate policies. The exchange rate policies are examined within the context of the argument of Bhagwati (1988) on anti-export bias policies and the consequences for trade flows. The study employs both the linear and non-linear ARDL estimation techniques on quarterly data for total export and its determinants for the period 2000 to 2016. The dependent variable, total export, is divided into its components, traditional and non-traditional export, where the traditional export is further divided into cocoa beans export and natural resources (comprising Gold, other minerals, and Crude oil). This is done to find out whether what is true for the whole, in terms of determinants of total export is necessarily true for its parts.

The findings from the linear ARDL technique suggests that neither total export nor its components respond to exchange rate volatility in the immediate short run. However, there is some persistence in the effects of exchange rate volatility on real natural resources and total export models, which suggests that the adverse effects of exchange rate uncertain may manifest in subsequent quarters. On the other hand, results from the non-linear ARDL technique suggest that negative exchange rate volatility (consistent with excessive depreciation) can depress the performance of both non-traditional export and total export in the immediate short run. Hence by decoupling the exchange rate volatility into either positive volatility or negative volatility, a clear immediate short-run negative effect of exchange rate volatility on the performance of non-traditional and total export is established. This outcome could be explained to the effect that in most cases exchange rate volatility in Ghana tends to be biased towards depreciation and equally erratic. At the same time, firms may have locked themselves into some contracts or possibly encounter supply constraints undermining their ability to take advantage of the real depreciation. In addition, the real depreciation can adversely affect exporters with high

imported input content. Hence, negative volatility can limit the short-run benefits from real depreciation of the domestic currency. Likewise, the non-linear ARDL suggests improvement in natural resources export performance in the short run under positive exchange rate volatility (associated with excessive appreciation). Since most of the owners of these natural resources are foreigners this may suggest improvement in their income. This likely improvement in their incomes may raise concerns about capital flight.

The thesis also finds that in the long run, whether one uses the linear or non-linear ARDL techniques, the effects of exchange rate volatility on NTE performance is dire. It evokes a lot of uncertainty that tends to discourage activity in the NTE sector, even though the same cannot be said for the traditional export. Hence exchange rate uncertainty is of more concern to NTEs than the exporters under the traditional sector (if any). The long-run response of total export to exchange rate volatility varies according to the estimation technique used. Total export performance responds positively to exchange rate volatility under the linear ARDL approach, but for the non-linear ARDL approach both positive and negative volatility depress performance in total export.

These findings provide empirical evidence to support the theoretical debate that the relationship between exchange rate volatility and export performance cannot be signed a priori and that the outcome is conditioned by a lot of assumptions including the choice of the econometric technique applied and the measure for exchange rate volatility as well as the composition of export. In terms of the policy, given the short and the long-run dimensions of the effects of exchange rate volatility on export performance and the components, policymakers are better placed to design appropriate and targeted policies to get the maximum effect.

On the issue of exchange rate policies in Ghana, the thesis seeks to investigate whether anti-export bias trade policies distort the incentive structure possibly in favour of the importable sector with dire consequences for export promotion. Findings from the study lend credence to

the fact that both in the short and long runs, an increase in anti-export bias policies undermines the performance of non-traditional export. Though the same implication is suggested for both the performance of natural resources and total export, the relationship is not statistically significant. Cocoa beans export appears to be shielded from the adverse effects of these exchange rate policies possibly because of the purchasing arrangements established by the Ghana Cocoa Board. Hence, the empirical findings from this study reinforce the argument that attempts at promoting export growth must be guided by the incentive signals emanating from the gamut of government policy impacting on the exchange rate trajectory and the disproportionate perverse responses that can be engendered.

On the other drivers of export performance in Ghana, the thesis finds that in general, exchange rate appreciation has pernicious effects on the performance of non-traditional and cocoa beans export both in the short and long runs notwithstanding the estimation technique<sup>33</sup>. However, from the linear ARDL, the effect of exchange depreciation on total export is positive and significant in the short-run, but the long-run effect is negative. The thesis also finds that improvement in economic activity measured by the Bank of Ghana's RCIEA props up the performance of both non-traditional and traditional export both in the short and long runs<sup>34</sup>. Finally, the thesis also finds that an improvement in the measure of foreign economic activity have a positive impact on total export performance in the short run, but not the same for the components of total export. However, the long-run effects of an improvement in foreign activity on total export performance and its components is adverse except the export of cocoa beans that the relationship is positive and statistically significant.

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<sup>33</sup> Although for the non-linear model for NTE both the short run and long run responds of NTE to real effective exchange rates are not statistically significant.

<sup>34</sup> However, for the non-linear model the relationship for cocoa bean was not statistically significant. The RCIEA comprise of nine indicators: Credit to private sector, domestic Vat, Industrial electricity consumption, SSNIT contributions, Imports, Port Activity, Cement sales, Sales of Key Manufacturers, Tourist Arrivals.

## CHAPTER FIVE

### GHANA'S ECONOMIC COMPLEXITY AND PRODUCT SPACE: IMPLICATIONS FOR EXPORT DIVERSIFICATION

#### 5. 1 Introduction

This chapter of the thesis seeks to investigate whether the nature of products Ghana produces, and exports has helped in its structural transformation agenda towards a more diversified export base. To undertake this investigation, we use the concepts of economic complexity and product space developed by Hausmann et al (2013). These constructs are used to assess the pace of both accumulation and evolution of productive knowledge (capabilities) embedded in a country's productive structure. Subsequently, these constructs are used to identify the products that offer potentials for Ghana to explore extensively the value addition spectrum and enhanced export diversification for economic development.

We refer to a quotation from Hartmann et al (2017, p. 7) that;

*“The Economic Complexity Index (ECI) measures the sophistication of a country's productive structure by combining information on the diversity of a country (the number of products it export), and the ubiquity of its products (the number of countries that export that product) (Hidalgo & Hausmann, 2009). The intuition behind ECI is that sophisticated economies are diverse and export products that, on average, have low ubiquity, because only a few diverse countries can make these sophisticated products. By the same token, less sophisticated economies are expected to produce a few ubiquitous products. ECI exploits this variation in the diversity of countries and the ubiquity of products to create a measure of a country's productive structure that incorporates information about the sophistication of products”.*

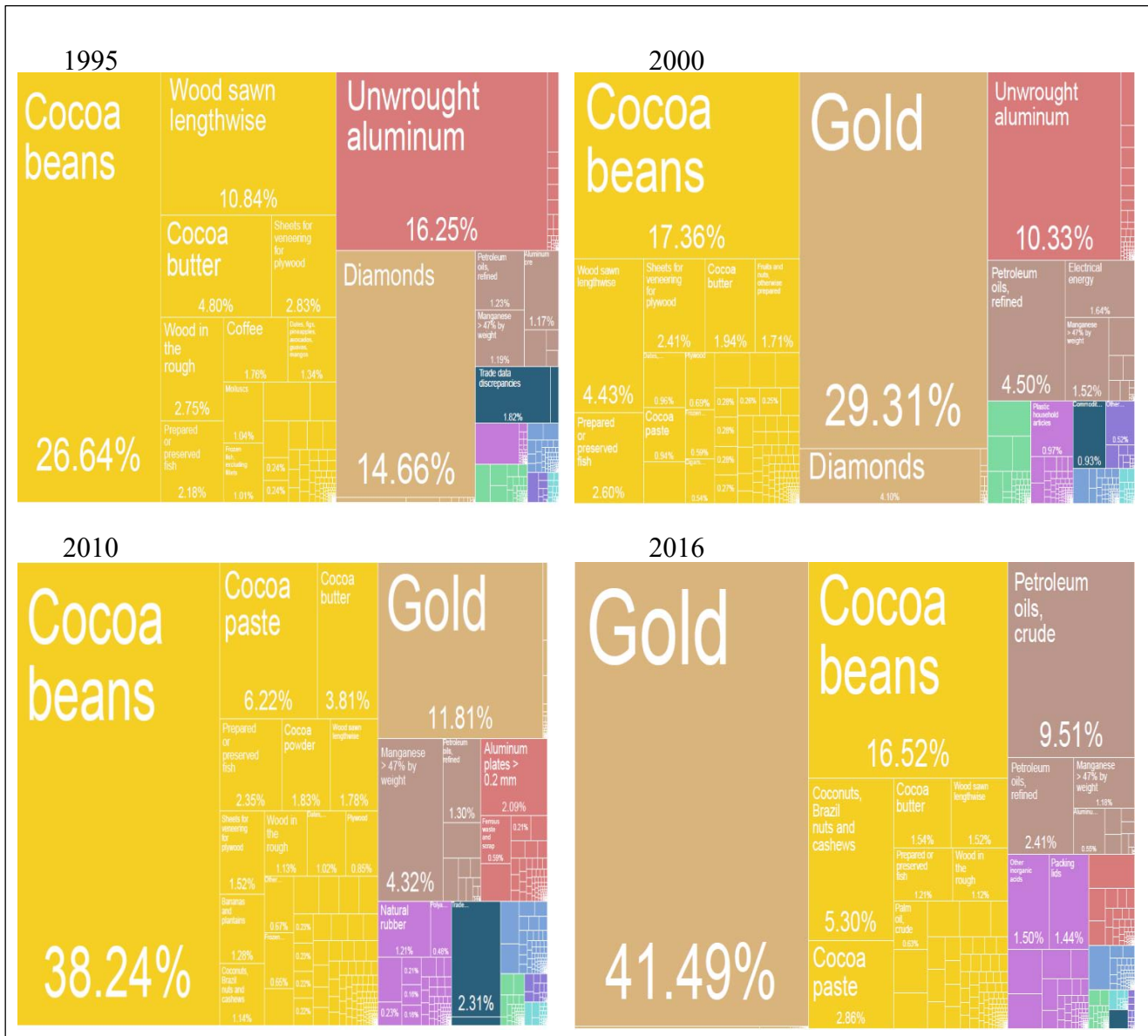
Product Space, on the other hand, is a network of relatedness between products that demonstrate that upscale products are located in a densely connected core whilst products of low-income elasticity occupy a less connected periphery, (Hidalgo et al. 2007).

The importance of export growth as a key ingredient in economic growth has been established by many studies both theoretical and empirical (Bahmani-Oskooee and Oyolola, 2007; Darku, 2012; Thirlwall and Hussain, 1982). However, these studies fail to distinguish between the relative contributions of the volumes of a country's export and the composition of its export to its growth agenda. More especially in the classical international trade theories by the Ricardian and Heckscher-Ohlin (H/O) models, countries are said to improve on the welfare of their citizens by specializing in the production and export of products that they either have comparative advantage or cost advantage because they use abundantly their endowed resources (Ricardo, 1817). In the process, structural transformation of the economy is perceived as a passive outcome of the process of gaining comparative advantage, (Hausmann and Klinger, 2008).

In recent times the discussions on export growth have transformed by placing less emphasis on the volumes of export to more importantly the composition of the products that countries export. In other words, the nature of products that a country export matters, and has significant implications for its structural transformation with impact on its current level of economic growth and prospects for future economic progress. Hausmann et al. (2007) stress that the productivity content of the export basket of a country is very crucial because it determines which country may enjoy accelerated economic growth and the one that may slack in economic growth. Hidalgo and Hausmann (2009) also depart from the traditional economic theory which seeks to de-emphasize the productive structure of countries and argue that what a country produces mattered more than how much value it can extract from its products. The basis of this logic is that the degree of sophistication of products tend to be disproportional and in the long-

run countries whose composition of production and export reflect high levels of variety and sophistication are more likely to experience higher levels of income<sup>35</sup>.

**Figure 5.1: The Structure of Ghana's Export Basket for Selected years**

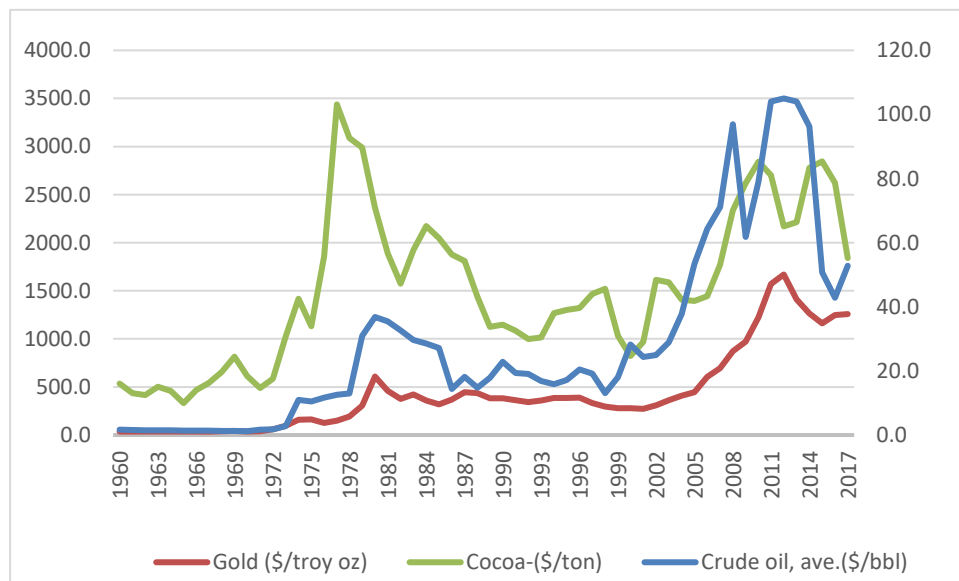


Source: Atlas of Economic Complexity, 2018 and Author

<sup>35</sup> Sophistication is said to capture more than technical characteristics to encompass product differentiation, product fragmentation, resources availability and other factors, (Lall et al. 2005).

Consistent with the above reasoning, the issue about the composition of export of developing countries, which has implications for structural transformation by diversifying into new products with higher value addition and laying the basis for increased manufacturing activity with prospects for sustainable growth and job creation, has become important in academic research. Available data suggest that Ghana’s export composition over the years has been dominated by some few primary products (cocoa beans, gold, and crude oil) with limited diversification into other products that may set the country on the path of exploring gains to be made in the value-chain spectrum. Figure 5.1 presents the structure of Ghana’s export for some selected years to highlight the issue of persistence in the level of concentration of its export basket.

**Figure 5.2: Prices of Some Selected Commodities: 1960-2017**



Source: World Bank Commodity Price Data (The Pink Sheet)

Ditya and Charyya (2012) argue that countries that continuously concentrate on the export of primary products suffer the fate of terms of trade shocks, slack in productivity growth and limited value addition. This position reinforces the Prebisch-Singer hypothesis that countries that specialise in primary commodities, coupled with slack in the pace of technical progress in

the primary sector, suffer from adverse trends in the commodity terms of trade and cause them to lag behind countries that manufacture products, in terms of development, (Prebisch, 1950; Singer, 1950). Figure 5.2 presents developments in the international prices of some selected primary commodities measured in dollars to highlight this issue. Cocoa prices are measured on the right axis, whilst both gold and crude oil prices are measured on the left axis. Trends in the selected global prices suggest increased volatility over the period 1960 to 2017 with implications for macroeconomic targets of the countries producing and exporting these primary products. The studies of UNCTAD (2012) and De, Cavalcanti, Mohaddes, and Raissi (2011) argue that commodity-exporting countries are faced with heightened risk with excessive price developments which has negative consequences for their economic growth.

Hence, the desire for diversification of the export basket of countries such as Ghana that predominantly undertake activities in the primary sector becomes relevant. This is because apart from helping to minimise the adverse effects of price volatilities, export diversification has the potential of facilitating sustained and inclusive growth. This diversification orientation also ties into the recent shift in public policy from an industry-neutral to an industry-specific approach with more room for the government's facilitating role to support activities within the value-chain arena (Chandra and Rodarte, 2009).

However, traditional economic growth theories, whether from the perspective of exogenous models like Solow (1956) or endogenous models like Romer (1990), have not given space for economic diversification and its implications for economic growth. These theories have attempted to make sense of the complex world by abstracting from the constituents of capital and labour to make predictions about aggregate indicators like Gross Domestic Product (GDP). Within this context, the conditions under which an economy can grow is just by enhancing the aggregate amount of capital, labour, and technology. They ignore the fact that the world is diverse, and countries are not equally diverse. It must be noted that the issue of economic

growth is more complex than just transforming aggregate inputs into output, but rather rooted in the process of producing multi-variety of products with multi-variety of inputs reflecting the capabilities of countries (Hidalgo 2009).

The critical question is that, if there is much value to be gained from diversification, then what products should be the focal point for the structural transformation agenda. Does Ghana possess the capabilities to produce and export such products? How do we identify such products for industrialisation policy and export promotion purposes?

To undertake this exploration, as suggested above, a framework that combines the concepts of Economic Complexity and Product Space introduced by Hausmann et al. (2013), Hausmann et al. (2007) and Hidalgo (2009) is adopted.

According to Hausmann et al. (2013), the knowledge base of a society is conditioned by the diversity of knowledge across individuals and how through a complex web of interactions individuals can deploy these diverse abilities to effective use. They argue further that knowledge embedded in the society can be categorised into explicit knowledge and tacit knowledge. Explicit knowledge is easy to acquire and can be common in many countries. Therefore, if all knowledge is classified as explicit, then the pace of convergence among countries is likely to be faster. It is worth noting that one of the core issues of development economics is to identify the source of disparity in prosperity amongst countries. Hence, the amount of tacit knowledge each country possesses, which is difficult to be embedded, can be traced as key in explaining disparities in incomes amongst countries. The point must be made that, technological knowledge which is an important component of the endogenous growth model, consists of three main components, which are the tools, the blueprint or codes, and the know-how. Countries with substantial resources can easily procure the tools and blueprints associated with technology. However, the same cannot be said of know-how. The know-how component akin to mental wiring, demonstrating the ability of the brain to perform a task

through the process of imitation and repetition as well as the process of diffusing the knowledge generated and preserved for use, which is considered more important to propel growth, (Hausmann et al. 2013). To the extent that the process of embedding this know-how is both time and resource-intensive, individuals must specialise. Besides, the individual who acquires such productive knowledge is likely to function efficiently in a society where the know-how is internally coherent with the collective know-how of the society. Indeed, the concentration of this specialised productive knowledge at the level of the individual, organisations or network of organisations is being referred to as capabilities. In other words, products are produced through the combination of specific non-tradable productive inputs considered as capabilities (Hausmann and Hidalgo, 2010).

Hidalgo and Hausmann (2009) argue that the development of countries is based on the number of capabilities they can accumulate and utilise in the production of goods and services. Countries that have these capabilities in considerable measure can make many things and tend to be more diversified. On the contrary, products that required more capabilities are going to be harder to make, therefore fewer countries are going to be able to make those products. As a result, poorly diversified countries are likely to make products that are on average made by many other countries, while highly diversified countries produce products that are on average produced by few other countries, (Hausmann and Hidalgo, 2010). Countries endowed with many capabilities to produce more diverse goods and at the same time produce goods requiring a lot of capabilities such that only a few countries can produce are classified as complex or sophisticated.

Economic complexity, therefore, reflects how the intricate network of interactions and hence how the receptacle of productive knowledge is mobilised within the society and channeled into the production of sophisticated goods for export. Indeed, the idea is that countries do not make all the products and services they use and need, but rather they make what they can, using their

embedded knowledge. More importantly, economic complexity is said to affect a country's level of per capita income and drives its future growth, (Hidalgo et al, 2007). In general, richer countries tend to produce and export more sophisticated goods, whilst poor countries on average tend to produce and export less sophisticated goods. Through a cross country growth model, which is controlled for measures of governance, human capital, competitiveness, and financial depth, it is established that the measure of economic complexity is superior to other covariates in the growth model (Hausmann et al., 2013). The evolution of economic complexity demonstrates the extent of export diversification feasible for a country based on its existing density of complementary capabilities. This suggests that the marginal returns for additional capability tend to increase once there are existing complementary capabilities.

Closely related to the above discussion is the concept of product space. The product space establishes a country's current collective know-how within the global technology frontier as well as the proximate complex goods within its technology frontier that the existing capabilities can be deployed easily to produce other products (Abdon and Felipe, 2011). Both the economic complexity and product space constructs are key in exploring the structural transformation possibilities of a country.

Therefore within the context of assessing the challenges to Ghana's export diversification effort, this thesis employs the economic complexity and product space constructs to address the following issues: why Ghana's export mix is less diversified; the nature of products Ghana produces and export (extent of sophistication) and the implication for the structural transformation and export diversification; identifying 'frontier' products that Ghana should target for its industrial policy and export promotion<sup>36</sup>.

The rest of this section of the thesis is organized as follows: Section 5.2 outlines the empirical strategy and the sources of the data used for the investigation. Section 5.3 focuses on the

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<sup>36</sup> Here we apply granular data on export available for 2016.

analytical section that seeks to address the key research questions. Section 5.4 ends with a conclusion.

## **5.2 Model Specification and Data Source**

### **5.2.1 Introduction**

This section of the thesis presents the theoretical model used to explain the key characteristics of the products to be identified by using the economic complexity constructs under the empirical analysis. For this purpose, we follow the theoretical model used by Hausmann et al. (2007) with its root in a mechanism referred to as “Self-discovery” in Hausmann et al, (2002). This model is adopted because according to Hausmann et al. (2007), the conceptual framework and its application is relevant for developing countries with undiversified production structures. We reinforce the conceptual analysis with the study of Hidalgo (2009) and Hausmann et al. (2013).

Hausmann et al. (2007) argue that in the context of developing countries, product innovators or inventors are faced with considerable cost uncertainty. Most especially in the face of domestic capacity constraint, entrepreneurs tend to embark on exploration to discover the underlying cost structure of the economy. This has consequences in the form of some spillover effects accruing to other entrepreneurs, which can be attributed to the process of “costs discovery”. Considering the case of a successful venture, emulators can avoid the sunk costs associated with the initial investment and capitalise on the success to extract some gains. On the contrary, in the event of failure, the costs associated with a new venture become solely the responsibility of the investor. This process can lead to suboptimal outcomes in the absence of active government policy to internalise the externality from the knowledge spillover. In a situation like this, the number of inventors who are motivated to embark on “cost discovery”, rather than the fundamentals of the economy will dictate the momentum for economic growth,

through the process of production and export. The aggregate effect will be to push the economy closer to its productivity frontier.

The model by Hausmann et al. (2007) seeks to establish that some traded goods are associated with higher levels of productivity than others. To this end, countries that can latch on these higher productivity endowed products, based on the process of “cost discovery” are set on the course for national development and posterity. A quantitative index is constructed which captures the productivity contents of various exported products and uses to rank countries based on the level of productivity embedded in their respective economies.

Though the model assumes some role for the standard forces of comparative advantage, this is not expected to be exclusive. Besides, since there is some level of uncertainty associated with the “cost discovery” process, it may be suggested that what a country can produce and the corresponding level of prosperity attainable are subjected to a stochastic process.

### **5.2.2 The Theoretical Model**

We adopt the Hausmann et al. (2007) theoretical model for the empirical analysis. However, to operationalise the economic complexity and product space constructs the discussions are augmented by the study of Hidalgo (2009) and Hausmann et al. (2013). The model is cast in a general equilibrium setting, which considers two sectors - a modern sector capable of producing a variety of goods and a traditional sector producing a single homogeneous good. Labour is the only factor of production, though the model considers human capital. All goods are normalised to an exogenously given world price  $P$ . Goods that are produced in the modern sector are identified by the productivity factor  $\theta$ , which depicts the size of output that can be generated from a set amount of investment undertaken. Goods are equally arranged on a continuum that suggests that higher-ranked goods represent goods embedded with higher productivity.

The output of the modern sector of the economy is represented by a continuous interval between 0 and  $h$  ( $\theta \in [0, h]$ ), where  $h$  is an index of the skill or human capital level of a country. It is assumed that  $h$  represents the upper boundary of the range and the same time captures the role of comparative advantage. Therefore, the higher the level of  $h$ , the higher the level of productivity expected to be exhibited by the good to be produced. It is further assumed that a project of a fixed size entails an investment of  $\beta$  units of labour.

From the onset of the investment decision, the investor is uncertain as to whether the product to be produced will emerge as a higher productivity one or a lower-productivity one. The  $\theta$  associated with the investment would only emerge after the sunk costs have been incurred. The investor may be aware that  $\theta$  is distributed uniformly over the range  $[0, h]$  before the commencement of the project. But, immediately  $\theta$  is discovered, provided it turns out to be of higher productivity, other investors can free ride and avoid incurring the sunk costs, except that what they can produce is inferior to that of the incumbent. In that case, we can represent the proportion of the incumbent's productivity attributed to the emulator by  $\lambda$  (where  $0 < \lambda < 1$ ). One project is assumed at any given point such that after discovering the productivity associated with his project, the investor can either stick with that project or copy that of another investor. Since exercising such an option can probably involve less profit to the investor, he will compare his productivity  $\theta_i$  to that of the most productive good discovered,  $\theta^{\max}$ . The investor will stick with his own if  $\theta_i \geq \lambda \theta^{\max}$ , otherwise he will emulate the  $\theta^{\max}$ .

### **Expected Profit from Investing in the Modern Sector**

The  $E(\theta^{\max})$  is an increasing function of the number of investors who start a project, and the skills in the economy are represented by  $h$ , given that  $\theta$  lies in the interval  $[0, h]$ .

If we let  $n$  represents the number of investors in the modern sector and with the assumption that  $\theta$  is distributed uniformly, we can specify an expression for  $E(\theta^{\max})$  as

$$E(\theta^{\max}) = \frac{hn}{n+1} \quad 5.1$$

In the limit,  $E(\theta^{\max})$  converges to  $h$  as  $n \rightarrow \infty$

This suggests that as more and more investors embark on cost discovery, the likelihood of achieving the highest or maximum productive embedded products increases.

The probability that an investor  $i$  will stick to his project can be specified as:

$$\text{prob}(\theta_i \geq \lambda\theta^{\max}) = 1 - \frac{\lambda E(\theta^{\max})}{h} = 1 - \frac{\lambda n}{n+1} \quad 5.2$$

The corresponding expected profit would be equal to:

$$E(\pi / \theta_i \geq \lambda\theta^{\max}) = \frac{1}{2} p[h + \lambda E(\theta^{\max})] = \frac{1}{2} ph \left[ 1 + \frac{\lambda n}{n+1} \right] \quad 5.3$$

Since  $\frac{1}{2}[h + \lambda\theta^{\max}]$  is the expected productivity of such a project.

On the other hand, the probability and expected profit in the case of the imitator can be specified as:

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<sup>37</sup> In mathematical statistics,  $\theta^{\max}$  is known as the **largest order statistic** of a distribution. Given that  $\theta$  is uniformly distributed on  $[0, h]$ , the **probability density function** of its **largest order statistic**,  $\theta^{\max}$ , if there are  $n$  independent random draws is

$$f(\theta^{\max}) = \frac{n(\theta^{\max})^{n-1}}{h^n}$$

This is a well-known result in probability theory. Therefore, the expected value of  $\theta^{\max}$  is:

$$E(\theta^{\max}) = \int_0^h \theta^{\max} f(\theta^{\max}) d\theta^{\max}$$

$$E(\theta^{\max}) = \int_0^h \frac{n(\theta^{\max})^n}{h^n} d\theta^{\max}$$

$$E(\theta^{\max}) = \frac{n}{h^n} \int_0^h (\theta^{\max})^n d\theta^{\max}$$

$$E(\theta^{\max}) = \frac{hn}{n+1}$$

$$\text{prob}(\theta_i < \lambda\theta^{\max}) = \frac{\lambda E(\theta^{\max})}{h} = \frac{\lambda n}{n+1} \quad 5.4$$

$$E(\pi / \theta_i < \lambda\theta^{\max}) = p\lambda E(\theta^{\max}) = ph \left[ \frac{\lambda n}{n+1} \right] \quad 5.5$$

Therefore, the sum of the expected productivity in the modern sector can be specified as:

$$E(\pi) = ph \left[ \left(1 - \frac{\lambda n}{n+1}\right) \frac{1}{2} \left(1 + \frac{\lambda n}{n+1}\right) + \left(\frac{\lambda n}{n+1}\right)^2 \right] = \frac{1}{2} ph \left[ 1 + \left(\frac{\lambda n}{n+1}\right)^2 \right] \quad 5.6$$

$$= \frac{1}{2} ph \left[ 1 + \left(\frac{\lambda n}{n+1}\right)^2 \right] \quad 5.7$$

$$E(\theta) = \bar{\theta} = \frac{1}{2} h \left[ 1 + \left(\frac{\lambda n}{n+1}\right)^2 \right] \quad 5.8$$

Hence the expected profitability as shown in equation 5.7 is a function of world price and expected productivity. At the same time, the expected productivity and profitability will collectively depend on the “skill” level ( $h$ ) and the number of investors that will engage in cost discovery/self-discovery.

The key proposition here is that as the productivity in the modern sector increases, the larger the number of investors who undertake cost discovery. The outcome of this process is that there will be increasing returns to scale in the modern sector arising from cost information spillover rather than technological externalities. In the absence of emulation ( $\lambda = 0$ ), productivity and profitability would depend on  $h$ .

**Long-Run Equilibrium**

In the long run, the number of entrants into the modern sector is endogenously determined and excess profits will eventually move to zero. Therefore, the flow (expected) profit in the modern sector is expressed as:

$$r(p, h, n^*) = E(\pi)_{LR} = \frac{1}{2} ph \left[ 1 + \left( \frac{\lambda n^*}{n^* + 1} \right)^2 \right] \quad 5.9$$

where  $n^*$  represents the long-run level of  $n$ .

The sunk investment costs are defined as  $\beta w$ , where  $\beta$  represents the unit of labour required upfront for investment and  $w$ , the economy's wage rate. At equilibrium, in the long run, the present discounted value  $r(p, h, n^*)$  should be equal to the sunk costs of investment.

$$\int_0^{\infty} r(p, h, n^*) e^{-\rho t} dt = \frac{r(p, h, n^*)}{\rho} = \beta w^* \quad 5.10$$

where  $\rho$  is the discount rate.

To determine wages in the economy, we set total labour demand for the fixed supply of labour ( $L$ ). Labour demand in the modern sector corresponded to  $\beta w^*$ . Considering the assumption of diminishing marginal product to labour in the traditional sector and the fact that this sector produces a single homogenous good using labour as the only factor of production, the traditional labour demand can be expressed as a decreasing function  $g(w)$ , in the form  $g'(w) < 0$ . Therefore, equilibrium in the labour market is specified as:

$$n^* \beta + g(w^*) = L \quad 5.11$$

Equations 5.10 and 5.11 will determine the long-run values of the endogenous variables  $n$  and  $w$ .

**Short-run Equilibrium**

In the short-run equilibrium, the labour market must clear with the assumption that  $n$  is fixed. This suggests that for a given level of  $n$ , the wage rate is determined by equation 5.10. To consider the dynamics towards long-run equilibrium and how decisions regarding entry into the modern sector are made, we assumed that an initial level of  $n$  is less than the optimal level  $n^*$ . In the process of moving to long-run equilibrium, it is expected that both  $n$  and  $W$  will increase. The increase in  $n$  suggests that prospects in the future are brighter than today, which can lead to slack in the decision to invest in the modern sector now. On the contrary, an increase in  $W$  suggests that the future costs of investment in the modern sector can be exorbitant, thus titling profitability to the current period. Within the framework, an assumption is made that the pace of increase in labour costs outweighs that of the benefits of productivity in the future. This will entice investors to increase their investment in the modern sector today. Therefore, to infuse some non-trivial dynamics into the model, a simple assumption is made regarding the limit where investment per unit of time is feasible. Here, the suggestion is that the rate of increase in  $n$  will be restricted by the exogenous parameter  $\tau$ , such that

$$|n(t)| \leq \tau$$

To this end, we expect a maximal adjustment in  $n$  the situation where net returns at time  $t$  were non-zero. Hence,

$$n(t) = \tau \quad \text{if} \quad \frac{r[p, h, n(t)]}{\rho} \succ \beta w(t) \quad 5.12$$

$$n(t) = -\tau \quad \text{if} \quad \frac{r[p, h, n(t)]}{\rho} \prec \beta w(t) \quad 5.13$$

$$n(t) = 0 \quad \text{otherwise} \quad 5.14$$

In a comparative analysis framework, an increase in the economy's labour endowment given equation 5.11 and a fixed level of  $n$  will require lower wages to clear the market. However, the reduced costs of investment associated with lower labour costs are likely to encourage more firms to enter the modern sector and engage in cost discovery, with the ultimate effect of increasing wages above the initial equilibrium. Thus, it is expected that with information spillover in the modern sector, its level of productivity will rise with its expansion and profits will gradually move to zero with increasing wages.

Likewise from equation 5.10, an increase in both  $p$  and  $h$  will result in higher  $n$  and  $W$  eventually. However, an increase in the sunk costs (the fixed costs of entry)  $\beta$  will result in the reduction of both  $n$  and  $W$ . This can be explained that the increase in the fixed costs of entry will discourage the number of investors willing to engage in cost discovery and at the same time adversely affect wages due to either low demand for labour or excess supply of it. The model also suggests that trade policies that affect  $p$  (the world market price) positively have the potential to promote entrepreneurship and improve economic growth.

This model, according to Hausmann et al. (2007) can be aligned with the endogenous growth tradition. However, the point of departure may be where they identified an empirically verifiable relationship between the nature/characteristics of goods that an economy can specialise in to drive its rate of economic growth. The whole idea can be encapsulated in the quote that, “..... anything that pushes the economy to a higher  $\theta^{\max}$  to specialize in good(s) with higher productivity levels, sets forth a dynamic (if temporary) process of economic growth as emulators are drawn in to produce the newly discovered high-productivity good(s)”p9.

### 5.2.3 Empirical Model

The theoretical model discussed above suggests that productivity in the modern sector will be driven by  $\theta^{\max}$  which is determined by both  $n$  and the country size ( $L$ ), human capital ( $h$ ) and other factors. For the empirical exercise,  $\theta^{\max}$  is represented by a measure calculated from export statistics referred to as *EXPY*.

*EXPY*, is a measure used to capture the productivity level associated with a country's export.<sup>38</sup> In calculating the *EXPY*, commodities are ranked according to the income level of the countries that export them. Therefore, Hidalgo (2009) criticised *EXPY* since it used information on the incomes of countries. This raises the issue of circular argument that "rich countries export rich country goods". To address this problem, Hidalgo (2009) and Hausmann et al. (2013) separate the information on income from the information on the network structure *EXPY* without diluting the core concept of capturing the productivity level associated with commodities.

It is worth noting that a study by (Chandra & Osorio Rodarte, 2007) on exploring the options for Ghana's export diversification suggested that export diversification is likely to be effective

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<sup>38</sup> The use of export data is predicated on the fact that countries normally export commodities in which they exhibit the highest productivity and at the same time data on export are more readily available than data on production.

$EXPY_i = \sum_i \left( \frac{x_{is}}{X_i} \right) PRODY_i$  where the weights  $\frac{x_{is}}{X_i}$  are the shares of each product in the country's total export, where  $i$  is a product.

$PRODY_i$  is an index of a weighted average of the per capita GDPs of countries exporting a given product and thus represents the income level associated with that product. For its construction, we let countries be indexed by  $j$  and goods indexed by  $s$

Total export of a country  $j$  equals:  $X_j = \sum_s x_{js}$

where  $x_{js}$  is the export of product  $s$  in country  $j$  and we let the per capita GDP of country  $j$  be denoted by  $Y_j$ . Then the productivity level associated with product  $p$  is given by

$$PRODY_p = \sum_j \frac{(x_{jp}/X_j)}{\sum_j (x_{jp}/X_j)} Y_j$$

where the numerator represents the value share of the commodity in total global export of that commodity.

to the extent that the products identified and developed for exports are linked more to per capita income. Based on this position the framework employed used PRODY and EXPY (a unique dollar denominated income tag for each product and basket of product respectively). Thus, consistent with the preceding argument there is some inherent contradictions in the measure of EXPY, which is income bias, and does not address the issue of factor specificity associated with natural resource exports.

Therefore, for the empirical analysis, this thesis adopts a metric constructed for measuring the level of sophistication (productivity) of each product in the global product space. The Economic Complexity Index (ECI) unlike the measure EXPY emphasis on the inclusivity engendered through a dynamic interactive process of developing and exporting products identified in such a way that countries optimize the value chain spectrum leading to further paths for export diversification. This metric is used to examine the level of sophistication of the products Ghana exports, (Hausmann et al. 2013). To assess how Ghana can deploy the stock of capabilities acquired over the years to produce diverse products, the thesis also uses metrics for measuring the degree of connectivity of products to each other as developed by Hidalgo (2009) and Hausmann et al. (2013). The aim is to establish the path of structural transformation Ghana can traverse as well as the extent and depth of export diversification that is feasible given its current export basket. It is worth mentioning that the methodology used is descriptive and highly data driven.

#### ***5.2.3.1 Measuring Economic Complexity***

In general, measuring the economic complexity of any country requires that we generate two indicators. First, a measure of the level of export diversification of a country reflecting in the number of products it produces (in which case the more products the country produces the better), and secondly a measure of the ubiquity of products which demonstrates the number of

countries producing those products (in which case less ubiquitous products are considered more complex since fewer countries produce them due to the complex network of relationships required for their production). Thus according to Hausmann et al. (2013) diversity and ubiquity can be expressed as:

$$Diversity = k_{c,o} = \sum_p M_{cp} \quad 5.15$$

$$Ubiquity = k_{p,o} = \sum_c M_{cp} \quad 5.16$$

where  $M_{cp}$  is a matrix that is 1, if a country  $c$  produces product  $p$  and 0 otherwise. Both the diversity and the ubiquity can be measured by summing over the rows or columns of that matrix.

Now to generate the economic complexity index (ECI) to gauge the amount of productive knowledge (capabilities) a country has accumulated or required to produce a product, higher difference levels of both indicators have to be considered by using the average of each other in an iterative process to correct for their initial levels. The reason is that the fact that two countries are equally diversified in terms of the number of products they produce does not mean they are equally sophisticated<sup>39</sup>. There is a need to check on average the number of countries that can produce the diverse products. In other words the average ubiquity of the products. Therefore, for a country, we must calculate the average ubiquity of the products exported, the average diversity of the countries that can produce those products and repeat the process at higher difference levels in an iterated manner in search of some convergence. Equally, for a product, we must calculate the average diversity of the countries that can produce them and the average ubiquity of the other products that those countries produce.

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<sup>39</sup> For instance, if a natural resource endowed country has crude oil, which tends to be less ubiquitous because few countries may be so endowed, this does not necessarily make it more sophisticated because the capabilities in extracting crude cannot be easily deployed to other products. But if a country gains capability in the production of a product like X-ray machines, which tends to be produced by few countries with complex interactions, then this will enhance the sophistication of the country and the level of capabilities will equally be enhanced.

Recursively, this can be expressed as

$$k_{c,N} = \frac{1}{k_{c,o}} \sum_p M_{cp} \cdot k_{p,N-1} \quad 5.17$$

$$k_{p,N} = \frac{1}{k_{p,o}} \sum_c M_{cp} \cdot k_{c,N-1} \quad 5.18$$

Equation 5.18 is substituted into equation 5.17 to obtain

$$k_{c,N} = \frac{1}{k_{c,o}} \sum_p M_{cp} \frac{1}{k_{p,o}} \sum_{c'} M_{c'p} \cdot k_{c',N-2} \quad 5.19$$

$$k_{c,N} = \sum_{c'} k_{c',N-2} \sum \frac{M_{cp} M_{c'p}}{k_{c,o} k_{p,o}} \quad 5.20$$

which can also be written as

$$k_{c,N} = \sum_{c'} \tilde{M}_{cc'} k_{c',N-2} \quad 5.21$$

$$\text{where } \tilde{M}_{cc'} = \sum_p \frac{M_{cp} M_{c'p}}{k_{c,o} k_{p,o}}$$

The equation 5.21 is satisfied when  $k_{c,N} = k_{c',N-2} = 1$  and this is the eigenvector of  $\tilde{M}_{cc'}$  linked to the largest eigenvalue. Since the eigenvector is a vector of ones, the information content is limited. Hence, the eigenvector linked to the second largest eigenvalue that captures the largest amount of variance in the system is used as the measure of economic complexity index (ECI)

$$ECI = \frac{\vec{K} - \langle \vec{K} \rangle}{stdev(\vec{K})} \quad 5.22$$

where  $\vec{K}$  = the eigenvector of  $\tilde{M}_{cc'}$  linked to the second largest eigenvalue and  $\langle \rangle$  is average

An analogous definition for the Product Complexity Index can be derived<sup>40</sup>. Since the problem is considered as symmetric, one can just transpose the index of countries ( $C$ ) with that for products ( $p$ ) consistent with equation 5.22 above.

$$PCI = \frac{\bar{Q} - \langle \bar{Q} \rangle}{stdev(\bar{Q})} \quad 5.23$$

Where  $\bar{Q}$  = the eigenvector of  $\tilde{M}_{pp}$ , linked with the second largest eigenvalue.

### 5.2.3.2 Revealed Comparative Advantage

To construct both the ECI and the product space, one has to construct another index referred to as Revealed Comparative Advantage (RCA) by Balassa (1925).<sup>41</sup> The RCA will ensure that countries and products are comparable by considering the size of the export volumes of countries and that of the world trade of the products. Balassa (1925) argued that a country has a revealed comparative advantage in a product if it exports more than its “fair” share. In other words the systemic importance of that product in total global export of that product.

In this case, if  $X_{cp}$  is to represent the export of a country  $C$  in the product  $p$ , then the

revealed comparative advantage that the country  $C$  has in a product  $p$  can be expressed as:

$$RCA_{cp} = \frac{X_{cp}}{\sum_c X_{cp}} \bigg/ \frac{\sum_p X_{cp}}{\sum_{c,p} X_{cp}} \quad 5.24$$

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<sup>40</sup> Product Complexity exhibits the level of sophistication of a product and for that make its strategic value. Economic complexity on the other hand shows the level of sophistication of a country’s export basket.

<sup>41</sup> Cited in Clark, (2005)

where the numerator represents the share of a product in a country's export basket and the denominator represents the share of the product in total world trade.

This index is used to construct a matrix that links each country to the products it produces.

Here, the entries in the matrix are 1 if country  $c$  exports product  $p$  with RCA greater than 1, and 0 otherwise.

We can therefore have:

$$M_{cp} = \begin{cases} 1 & \text{if } RCA_{cp} \geq 1 \\ 0 & \text{otherwise} \end{cases}$$

To incorporate the effect of price fluctuations of the commodities involved, a modified definition of RCA where the denominator represented the average over the previous three years is used for generating the indices.

### 5.2.3.3 Product Space

Developing countries face challenges in their attempt to transform the structure of their economies. In addition to the huge natural and physical resource requirements to support large scale changes underpinning new and leading sectors as well as technological upgrading, they are to contend or compete with economies well advanced in terms of cost efficiency and productive advantages, (Fortunato et al, 2015). At the same time, the new products and sectors that emerge in the structural transformation process do not offer equal prospects for economic advancement. The critical role for the government in using its industrial policy in conjunction with the private sector to guide the discovery of new products that have the potential to maximise current and prospective productivity and competitiveness of the economy and economic development is very crucial.

The product space framework suggested and developed by Hidalgo et al. (2007), Hausmann and Klinger (2007) and Hausmann et al., (2013) can be used to identify sectors and products with potentials for improved competitiveness based on a country's current set of productive capabilities. The theoretical framework underpinning the product space concept is developed on a model that suggests that human capital tends to be product-specific and the degree of substitutability across products quite heterogeneous, (Hidalgo et al, 2007). A similar theoretical argument have been advanced by Lazear (2009) that firm-specific human capital can be considered as a weighted combination of skills unique to the firm, however, the same weighted combination of skill may not be a perfect substitute required for another firm. The same theory equally rhythms well with the models of learning-by-doing.

In constructing the product space, the key consideration is to focus on products outside the current export basket of the country, yet within adjacent possibilities and offer opportunities for improving the average level of sophistication of the products in the export basket of a country, (Hausmann and Jasmina, 2015). Since, by and large, a country's economic advancement is likely to be associated with an increased level of products sophistication and economic complexity as well as consistent with the claim that economic development tends to be path-dependent, countries are better placed to adapt embedded capabilities to new products within their adjacent possibilities. Thus, to enhance the export diversification agenda of Ghana, the product space concept is used to locate the new products within its feasible range given its current capabilities. At the same time, it is used to identify products that offer prospects for improving the collective level of sophistication of Ghana's export basket and their strategic value for structural transformation leading to a more diversified export base.

The following sub-sections are devoted to explain some of the key indices that are used to operationalize the product space construct.

#### 5.2.3.4 Measuring Proximity

To produce a product, one will require some capabilities. The capabilities of a country can be captured by the proximity between the products being currently produced and the desirable products outside its current export basket. Acquired capabilities used in the production of some current products can either be deployed to produce other goods or maybe unique to those products. Since capabilities cannot be observed, the measure of proximity is used to gauge the similarity between the capabilities required to produce a pair of goods by assuming that they are co-exported. Hence, we assume that to the extent that two products share most of the requisite capabilities, then the country that exports one of the products is more likely to export the other, otherwise they are not likely to be co-exported.

To this end, we base the proximity measure on the conditional probability that if a country exports a product  $y$  then it is likely to export  $y'$ . The conditional probability is not considered to be symmetric, so we selected the minimum of the probability of exporting product  $y'$ , given  $y$  and the reverse is true.

We define the proximity measure as:

$$\phi_{yy'} = \frac{\sum_c M_{cy} M_{cy'}}{\text{Max}(k_{y,o}, k_{y',o})} \quad (5.25)$$

Where  $M_{cy} = 1$  if a country  $c$  exports product  $y$  with  $RCA > 1$  and 0 otherwise,  $k_{y,o}$  is the ubiquity of product  $y$ .

#### 5.2.3.5 Positioning Countries within the Product Space

To offer further clarity on the product space construct, Hausmann et al. (2013) use a metaphor to describe the network structure. In this case, countries are considered as ‘Monkeys’ and products as ‘Trees’. One can readily surmise that ‘monkeys’ in dense forest with trees closed to each other can effortlessly move across the ‘trees’ (products). It will, however, require a lot

of effort and agility on the part of ‘monkeys’ that are in the sparse forest to easily move about. In like manner, countries producing products that are in the dense part of the product space and surrounded by a lot of products will find diversification easier than countries producing products located in the peripheral. In what follows, we describe the matrices which established such product networking and the positioning of countries.

### *Distance*

A country can infer the deficit in capabilities to reach out to new products by using the concept of distance. It is used to calculate the sum of the proximities between a product and all the products that a country may not be currently exporting. This is normalised by the sum of proximities between all products and  $y'$  (where  $y'$  is the weighted proportion of products connected to the good  $y$  that country  $c$  is not exporting). The weights are represented by the proximity index. In this case, if the country  $c$  is exporting most of the products connected to the product  $y$ , then the distance will be shorter and close to zero, otherwise, it will be close to 1. We can specify the measure for distance as:

$$d_{cy} = \frac{\sum_c (1 - M_{cy'}) \phi_{yy'}}{\sum_{y'} \phi_{yy'}} \quad 5.26$$

Thus, with the distance, we can measure how far each product will be from a given country’s current export basket. It is worth noting that the level of economic progress of a country can be largely linked to the complexity of its products mix, thus a country stands to gain, the closest are most of the current products in its export basket to complex products within the product space. This situation will offer better opportunities for diversification.

Hence, this opportunity value, also referred to as complexity outlook can be expressed as:

$$\text{Complexity} \cdot \text{Outlook}_c = \sum_{y'} (1 - d_{cy'}) (1 - M_{cy'}) PCI_{y'} \quad 5.27$$

where  $PCI$  is the product complexity index of the product  $y'$ .

One can use the complexity outlook measure to account for the level of complexity of the products that a country will be lacking comparative advantage by considering how close those products are to the country's current export basket. Higher complexity outlook value may suggest that a country is positioned in a location within the product space such that it is either close to more products or more complex products or both.

The opportunity value is used to establish opportunity gain. The opportunity gain measure is used to capture the relative contribution of an additional product with an increasingly higher level of product complexity. This can be specified as:

$$\text{Opportunity} \cdot \text{gain}_c = \left[ \sum_{y'} \frac{\phi_{yy'}}{\sum_{y''} \phi_{y''y'}} (1 - M_{cy'}) PCI_{y'} \right] - (1 - d_{cy'}) PCI_y \quad 5.28$$

#### 5.2.4 Data Source

We use data from the Harmonised System 4-digit classification level trade statistics (HS4 data) at a more granular level (disaggregated into 1,240 different products). It is accessed from the MIT Observatory of Economic Complexity (2018) and the Harvard Atlas of Economic Complexity websites (2018). Data on World Bank classification of income levels is obtained from World Development Indicators (2018), World Bank. Data on per capita GDP is obtained from the World Economic Indicators (2018). Then the Lall classification of products are extracted from the United Nations COMTRADE database.

### 5.3 The Analytical Section

The analyses here follow the descriptive approach of Hausmann and Jasmina, (2015) and Fortunato et al. (2015). The various indexes reflecting economic and product complexities (RCA, ECI, and PCI), as well as the measures of distance and opportunity gains within the product space frontier are used either individually or collectively to address the key issues that this section of the thesis seeks to investigate: being why Ghana's export mix is less diversified; the nature of products Ghana produces and export (extent of sophistication) and the implication for the structural transformation and export diversification; identifying 'frontier' products Ghana can target for its industrial policy and export promotion.

To address these issues, the following analytical procedure is followed:

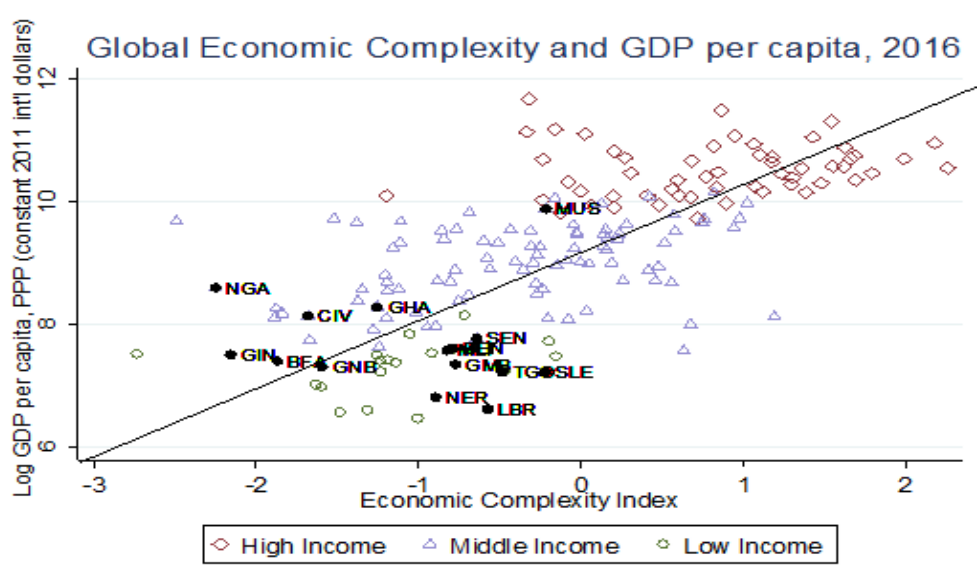
- Examine the relationship between ECIs and per capita incomes
- Trace Ghana's accumulation of capabilities as reflected in the evolution of its ECIs and compared the same with some other countries and regions
- Examine the products that Ghana possessed RCA and how they compared with other countries in the ECOWAS sub-region
- Outline how Ghana's RCAs have evolved between the years 2000 and 2016 by adopting a categorisation scheme of the RCAs used in the literature. The various categories of the RCA are then compared/crosstab with the level of product sophistication and product community categories to demonstrate how Ghana is more concentrated in less sophisticated products. This is done in the context of some selected country comparisons.
- In a similar vein, a comparative analysis is done for the same countries in terms of the evolution of their product space (between two periods), since that has implications for both current and future structural transformation

- Identify new products (“frontier products”) within Ghana’s current productive knowledge with potential for aiding its structural transformation agenda towards a more diversified export base
- Examine how the frontier products can be promoted within the ECOWAS regional trade given the region’s derived import intensity for each of the products.

### 5.3.1 The Relationship between ECIs and Income Per Capita

Since the ECIs reflects the gamut of productive knowledge/know-how embedded in an economy, they tend to have a strong link with the income levels of countries. Figure 5.3 presents the relationship between ECIs and per capita income for 220 countries with specific highlights on the 15 ECOWAS countries.

**Figure 5.3: Global Economic Complexity Index and GDP Per Capita, 2016**



Source: Author’s calculations

From the graph, countries are separated per the World Bank’s classification of income levels. Low-income countries are denoted in circles, middle-income countries in triangles and high-income countries in squares. In a diminishing order, countries in the high-income group

generally tend to have relatively higher levels of ECIs than the other income groups. Ghana and its peers in the ECOWAS region seem to have relatively lower ECIs consistent with their income groups and with some degree of heterogeneity. This outcome is consistent with the study by Hausmann et al., (2013) which find that controlling for countries' natural resources, ECIs explained about 78 percent of the variations in income across 128 countries. Hence, more complex economics are more likely to have higher levels of income.

### **5.3.2 Evolution of Ghana's Economic Complexity**

As discussed under section 5.2.3.1, ECI is a measure of the level of productivity of a country embedded in the process of capabilities accumulation in a knowledge-intensive setting that finds expression in the nature/characteristics of products countries export. Hence, we examine the trend of Ghana's ECI for the period 1995 to 2016 and compared that with Nigeria for the ECOWAS sub-region analysis, and Malaysia and Singapore within East Asia and Pacific sub-region. The basis for selecting Malaysia and Singapore for comparison is that they have had exceptional performance in export-led growth. In addition, Malaysia has some historical parallels with Ghana, in terms of having the same year of independence (1957) and the initial industrial policy orientation. It would be noted that in the early stages of development, both countries opted for import substitution as a key industrial policy tool to transform their economies from primary production into more industrialised economies with significant emphasise on manufacturing export. Though Ghana's effort did not yield many desirable outcomes. Singapore gained independence in 1965 but turned their challenging circumstances into opportunities through deliberate government policies to engage both nationals and non-nationals in their development effort<sup>42</sup>. Nigeria is selected because it is a peer country and to demonstrate that being a resource-rich country is just a matter of geology, but not a necessary

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<sup>42</sup> Both countries from the East Asian are also shining examples of good governance.

condition for knowledge accumulation. This is because of the less ubiquitous nature of their production and export, crude oil<sup>43</sup>.

A cursory observation of the box graphs in figure 5.4 depicts Ghana's average ECI for the period 1995 to 2016 as negative 1.22 which compares favourably to the negative 2.21 for Nigeria, a resource-rich country, but unfavourably to the two East Asian countries, Malaysia and Singapore which post positive average ECIs of 0.63 and 1.39 respectively for the same period. Ghana's weak effort at accumulating capabilities as reflected in the negative average ECI can partly explain its inability to match the export performance of frontier countries like Malaysia and Singapore that exhibit sustained pace of accumulating capabilities as reflected in their positive ECIs.

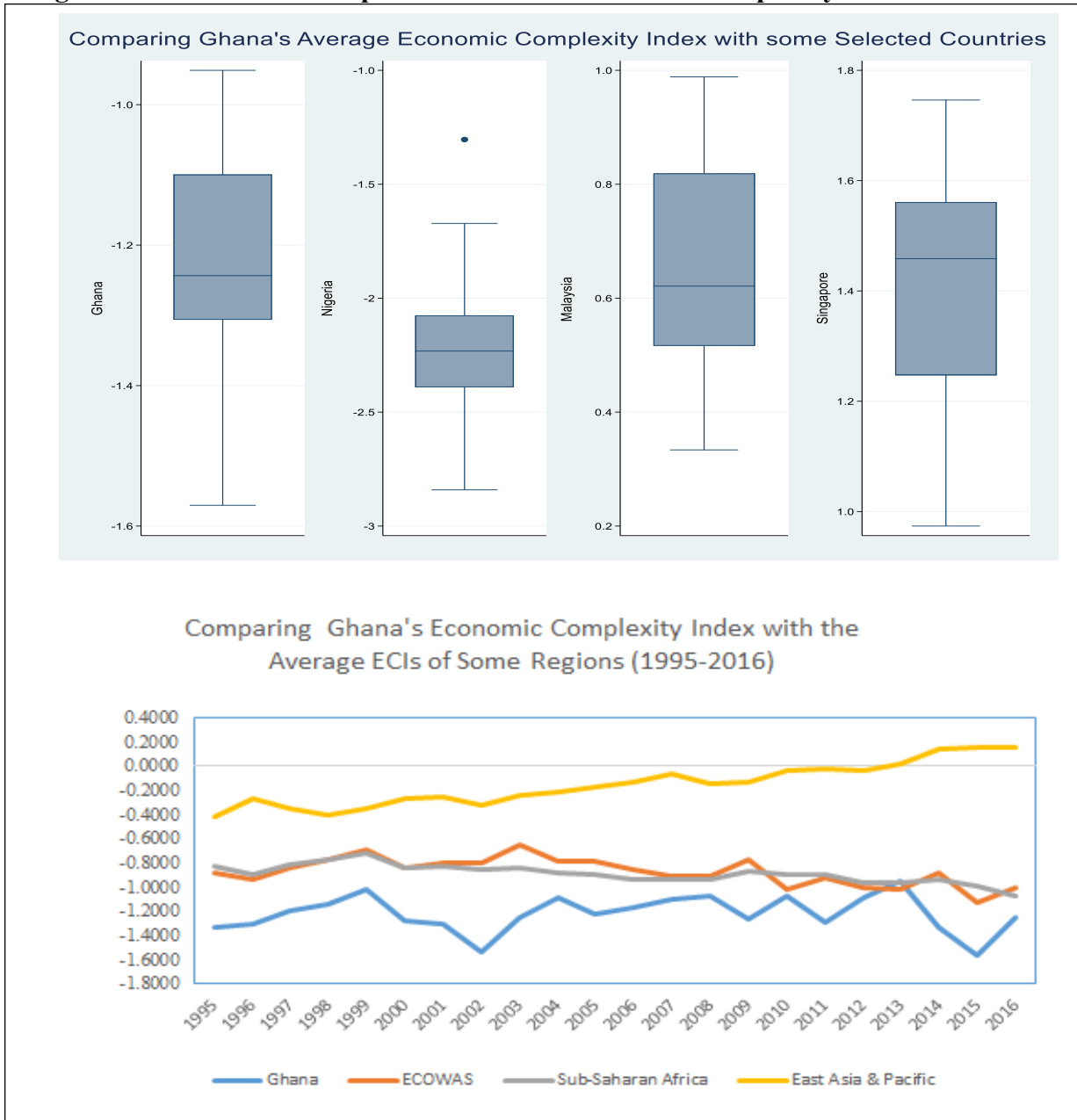
From Figure 5.4, Ghana's accumulated capabilities over the years as reflected in the evolution of ECIs for the period 1995 to 2016 has been quite uneven with no discernable pattern. It would be recalled that after the implementation of the ERP and SAP, the period, 1992 to 1998, was when there was some relative macroeconomic stability and that might have translated into improved ECI around that period. However, the deterioration of external conditions in 1999 subsequently triggered a sharp decline in the ECI. In addition, improved macroeconomic conditions between 2009 and 2013 might have impacted positively on the ECI. It is also worth stating that energy supply shock in 2014 coupled with the exchange rate crisis might have negatively impacted the ECI in 2015.

In general, the average for the countries in the East Asia & Pacific region is on an upward trajectory whilst the averages for both the SSA region and ECOWAS sub-regions are on a downward path.

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<sup>43</sup> In general, less ubiquitous products are supposed to be produced by few countries because of the complex network of processes involved and the high knowledge intensive requirement as well as the spillover effects they generate. Geology may lead to some few countries producing such natural resources.

**Figure 5.4: Historical Perceptive on Ghana’s Economic Complexity**



Source: Author’s construct

A possible explanation may be that countries in the East Asia & Pacific regions exert considerable efforts at scaling up the levels of capabilities to be in the position to produce diverse and possibly less ubiquitous products. This may explain why in general most of the countries in East Asia and Pacific countries perform better in terms of export diversification and economic growth than their counterparts in the SSA region and the ECOWAS sub-region.

### 5.3.3 Analysis of Ghana's Revealed Comparative Advantage (RCA)

As has been mentioned already, the concept of reveal comparative advantage can be used to highlight the systemic importance of a product in a country's export basket relative to the global significance of that product and the extent of diverse products that a country can produce.

Hence, a country is said to have a revealed comparative advantage in a product if the calculated RCA is greater than one.

Table 5.1 presents the number of products that Ghana had RCA in the years 2000 and 2016, the product community categorises into which they belong, as well as the associated export values and their relative shares in total export.

**Table 5.1: Ghana's Export Products with RCA (2000 & 2016)**

Commodity Community	2000			2016			Total Number of Products in category
	Number of Products Ghana has RCA>1	Value of Ghana's Exports (US\$' 000)	% of Ghana's Merchandised Exports	Number of Products Ghana has RCA>1	Value of Ghana's Exports (US\$' 000)	% of Ghana's Merchandised Exports	
Animal & animal products	3	26,500.0	1.5	2	30,000.0	0.2	44
Vegetable products	21	77,000.0	4.4	16	964,023.8	8.0	101
Foodstuffs	11	542,000.0	30.9	12	2,891,602.9	23.9	56
Mineral products	7	165,000.0	9.4	6	1,448,300.0	12.0	66
Chemicals & allied industries	6	5,055.1	0.3	5	76,072.8	0.6	176
Plastics/rubbers	2	8,010.9	0.5	4	310,000.0	2.6	43
Wood & wood products	14	195,000.0	11.1	5	320,000.0	2.6	68
Textiles/clothing	4	15,700.0	0.9	1	7,400.0	0.1	149
Footwear/headgear	1	19.3	0.0	1	650.2	0.0	20
Stone/glass	5	483,000.0	27.6	4	5,422,269.0	44.8	67
Metals	8	156,000.0	8.9	8	146,500.0	1.2	157
Machinery/electrical	1	4,734.8	0.3	1	38,000.0	0.3	133
Miscellaneous	4	1,846.9	0.1	1	403.7	0.0	101
<b>Total</b>	<b>87</b>	<b>1,679,867.0</b>	<b>95.8</b>	<b>66</b>	<b>11,655,222.4</b>	<b>96.3</b>	<b>1181</b>

Source: Author's construct using data from Atlas of Economic Complexity Website

In 2000, Ghana had RCA in 87 products with an export value of about US\$1.68 billion, constituting 95.8 percent of the total export of goods<sup>44</sup>. The number of products in which Ghana had RCA declined to 66, with an export value of about US\$ 11.65 billion, representing some

<sup>44</sup> The last column depicts the number of products exported globally in that product community category

96.3 percent of total merchandised export. This suggests that Ghana managed to improve its share of the global trade in value terms over the past sixteen years. However, this is achieved on the back of increased export concentration exposing the country to potential vulnerabilities from changes in the world prices of these few products.

Comparing the two periods, Ghana is generally diversified in the production and export of vegetable products and foodstuffs. In 2016, the main products in the vegetable products category are coconuts, Brazilian nuts and Cashew nuts totaling US\$ 600 million whilst that in the foodstuff category is cocoa beans totaling US\$2.1 billion. The product with the highest export value is in the stone/glass category, which is gold totaling US\$ 5.0 billion, whereas in the minerals category there is crude petroleum amounting to US\$1.2 billion.

Table 5.2 presents the extent of product diversification among the countries in the ECOWAS sub-region. The indicators demonstrate a low level of export diversification for countries in the sub-region, although, Ghana's export basket is more diversified than eleven of the countries except for Senegal, Togo, and Benin. Almost all the countries are more diversified in the vegetable products and foodstuff categories, with few diversified in the export of products in the chemicals and allied products and metals categories. This may expose the sub-region to common external shocks demanding some common approach to diffuse such potential threats.

**Table 5.2: Number of Export Products with RCA, Ghana, and ECOWAS countries (2016)**

	Ghana	Senegal	Togo	Mali	Guinea	Cote D'Voire	Gambia	Benin	Nigeria	Burkinafoso
Animal & animal products	2	10	4	6	3	0	5	4	3	3
Vegetable products	16	27	18	6	11	15	7	31	7	18
Foodstuffs	12	16	13	6	3	15	3	8	6	0
Mineral products	6	12	9	1	3	8	2	3	9	4
Chemicals & allied industries	5	18	13	10	0	3	2	3	0	0
Plastics/rubbers	4	2	4	1	1	1	0	2	1	0
Raw hides, skins, leather & furs	5	4	5	4	1	2	0	2	5	1
Wood & wood products	0	5	3	2	1	7	2	6	2	0
Textiles/clothing	1	7	10	8	2	3	2	5	0	2
Footwear/headgear	1	2	2	1	0	0	0	0	2	0
Stone/glass	4	1	3	1	1	1	2	3	0	1
Metals	8	18	11	2	3	4	4	14	6	1
Machinery/electrical	1	2	5	1	0	0	2	3	0	0
Transportation	0	1	4	2	0	0	0	1	1	0
Miscellaneous	1	6	0	4	1	1	3	0	0	0
Total	66	131	104	55	30	60	34	85	42	30

Source: Author's Calculations using Export data at the HS4 level from Atlas of Economic Complexity Website

### 5.3.4 How Ghana's RCAs have evolved between the years 2000 and 2016 by adopting a categorisation scheme of the RCAs

One of the core hypotheses that this thesis seeks to explore is that the nature of products countries export matters for both current and future export diversification and prospects for economic growth. Therefore, it becomes imperative to seek ways to assess both the current level of sophistication of products exported by Ghana and how that can translate into future opportunities in new strategic sectors. To accomplish we under an in-sample analysis by adopting the approach by Fortunato et al., (2015). According to this approach, RCAs are categorised into four groups based on how they have evolved between two periods (in this case 2000 and 2016)<sup>45</sup>. The groups are referred to as *emerging*, *established*, *underdeveloped* and *losing out*. The *emerging* group is used to represent products that Ghana did not have RCA ( $RCA < 1$ ) in 2000 but managed to secure RCA in 2016 ( $RCA > 1$ ). The *established* group are products that Ghana did have RCA in 2000 ( $RCA > 1$ ) and continues to have RCA in 2016 ( $RCA > 1$ ). The *underdeveloped* group are products that Ghana did not have RCA in 2000 ( $RCA < 1$ ) and continues not to have RCA in 2016 ( $RCA < 1$ ). Lastly, the *losing out* group captures products that Ghana used to have RCA ( $RCA > 1$ ) but is no more having RCA in 2016 ( $RCA < 1$ )<sup>46</sup>.

The above categorisation is compared with the level of product sophistication as measured by the Product Complexity Index (PCI) and the value of export. The idea here is that products

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<sup>45</sup> With the dataset ending at 2016, we selected the start period of 2000 to be the same as the period selected for the first empirical paper. We also chose that period, to ensure that we get sufficient years for productive knowledge to be embedded and open new paths for diversification. Also, given that a similar study by Chandra, V., Osorio-Rodarte (2007) employed data for the periods 1980-84 to 2000-04. Thus, we decided to consider a relatively more current period, 2000-2016, in order to update the literature

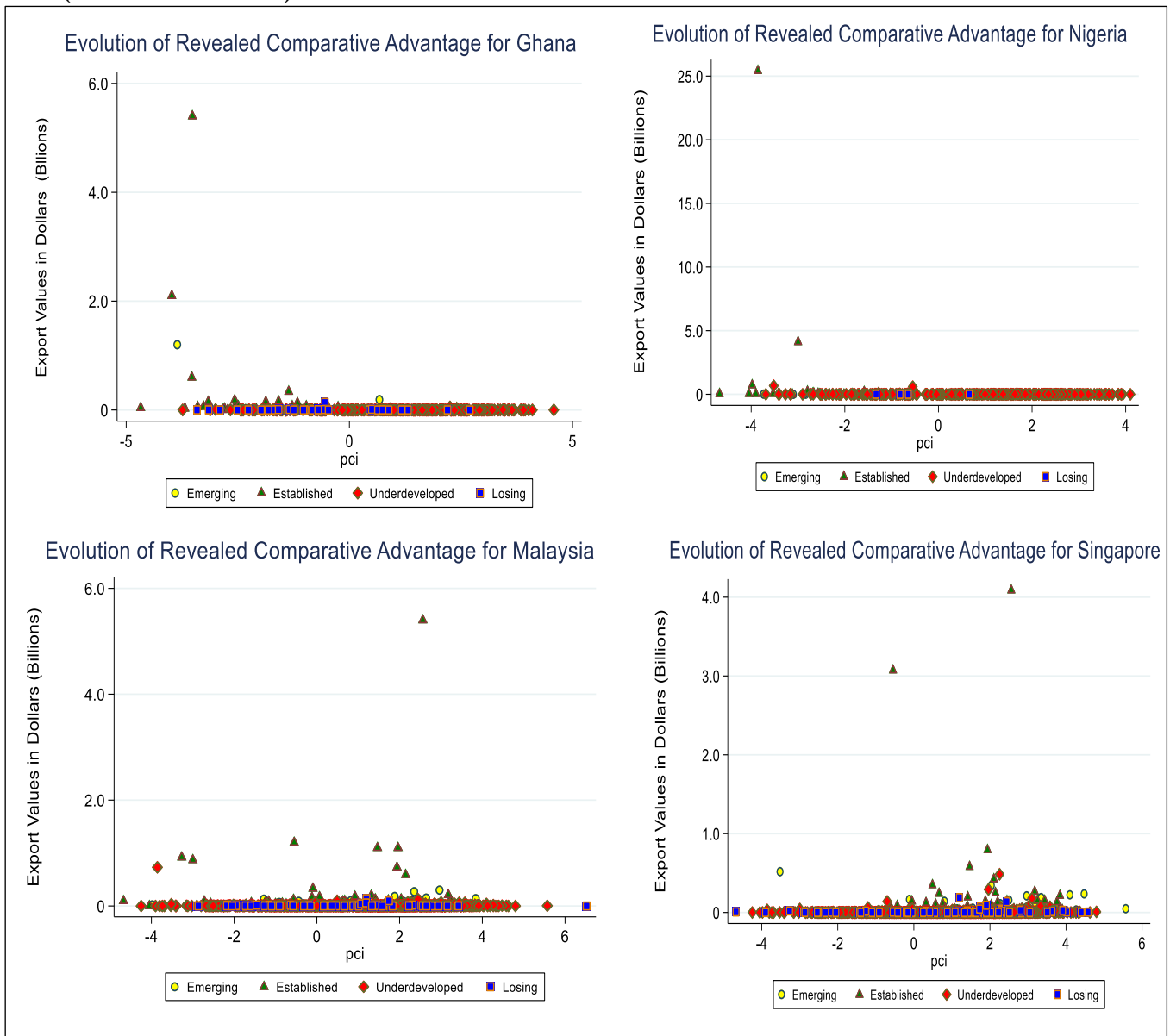
<sup>46</sup> It will be noted that, I did a similar categorization by comparing the averages of RCAs for the period 2000-2004 to that of 2012-2016, instead of comparing the years 2000 and 2016. However, since there was not significance material difference between the two categorizations, I stuck to the later for the purpose of analysis.

with higher PCI have better prospects in opening paths to new products. Production and export of a lot of products with high PCI could potentially prop up the growth of an economy in terms of promoting both forward and backward linkages, minimise the coordination problems related to deficits in capabilities to move into new products and ultimately facilitate the country's structural transformation strategy. This analysis is done initially by using graphs. Subsequently, crosstabs of the categories with the product community groups are generated to examine the sectors that emanate because of changes in the RCAs over the 16 years.

For this analysis, Ghana and Nigeria are placed on one side (representing the ECOWAS sub-region) and compare to Malaysia and Singapore on the other side (representing the East Asia & Pacific region). The exercise reveals the sectors that contributed to the successes of the countries in the East Asia & Pacific region in their export promotion drive as against that of the countries in the ECOWAS sub-region, especially Ghana.

Figure 5.5 presents four graphs in a quadrant for the four countries. In each graph, the categories for the RCAs between the years 2000 and 2016 are compared with the level of PCIs and the values of export.

**Figure 5.5: Evolution of Revealed Comparative Advantage of Selected Countries (bet.2000 and 2016)**



Source: Author generated

From Figure 5.5 both Ghana and Nigeria are established in the production and export of products with exceptionally low PCIs and these products largely fetched the highest export values<sup>47</sup>. Ghana is highly established in the production of gold, cocoa, and coconuts & Brazil

<sup>47</sup> Indeed, due to the large number of products involved, for all the respective country analysis, we will select the three export products that fetch the highest values in the country's export basket. The rest of the statistics are summarised in the crosstabs below.

nuts & cashew with PCIs of -3.518, -3.978 and -3.595 respectively. Suggesting that Ghana has built capabilities in products with low sophistication and weak linkage possibilities to other sectors.

A similar commentary can be made of Nigeria, which is also established in products with relatively low PCIs. The three products with the highest export values that Nigeria is established in are crude petroleum, petroleum gas and cocoa with PCIs of -3.856, -2.998 and -3.978 respectively.

Examining both countries, most of the high-value products that emerged because of their respective acquired capabilities over the years, equally tended to have low levels of sophistication as reflected in their PCIs. However, the average PCIs for the emerging products in both countries tend to be relatively higher than that for the established products, though Ghana seems to be more complex than Nigeria<sup>48</sup>. For instance, the highest three products that emerged in Ghana's export basket were crude petroleum, plastic lids, and other inorganic acids with PCIs of -3.856, 0.672 and 0.923, respectively. This can be compared with the emerging products in Nigeria's export basket, which are scrap copper, raw lead, and cement also with PCIs of -1.2682, -1.3963 and -1.5726, respectively. In the case of Ghana, the emerged products with positive PCIs offer some glimmer of hope in terms of new paths leading to other products with possibly higher PCIs likely to aid the country's structural transformation.

Unfortunately, Ghana appeared to be losing out in products that have relatively higher PCIs than the ones associated with the established products. Ghana lost out in the export of products such as refined petroleum, electricity and other processed fruits and nuts amongst others with PCI levels of -0.5481, 0.5025 and -1.341, respectively. Similarly, Nigeria lost out on

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<sup>48</sup> The average PCI for the established products category for Ghana and Nigeria are -1.88323 and -2.65503, whilst that for the emerging products category are -0.28575 and -1.80466 respectively. Suggesting that the countries are increasing the levels of product sophistication with the expansion of their export basket to secure RCA in new products. The same holds for the two East Asian countries. Singapore and Malaysia have average PCI levels for their established products to be 1.32587 and 0.505138, but that for the emerging products are 2.5334 and 1.056995, respectively.

relatively higher PCI products such as precious stones (-1.3328), other vegetable residues (-0.6422) and processed bones (0.6584).

The evidence for Malaysia and Singapore is different from those for Ghana and Nigeria. From figure 5.5, both countries are largely established in products with relatively high PCIs. Singapore is established in the export of products such as integrated circuits, refined petroleum, and computers with PCI levels of 2.5619, -0.5481 and 1.9372, respectively. In a similar vein, Malaysia is established in the production and export of integrated circuits, refined petroleum, and telephones with PCI levels of 2.5619, -0.5481 and 1.9372, respectively. It is therefore not surprising that these two countries are in the league of countries that have made tremendous achievements in export-led growth both based on export diversification and the level of sophistication of export products, with high potential for opening new paths for further growth. In the emerging products category, both countries tend to export products with relatively high PCIs. For Singapore, some of the emerging products in its export basket are gold, gas turbines and chemical analysis instruments with PCI levels of -3.5182, 2.0349 and 4.1005, respectively. On the other hand, Malaysia's export basket has emerging products such as industrial printers, oscilloscopes, and low voltage protection equipment with PCI levels of 2.9653, 2.3524 and 1.8817, respectively.

Singapore lost RCA in products such as broadcasting equipment, medical instruments, and passenger & cargo ships with PCI levels of 1.1980, 2.4447 and 1.9064, respectively. At the same time, Malaysia equally lost RCA in products such as broadcasting equipment, electrical transformer, and seats with PCI levels of 1.1980, 1.7438 and 1.1891, respectively. Both Singapore and Malaysia lost RCA in products with average PCI levels of 0.9772 and 0.6423, respectively. It would be noted that both Singapore and Malaysia lost RCA in products with average levels of PCI (average sophistication level) lower than the average levels of PCI for the emerging RCA products. Though a similar pattern is seen in the case of Ghana, the same

did not happen for Nigeria<sup>49</sup>. This suggests that initial conditions in terms of the number of products with RCAs and their average PCI levels count a lot for the PCI levels for the emerging RCA products. From the analysis above, countries that initially had RCA in a lot of products and a high average level of PCI tend to increase the average level of PCI for the emerging RCA products.

Table 5.3 presents the product community or the sectors experiencing these evolutions in the RCA<sup>50</sup>. From the analytical tables, one can deduce some implications for a country's structural transformation effort. In general, Ghana and Nigeria established RCA largely in the vegetables, foodstuffs and mineral sectors, suggesting that not much has been achieved over the years in scaling up value addition in the other sectors which tended to have huge potential for industrialization.

In contrast, Singapore and Malaysia established RCA in the machinery/electrical, chemicals & allied, and miscellaneous sectors. The number of capabilities acquired from these sectors is solid enough to deploy to a lot more sectors, unlike the case of Ghana and Nigeria. Consistently, Ghana and Nigeria have emerging RCAs in the foodstuff, vegetables, minerals, and metals sectors. This compares with Singapore and Malaysia that have emerging RCA in the chemical and allied, machinery/electrical, metals, and miscellaneous sectors.

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<sup>49</sup> The average level of PCI for the products losing RCA for Singapore and Malaysia are 0.97723 and 0.64228 compared with the average level of PCI for the emerging products are 2.5334 and 1.056995 respectively. However, the average level of PCI for the losing RCA products for Ghana and Nigeria are -0.417045 and -0.241374 compared with emerging products category of -0.28575 and -1.80466 respectively

<sup>50</sup> A product community is considered as a group of products that require related productive knowledge

**Table 5.3: Product Community and Evolution of Reveal Comparative Advantage Categories of Selected Countries**

Ghana						Nigeria					
	Emerging	Established	Underdeveloped	Losing	Total		Emerging	Established	Underdeveloped	Losing	Total
Animal & animal products	0	2	41	1	44	Animal & animal products	1	2	40	1	44
Chemicals & allied ..	4	1	166	5	176	Chemicals & allied ..	0	0	176	0	176
Foodstuffs	4	8	41	3	56	Foodstuffs	2	4	49	1	56
Footwear/headgear	1	0	18	1	20	Footwear/headgear	2	0	18	0	20
Machinery/electrical	0	1	132	0	133	Machinery/electrical	0	0	133	0	133
Metals	4	4	145	4	157	Metals	5	1	150	1	157
Mineral products	2	4	57	3	66	Mineral products	5	4	57	0	66
Miscellaneous	0	1	97	3	101	Miscellaneous	0	0	101	0	101
Plastics/rubbers	2	2	39	0	43	Plastics/rubbers	0	1	42	0	43
Raw hides, skins, l..	0	0	21	0	21	Raw hides, skins, l..	2	3	16	0	21
Stone/glass	3	1	59	4	67	Stone/glass	0	0	66	1	67
Textiles/clothing	1	0	144	4	149	Textiles/clothing	0	0	149	0	149
Transportation	0	0	38	0	38	Transportation	1	0	37	0	38
Vegetable products	5	11	75	10	101	Vegetable products	2	5	94	0	101
Wood & wood products	0	5	54	9	68	Wood & wood products	0	2	65	1	68
Singapore						Malaysia					
	Emerging	Established	Underdeveloped	Losing	Total		Emerging	Established	Underdeveloped	Losing	Total
Animal & animal products	0	3	41	0	44	Animal & animal products	0	4	39	1	44
Chemicals & allied ..	19	22	123	12	176	Chemicals & allied ..	14	8	149	5	176
Foodstuffs	2	5	45	4	56	Foodstuffs	5	7	42	2	56
Footwear/headgear	0	0	20	0	20	Footwear/headgear	0	0	19	1	20
Machinery/electrical	11	24	85	13	133	Machinery/electrical	17	23	87	6	133
Metals	9	8	127	13	157	Metals	15	16	119	7	157
Mineral products	2	4	57	3	66	Mineral products	9	6	50	1	66
Miscellaneous	17	13	66	5	101	Miscellaneous	11	8	72	10	101
Plastics/rubbers	3	8	29	3	43	Plastics/rubbers	5	7	29	2	43
Raw hides, skins, l..	0	1	19	1	21	Raw hides, skins, l..	0	0	20	1	21
Stone/glass	8	1	55	3	67	Stone/glass	10	6	46	5	67
Textiles/clothing	3	0	139	7	149	Textiles/clothing	7	5	119	18	149
Transportation	4	4	28	2	38	Transportation	1	1	36	0	38
Vegetable products	0	6	89	6	101	Vegetable products	5	10	82	4	101
Wood & wood products	3	3	57	5	68	Wood & wood products	4	9	51	4	68

Source: Author generated

It would be noted that both Ghana and Nigeria lost RCA in products they used to have RCA, but in the case of Ghana, the unfortunate commentary is that it lost RCA in some products in the chemical and allied and textiles sectors with much potentials for enhancing the structural transformation strategy. This could be attributed largely to the stiff competition from relatively cheaper alternatives from China and the high costs of doing business in Ghana (especially the

costs, availability, and reliability of electricity in Ghana)<sup>51</sup>. Ghana and Nigeria have a lot more products with underdeveloped RCAs than Singapore and Malaysia. It could be suggested that Ghana and Nigeria have more room to improve on their average level of sophistication provided they could take the paths countries like Singapore and Malaysia took.

### 5.3.5 The Product Space of Ghana and Selected Countries

As mentioned earlier, the product space concept was developed by Hidalgo et al. (2007) and Hausmann and Klinger,(2007) as a global technological network frontier to investigate the hypothesis that there are knowledge spillovers in the process of production. The product space is constructed using largely the measures of proximity and distance as specified under section 5.2.3.3. This highlights the fact that the evolution of RCA of countries is conditioned by the pattern of relatedness of products at the global level. As a result, growth tends to be path-dependent and countries largely move from current products to proximate products to address the problem of resource coordination under conditions of factor specificity.

Consistent with the analysis we did on the categorisation of the evolution of the RCAs above, the product space supports the claim by Hausmann and Jasmina (2015) that “mapping the position of many countries in the product space overtime shows that new export products tend to emerge close to existing products in the product space” p16.

Thus, figures 5.6, 5.7, 5.8 and 5.9 present the product space for Ghana and the selected countries. From the charts, one can determine, given the current productive knowledge and the respective proximate products, the new products countries can move into with some ease.

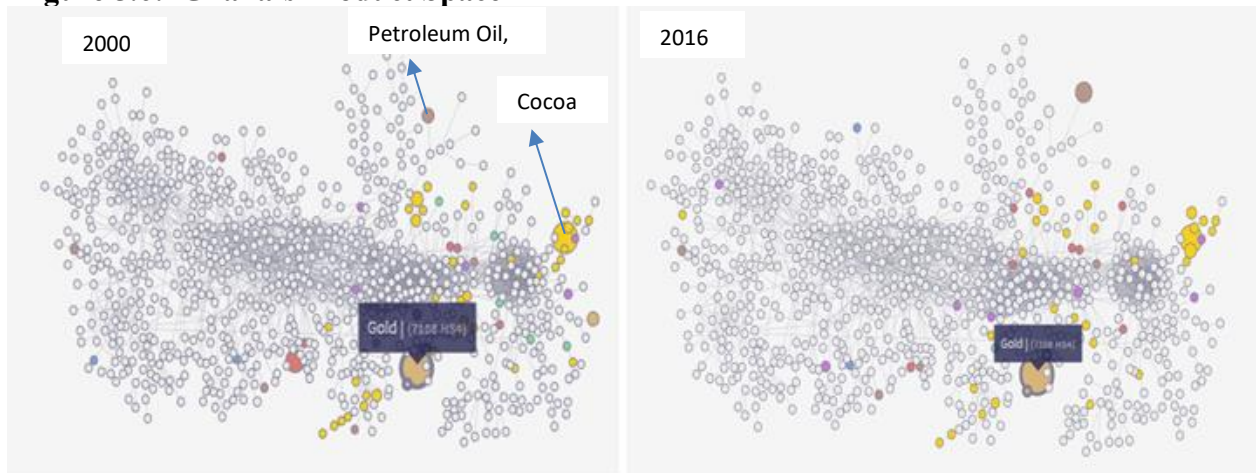
Within the product space, the coloured nodes denote products that countries export with RCA >1, whilst the pale nodes represent products that countries have RCA < 1. The size of the nodes

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<sup>51</sup> According the World Bank’s Ease of Doing Business Survey for 2018, Ghana is ranked 120 out of 190 countries, Nigeria is ranked 145, Singapore is ranked 2 and Malaysia is ranked 24. According to the same report, Ghana is ranked 136 on the matric of getting electricity, Nigeria is ranked 172, Singapore is ranked 12 and Malaysia is ranked 8. Refer to Appendix tables

depicts the significance of the product in a country’s export basket. It is suggested that products in the same product communities are represented by different colours, which tend to cluster more than others, meaning they share a considerable amount of requisite knowledge<sup>52</sup>. Examples of such product communities are machinery, chemicals, electronics, and textiles, (Hausmann and Jasmina 2015).

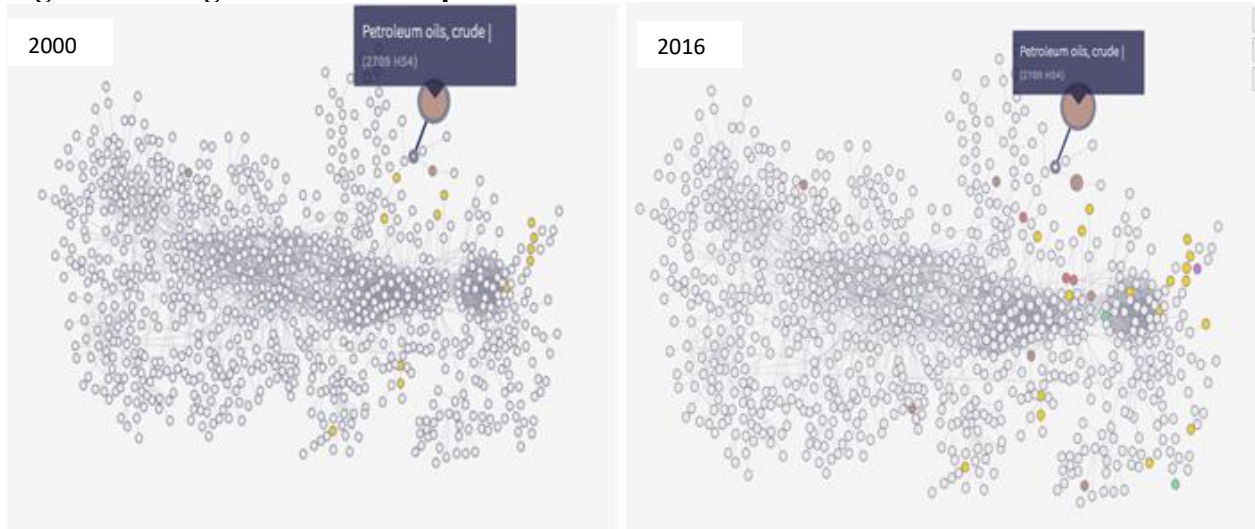
**Figure 5.6: Ghana’s Product Space**



Source: Author’s calibration and Atlas of Economic Complexity



<sup>52</sup> The legend for the figures positioned under Figures 5.6 & 5.7 can be read from left as textiles; vegetables, foodstuffs, and wood; stones and glass; minerals; metals; chemicals and plastics; transport vehicles; machinery; electronics

**Figure 5.7: Nigeria's Product Space**

Source: Author's calibration and Atlas of Economic Complexity

The product space has been designed to be heterogeneous with dense portions where products are largely connected, and a sparse portion where products are largely disconnected. From figure 5.6, one can observe that Ghana's current export location in the product space can be described as largely sparse and disconnected. Most of its high-value export products (such as gold, cocoa, petroleum, oil, and crude) are found in the peripheral of the product space, offering less strategic value in terms of taking advantage to deploy acquired capabilities to other strategic products. Comparing the charts for years 2000 and 2016, the structure of Ghana's product space has not witnessed a significant transformation. Only a few emergent high-value products can be detected over the sixteen years interval/period and considered as being strategically positioned within the product space to aid any diversification effort<sup>53</sup>.

The situation for Nigeria appears not significantly different from that of Ghana as presented in figure 5.7. Nigeria's export basket is largely found in the sparse and scattered locations in the

<sup>53</sup> For instance, under the chemicals & allied industries, products that have emerged are hydrogen peroxide and shaving products and other inorganic acids with PCIs of 1.12106, 1.35969 and 0.92275, respectively. Under metals, there are garden tools and large iron containers with PCI of 1.33452 and 1.12665. Under plastic/rubber there are plastic pipes and plastic lids with PCI of 1.11524 and 0.67228; and under stone/glass there is glass bulbs with PCI of 1.46268.

product space. This is characteristic of countries that are natural resource-rich and have not made conscious attempts at structural transformation through the acquisition of the requisite know-how, which can easily be used in the expansion of strategic industries. Nigeria's major export, petroleum oil, and crude are found located in the peripheral of the product space with limited strategic significance because not a lot of industries are located within that cluster to benefit from the acquired capabilities.

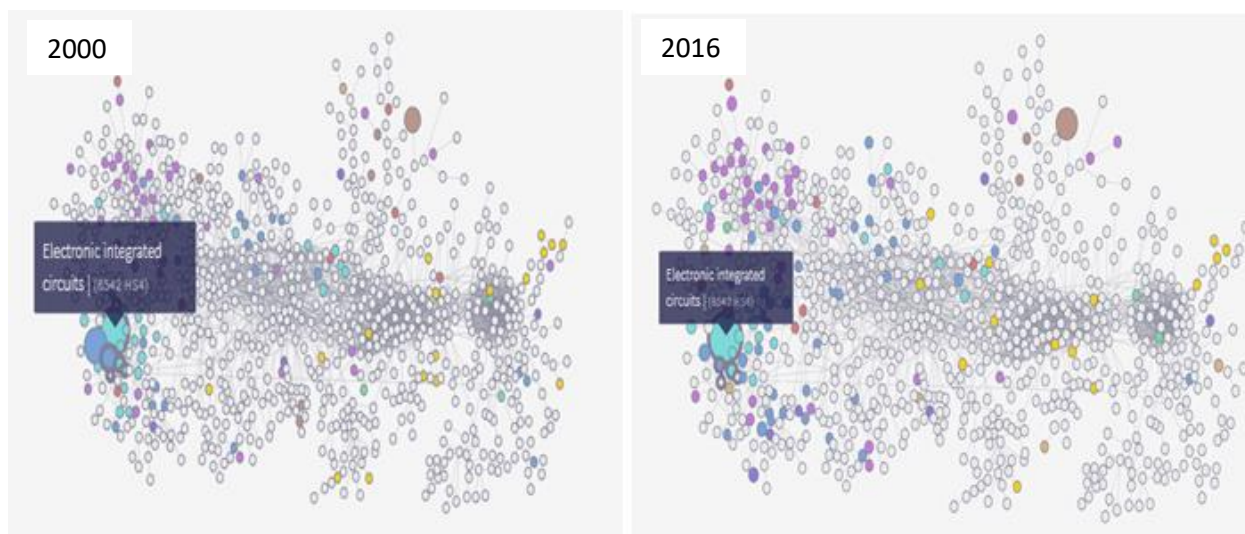
Though both countries seem constrained in terms of their abilities to leverage on their acquired capabilities to launch any effective export diversification drive, Ghana appears to be better placed than Nigeria regarding the density of their respective product space to undertake some structural transformation. Some of the products Ghana could potentially latch on given the emergent products with the positive PCIs are medicaments (not package), rubber pipes and belting, iron springs, valves, baked goods, sauces & seasoning, soups & broths, ice cream, and other edible preparations among others, located in the dense areas in the product space<sup>54</sup>.

The figures 5.8 and 5.9, present the product space for Singapore and Malaysia. It can generally be said that the export baskets of both countries are found in the location of the product space that can be described as dense and not disconnected. The two countries have electronic integrated circuits as their major export products. These products are found in the product space, where they are surrounded by a lot more products of strategic value (such as parts and accessories, electronic printed circuits, diodes and transistors, optical fibers, and cables among others). In such situations, structural transformation that can lead to a more diversified export base will be enhanced.

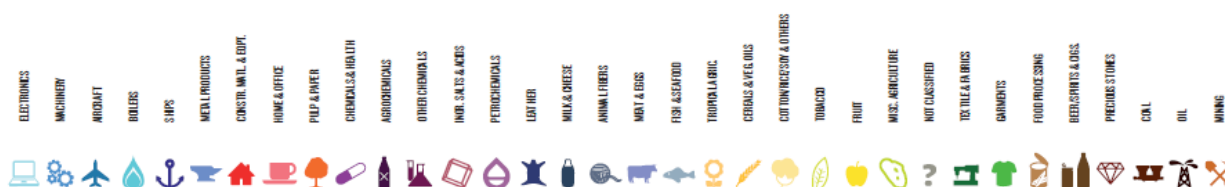
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<sup>54</sup> Using the web base interactive product space network on [altas.cid.harvard.edu/explore/network/country](http://altas.cid.harvard.edu/explore/network/country)

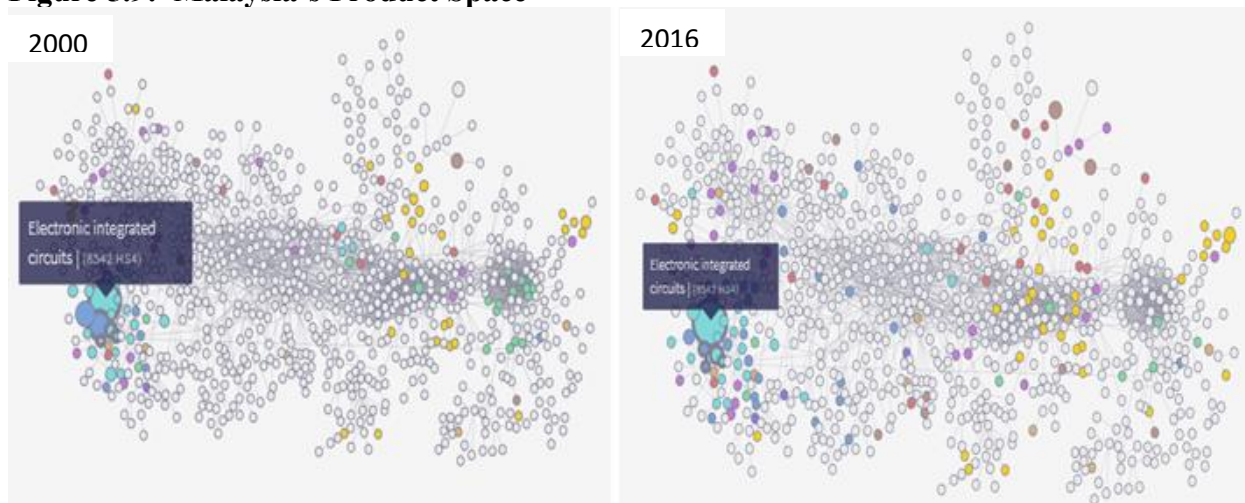
**Figure 5.8: Singapore’s Product Space**



Source: Author’s calibration and Atlas of Economic



**Figure 5.9: Malaysia’s Product Space**



Source: Author’s calibration and Atlas of Economic

These countries over the years have leveraged on their respective capabilities to dominate the global technology space by spreading their tentacles all over the frontier. This general assessment of the performance of both Singapore and Malaysia is consistent with the findings

of Hausmann and Klinger (2007) that the pace of structural transformation is more pronounced in countries that initially have solid footings in the dense part of the product space.

Although the strategic location of Singapore for providing shipping services for the two strong Asian Economies, China and India has been cited as a key factor in facilitating international trade in the country, the role of deliberate industrial policy by their forebear geared toward supporting and promoting high-tech industries with massive investment in research and development, as well as creating the conducive environment for foreign direction investment (FDI) to thrive cannot be discounted, (Fosu, 2013). In other words, these countries pursued a multidimensional approach to export diversification to the extent that they focused both on identifying products of strategic value and enablers for further growth, and at the same time laid a solid base to engender the requisite capabilities to backstop the structural transformation process. Therefore, there are some deep lessons to be drawn from the experiences of Malaysia and Singapore to inform Ghana's export diversification strategy. The need to ensure that apart from creating the enabling stable macroeconomic conditions, deliberate government policy to prop up the private sector to invest in products and sectors with prospects for engendering the level of sophistication of the economy and further lead to paths for sustaining the momentum for economic progress must be seriously considered.

Hence, by using the ECI and the measures of distance and opportunity gain as espoused above, we devote the next section to identify the new products within the adjacent possibilities of Ghana's current productive knowledge and consider their basic characteristics and how Ghana can take advantage of them to enhance its export diversification strategy.

### **5.3.6 Selection of New Products within Ghana's Knowledge Frontier**

In this section, we use an approach consistent with an objective criteria specified by Hausmann and Jasmina (2015) that involved a combination of the concept of ECI, the measures of

distance and opportunity gain to identify the new products reflecting more diverse and attractive product mix (otherwise referred to as “frontier” products) for Ghana, given its current productive knowledge.

As earlier mentioned, Ghana launched a strategic trade document with the title “Ghana National Export Strategy for the Non-traditional Export Sector”<sup>55</sup>. The Strategic document spells out a methodology used to identify some products that authorities must focus to drive the export diversification effort. The methodology is referred to as the economic benefit model adopted from Markham and Buatsi, (2000). The factors that are considered before a product passed for selection under this model are: (a) market and economic growth potential; (b) opportunity for early maturity; (c) political impact and massive demonstration effect. It would be noted that additional factors are considered under each of the factors stated above. Based on the factors listed above, making an optimal decision as to the appropriate products to select and develop for export promotion would encounter some practical challenges. This is because under this methodology there appears to be no objective measure to optimally capture all these factors and determine what level or threshold to use to select products for export promotion. So, the outcome is likely to be value laden.

Therefore, we will compare the list of priority products, generated from the methodology adopted by the Ghana National Export Strategic plan, to the “frontier products” generated by using the current approach. This is meant to establish the extent to which the priority lists products compare with the “frontier products” not only in terms of the capabilities acquired over the years but also the strategic value of the products to scale up the average level of sophistication of Ghana’s export.

To further explore the possibility of developing the “frontier products” to target the ECOWAS sub-region market and the global market, we develop an indicator of import intensity for the

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<sup>55</sup> Ministry of Trade and Industry (2013): Ghana National Export Strategy for the Non-Traditional Sector

ECOWAS sub-region. The indicator is developed by using the same theoretical concept supporting the reveal comparative advantage analysis<sup>56</sup>. We then compare the “frontier products” identified in Ghana’s current productive knowledge with those products that are intensively imported in the sub-region to guide Ghana’s effort at targeting that market effectively, provided it has the competitive urge.

According to Hausmann and Jasmina (2015) the “frontier products” must satisfy the criteria that: (i) the level of product sophistication must exceed the average associated with a particular country’s current export basket (in this case Ghana’s); (ii) the products are within the country’s feasible region, given its productive knowledge; and (iii) the products will aid further export diversification efforts in the future. Hence, the optimal condition is that countries diversify into new products with high PCI, closest Distance, and the highest Opportunity gain. Notwithstanding, these three ideal conditions may not always converge. Often, products with higher PCI may lie at a distance further from the current productive knowledge, which may deepen the coordination problem.

For the practical implementation of this approach, the following order of sequencing is adopted to identify the “frontier” products:

- (1) We eliminate all products (that Ghana does not have RCA) with PCI values below the average PCI of all existing products in Ghana’s export basket. The residual products

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<sup>56</sup> Here we use the same formula for RCA applied to export, but in this case for imports. Therefore, we compare the average imports of a particular product by the ECOWAS sub-region to the total imports by the Sub-region and the total import of that particular product to world trade. The ratio gives us the intensity indicator.

$$RCA_{cp} = \frac{\frac{M_{cp}}{\sum_c M_{cp}}}{\frac{\sum_p M_{cp}}{\sum_{c,p} M_{cp}}}$$

where  $M$  represents imports and  $c$  in this case represents ECOWAS countries and the rest as explained above.

Hence for a particular product if the calculated RCA is greater than one, then we conclude that the sub-region has RCA in the importation of that product and for that reason the product is intensively imported.

have PCIs either equal or above the average PCI for Ghana's current export basket and are likely to augment the level of sophistication of Ghana's export basket.

- (2) To identify products that are feasible within the proximity of Ghana's current productive knowledge, we use the measure of distance, where the closer the distance measure, the preferable the product. In this case, it has been argued that whilst there may be no threshold for the measure of distance, it must be possible for the widest distance to be narrowed with enough investment. Thus, for this exercise, the median distance of products that Ghana did not have RCA was used as the threshold.
- (3) Like the above, we use the mean of the measure of opportunity gain (where values above the mean are preferable) to eliminate products that do not have prospects of opening new paths for export diversification.

After executing the above procedure, Tables 5.4a and b present Ghana's identified frontier products. About 131 products are identified, but this list is reduced to 91 to exclude products with export values less than US\$1,000. From the two tables one can observe the PCIs of the products identified; their closeness to Ghana's export basket represented by the distance measure; the complexity outlook to be gained as reflected in the opportunity gain measure; the values of export of each product both within Ghana's export basket and that of the ECOWAS region; the corresponding values of each product in terms of the imports into the ECOWAS region and global trade; finally the sectors for each product represented by the product community (pointing to the similarity in terms of the requisite capabilities needed for products within that cluster) and the Lall classification, pointing to the level of technology embedded in each product. It is observed that the average levels of sophistication of the identified products as represented by the PCIs are greater than one.

In Table 5.1 we reported that Ghana had RCA in 66 products out of the 892 products (of the global total of 1241 products) it exported in 2016. These products had a share of 96.3 percent of the total export value in 2016. The average level of PCI for the 66 products is negative 1.254 suggesting a low level of complexity and for that matter sophistication with weak prospects for structural transformation and diversification.

A different picture is emerging from Table 5a &b, suggesting that for the 91 frontier products, which though Ghana does not have RCA yet, but are feasible within its current productive knowledge and constitute about 1.07 percent of the total export value for 2016, the average level of PCI is 1.696. This implies that the frontier products possess high strategic value and the potential of enhancing the structural transformation of the Ghanaian economy if they are exploited and developed for export. Especially, by considering the sectors emerging from the frontier products; their strategic location within the product space and their potential to drive the structural transformation and export diversification agenda. A shift from focusing on foodstuff and vegetable products to chemicals & allied industries, machinery/electricals, plastics and metals among others, which are more technology-inclined and have the complex network structures that can help to create further industries and wealth creation.

**Table 5.4: Products identified within Ghana's productive knowledge (using 2016 export basket)<sup>57</sup>**

Products	PCI	DISTANCE	OPGAIN	EXPORT	ECOWAS	ECOWAS	WORLD	PRODUCT COMMUNITY	LALL CLASSIFICATION
				VALUE	EXPORTS	IMPORTS (US\$)	IMPORTS (US\$)		
Pig Meat	2.3212	0.9563	0.9338	43,978	234,748	18,000,000	26,000,000,000	Animal & animal products	Processed
Whey	2.0371	0.9542	0.8334	9,958	2,600,000	16,000,000	3,700,000,000	Animal & animal products	Processed
Packaged Medicaments	2.2539	0.9533	0.8390	56,000,000	71,000,000	2,300,000,000	320,000,000,000	Chemicals & allied industries	HT2: Other high technology
Beauty Products	2.4039	0.9561	1.0107	27,000,000	92,000,000	160,000,000	38,000,000,000	Chemicals & allied industries	MT2: Process industries
Pesticides	1.7941	0.9505	0.7627	2,000,000	9,200,000	570,000,000	30,000,000,000	Chemicals & allied industries	MT2: Process industries
Cleaning Products	1.0548	0.9389	0.5322	1,700,000	18,000,000	230,000,000	29,000,000,000	Chemicals & allied industries	MT2: Process industries
Nonaqueous Paints	1.4649	0.9457	0.7254	1,600,000	8,400,000	100,000,000	12,000,000,000	Chemicals & allied industries	MT2: Process industries
Perfumes	1.1586	0.9499	0.6542	994,397	12,000,000	52,000,000	15,000,000,000	Chemicals & allied industries	MT2: Process industries
Industrial Fatty Acids, Oils and Alcohols	2.2700	0.9534	1.0209	934,871	4,400,000	150,000,000	44,000,000,000	Chemicals & allied industries	Semi-processed
Chlorides	1.3586	0.9552	0.7376	498,284	555,498	12,000,000	2,100,000,000	Chemicals & allied industries	RB2: Other resource based products
Dental Products	1.3138	0.9487	0.5478	427,660	1,800,000	66,000,000	4,800,000,000	Chemicals & allied industries	MT2: Process industries
Aqueous Paints	1.6600	0.9465	0.6852	345,748	2,500,000	33,000,000	5,400,000,000	Chemicals & allied industries	MT2: Process industries
Organic Composite Solvents	1.0247	0.9418	0.6206	318,986	901,272	27,000,000	1,400,000,000	Chemicals & allied industries	MT2: Process industries
Sodium or Potassium Peroxides	1.0718	0.9553	0.7823	307,610	2,100,000	94,000,000	4,700,000,000	Chemicals & allied industries	RB2: Other resource based products
Saturated Acyclic Monocarboxylic Acids	2.2857	0.9568	0.9104	125,833	349,686	42,000,000	12,000,000,000	Chemicals & allied industries	MT2: Process industries
Carbon	1.3941	0.9557	0.7136	106,818	120,046	2,500,000	3,200,000,000	Chemicals & allied industries	RB2: Other resource based products
Glaziers Putty	1.9061	0.9487	0.7730	98,799	484,299	40,000,000	7,000,000,000	Chemicals & allied industries	MT2: Process industries
Polishes and Creams	1.2663	0.9482	0.7245	56,424	369,555	18,000,000	2,000,000,000	Chemicals & allied industries	MT2: Process industries
Antifreeze	1.8290	0.9522	0.7853	54,740	78,932	7,100,000	1,100,000,000	Chemicals & allied industries	MT2: Process industries
Nitric Acids	1.8471	0.9536	0.7867	51,895	60,193	1,300,000	280,000,000	Chemicals & allied industries	RB2: Other resource based products
Carbides	1.1737	0.9566	0.5160	30,355	76,686	12,000,000	1,700,000,000	Chemicals & allied industries	RB2: Other resource based products
Dyeing Finishing Agents	1.2524	0.9508	0.6345	13,748	122,561	6,200,000	4,000,000,000	Chemicals & allied industries	Semi-processed
Other Paints	1.4654	0.9468	0.6616	11,013	243,171	10,000,000	740,000,000	Chemicals & allied industries	MT2: Process industries
Bandages	2.4226	0.9561	1.0353	2,502	139,941	34,000,000	7,100,000,000	Chemicals & allied industries	HT2: Other high technology
Chocolate	1.4971	0.9439	0.5812	6,100,000	150,000,000	55,000,000	25,000,000,000	Foodstuffs	Semi-processed
Beer	0.9675	0.9458	0.5076	284,260	9,200,000	62,000,000	14,000,000,000	Foodstuffs	Processed
Other Fermented Beverages	1.6849	0.9457	0.6002	270,569	376,346	6,300,000	1,400,000,000	Foodstuffs	Processed
Other Frozen Vegetables	0.9807	0.9556	0.5519	96,343	260,725	12,000,000	7,200,000,000	Foodstuffs	Processed
Excavation Machinery	2.2016	0.9513	0.8795	6,800,000	33,000,000	570,000,000	47,000,000,000	Machinery/electrical	MT3: Engineering industries
Telephones	1.9617	0.9539	0.7313	3,300,000	23,000,000	930,000,000	280,000,000,000	Machinery/electrical	HT1: Electronics and electrical products

Source: Author's construct

<sup>57</sup> The median for the Distance measure is 0.95678 and the Means for the PCI and OPPGAIN measures are 0.9115 and 0.4926 respectively

**Table 5.4 Products identified within Ghana's productive knowledge (using 2016 export basket),Cont'd**

Products	EXPORT			ECOWAS	ECOWAS		WORLD	PRODUCT COMMUNITY	LALL CLASSIFICATION
	PCI	DISTANCE	OPGAIN	VALUE (US\$)	EXPORTS (US\$)	IMPORTS (US\$)	IMPORTS (US\$)		
Electrical Transformers	1.7438	0.9565	0.7322	388,773	3,200,000	470,000,000	83,000,000,000	Machinery/electrical	HT1: Electronics and electrical products
Low-voltage Protection Equipment	1.8817	0.9542	0.8746	131,698	2,800,000	270,000,000	89,000,000,000	Machinery/electrical	MT3: Engineering industries
Navigation Equipment	2.2905	0.9562	1.0464	66,287	384,281	27,000,000	19,000,000,000	Machinery/electrical	HT1: Electronics and electrical products
Electric Heaters	1.9058	0.9567	0.5937	36,954	830,185	99,000,000	41,000,000,000	Machinery/electrical	MT3: Engineering industries
Water and Gas Generators	1.7626	0.9523	0.7515	19,016	335,492	80,000,000	840,000,000	Machinery/electrical	MT3: Engineering industries
Other Iron Products	2.3390	0.9535	0.7910	2,200,000	11,000,000	320,000,000	41,000,000,000	Metals	LT2: Other low technology
Iron Cloth	1.4616	0.9515	0.5969	1,900,000	2,500,000	52,000,000	3,900,000,000	Metals	LT2: Other low technology
Iron Structures	1.6550	0.9413	0.5147	1,400,000	24,000,000	680,000,000	41,000,000,000	Metals	LT2: Other low technology
Hot-Rolled Iron Bars	1.4753	0.9491	0.6281	1,000,000	7,000,000	160,000,000	8,100,000,000	Metals	LT2: Other low technology
Other Cast Iron Products	1.4855	0.9549	0.5615	322,762	395,831	42,000,000	5,800,000,000	Metals	LT2: Other low technology
Aluminium Structures	1.5980	0.9442	0.5287	231,280	512,517	110,000,000	10,000,000,000	Metals	LT2: Other low technology
Aluminium Bars	1.4349	0.9482	0.5009	157,624	448,232	200,000,000	17,000,000,000	Metals	Other primary products
Large Flat-Rolled Iron	2.1174	0.9533	0.8482	146,790	1,400,000	15,000,000	3,600,000,000	Metals	LT2: Other low technology
Small Iron Containers	1.1318	0.9398	0.5197	117,191	4,300,000	39,000,000	5,500,000,000	Metals	LT2: Other low technology
Other Iron Bars	1.7205	0.9531	0.6454	58,715	7,000,000	24,000,000	2,100,000,000	Metals	LT2: Other low technology
Coated Metal Soldering Products	1.5997	0.9490	0.6352	15,283	303,718	53,000,000	2,700,000,000	Metals	LT2: Other low technology
Metal Stoppers	1.5474	0.9513	0.6409	11,792	1,900,000	56,000,000	5,800,000,000	Metals	LT2: Other low technology
Iron Sheet Piling	1.5507	0.9500	0.6599	9,293	602,038	14,000,000	1,800,000,000	Metals	LT2: Other low technology
Metal Signs	1.3090	0.9493	0.6309	4,872	114,306	6,500,000	640,000,000	Metals	LT2: Other low technology
Copper Bars	1.0831	0.9486	0.5815	4,244	89,085	4,800,000	4,500,000,000	Metals	Other primary products
Chalk	1.2177	0.9538	0.7061	5,696	175,729	1,500,000	150,000,000	Mineral products	Other primary products
Granulated Slag	1.2569	0.9554	0.5094	2,277	2,277	5,600,000	580,000,000	Mineral products	Other primary products
Optical Fibers	2.2055	0.9565	0.8630	1,700,000	2,000,000	13,000,000	26,000,000,000	Misscelaneous	HT2: Other high technology
Surveying Equipment	2.2749	0.9550	0.9723	792,308	4,000,000	47,000,000	7,000,000,000	Misscelaneous	HT2: Other high technology
Prefabricated Buildings	1.4512	0.9447	0.5003	745,489	6,000,000	160,000,000	7,300,000,000	Misscelaneous	RB1: Agro/forest based products
Opto-Electric Instrument Parts	2.5722	0.9555	1.0058	31,762	63,331	53,000,000	2,800,000,000	Misscelaneous	HT2: Other high technology
Military Weapons	1.9048	0.9548	0.6487	21,317	31,000,000	190,000,000	1,200,000,000	Misscelaneous	MT3: Engineering industries
Ink Ribbons	2.1750	0.9555	1.0516	3,497	33,463	7,400,000	1,600,000,000	Misscelaneous	LT2: Other low technology
Other Plastic Sheettings	2.0672	0.9458	0.7702	2,700,000	8,500,000	100,000,000	22,000,000,000	Plastics/rubbers	MT2: Process industries
Raw Plastic Sheeting	1.3025	0.9402	0.5483	1,400,000	14,000,000	250,000,000	51,000,000,000	Plastics/rubbers	MT2: Process industries

Source: Author's construct

**Table 5.4 Products identified within Ghana's productive knowledge (using 2016 export basket),Cont'd**

Products	PCI	DISTANCE	OPGAIN	EXPORT	ECOWAS	ECOWAS	WORLD	PRODUCT COMMUNITY	LALL CLASSIFICATION
				VALUE	EXPORTS	IMPORTS	IMPORTS		
				(US\$)	(US\$)	(US\$)	(US\$)		
Plastic Building Materials	1.8630	0.9487	0.6259	1,000,000	1,500,000	73,000,000	9,300,000,000	Plastics/rubbers	LT2: Other low technology
Other Rubber Products	2.5003	0.9558	0.9897	199,166	1,200,000	67,000,000	24,000,000,000	Plastics/rubbers	RB1: Agro/forest based products
Used Rubber Tires	1.1431	0.9509	0.6491	109,584	620,635	46,000,000	2,400,000,000	Plastics/rubbers	RB1: Agro/forest based products
Plastic Wash Basins	1.7683	0.9528	0.6912	28,435	73,276	29,000,000	3,400,000,000	Plastics/rubbers	LT2: Other low technology
Rubber Sheets	2.5610	0.9553	1.0229	18,005	164,031	21,000,000	3,500,000,000	Plastics/rubbers	RB1: Agro/forest based products
Rock Wool	2.8275	0.9554	1.0976	48,594	346,999	11,000,000	3,700,000,000	Stone/glass	RB2: Other resource based products
Asbestos Cement Articles	1.3486	0.9437	0.5341	45,053	814,432	8,600,000	1,100,000,000	Stone/glass	RB2: Other resource based products
Friction Material	1.2546	0.9566	0.8370	5,981	14,367	9,700,000	1,400,000,000	Stone/glass	RB2: Other resource based products
Glass Fibers	2.2210	0.9554	0.7970	2,325	167,892	13,000,000	11,000,000,000	Stone/glass	RB2: Other resource based products
Cement Articles	2.0893	0.9512	0.7986	1,600	250,559	79,000,000	7,700,000,000	Stone/glass	RB2: Other resource based products
Vegetable Fiber	1.6062	0.9495	0.6097	1,002	12,976	2,600,000	390,000,000	Stone/glass	RB2: Other resource based products
Synthetic Monofilament	1.5746	0.9543	0.8259	170,427	352,356	20,000,000	1,200,000,000	Textiles/clothing	LT1: Fashion cluster
Non-Retail Synthetic Filament Yarn	1.4077	0.9508	0.5369	46,741	245,169	49,000,000	16,000,000,000	Textiles/clothing	LT1: Fashion cluster
Buses	1.5740	0.9503	0.6409	401,132	3,000,000	420,000,000	16,000,000,000	Transportation	MT1: Automotive products
Trailers	2.5090	0.9552	0.9216	217,584	5,600,000	220,000,000	22,000,000,000	Transportation	MT2: Process industries
Tractors	2.0854	0.9567	0.8545	151,717	6,300,000	380,000,000	42,000,000,000	Transportation	MT3: Engineering industries
Recreational Boats	1.2830	0.9504	0.5722	3,232	1,200,000	17,000,000	13,000,000,000	Transportation	MT3: Engineering industries
Rapeseed Oil	1.5465	0.9479	0.6101	45,940	63,161	1,700,000	6,100,000,000	Vegetable products	Semi-processed
Cereal Straws	1.0417	0.9545	0.5190	19,331	33,780	19,877	230,000,000	Vegetable products	Semi-processed
Corrugated Paper	2.0633	0.9541	0.8001	1,100,000	1,200,000	9,600,000	1,700,000,000	Wood & wood products	RB1: Agro/forest based products
Other Printed Material	1.7633	0.9476	0.7493	657,539	2,100,000	37,000,000	11,000,000,000	Wood & wood products	Other
Uncoated Paper	1.9595	0.9535	0.6552	258,045	796,372	200,000,000	18,000,000,000	Wood & wood products	RB1: Agro/forest based products
Brochures	1.1414	0.9504	0.6008	242,437	2,400,000	120,000,000	15,000,000,000	Wood & wood products	Other
Shaped Paper	1.7341	0.9557	0.8253	238,478	851,682	92,000,000	12,000,000,000	Wood & wood products	LT2: Other low technology
Letter Stock	1.2886	0.9441	0.5159	27,009	192,296	6,300,000	960,000,000	Wood & wood products	LT2: Other low technology
Cigarette Paper	1.1581	0.9497	0.6096	24,191	51,423	14,000,000	2,000,000,000	Wood & wood products	LT2: Other low technology
Particle Board	1.4124	0.9447	0.5428	10,221	11,399	6,300,000	7,200,000,000	Wood & wood products	RB1: Agro/forest based products
Wood Crates	1.6810	0.9403	0.5514	6,379	186,119	5,000,000	3,000,000,000	Wood & wood products	RB1: Agro/forest based products
Cellulose Fibers Paper	1.5471	0.9556	0.7632	5,692	131,657	170,000,000	13,000,000,000	Wood & wood products	RB1: Agro/forest based products
Other Uncoated Paper	1.1921	0.9469	0.5442	5,376	1,000,000	77,000,000	9,900,000,000	Wood & wood products	RB1: Agro/forest based products
Newspapers	2.3011	0.9520	0.8835	5,025	156,568	7,000,000	3,300,000,000	Wood & wood products	Other

Source: Author's construct

As mentioned above, the Ghana National Export Strategic document identified some priority list of products that must be developed and exported to drive the export diversification agenda. The priority lists, as well as the associated PCIs of most of the products are presented below.

Priority List for Export Promotion by the Ghana National Export Strategic Document<sup>58</sup>

1. Fresh chilled/frozen and processed fish (e.g. Canned Tuna, Fresh/ chilled fish, prepared Fish)

Fish, fresh or chilled, excluding fish fillets and other fish meat of heading (-1.21)

Fish, dried, salted or in brine; smoked fish, whether cooked before or during the smoking process; flours, meals,, and pellets of fish, fit for human consumption (-1.47), Fish fillets and other fish meat (whether or not minced), fresh, chilled or frozen (-1.21)

2. Vegetable oils and seeds, tree crop oils and seeds (e.g. raw and processed Shea/Karite nuts, cashew nuts, oil palm, groundnuts, soya, sunflower, etc.)

Coconuts, Brazil nuts and cashew nuts, fresh or dried, whether or not shelled or peeled (-2.48), other pure vegetable oils (-0.253 & -1.238), forage crops (-0.164), spice seeds (-1.428), Palm oil (-2.16)

3. Fresh and processed fruits and vegetables (e.g. fresh pineapples, banana, mangoes, papaya, citrus, chillies, melons, cut fruit, tomato paste)

Dates, figs, pineapples, avocados, guavas, mangoes and mangos teens, fresh or dried (-1.78), processed tomatoes (-1.618),

4. Root crops such as yams, cassava -3.686, and sweet potatoes (-0.871)

5. Grains and legumes such as rice (-1.99), maize and cowpeas

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<sup>58</sup> The PCI values are in parentheses

6. Natural plant product preparations/nutraceuticals (medicinal plants and parts, culinary herbs, high nutrient plants, etc.)

Packaged medicaments (2.254), unpackaged medicaments (1.678)

7. Natural rubber and rubber products

Natural rubber, balata, gutta-percha, guayule, chicle, and similar natural gums, in primary forms or plates, sheets or strip (-2.91)

8. Processed cocoa products

Cocoa powder (-0.643), cocoa butter (-1.45) and cocoa paste (-.0526)

9. Products of the creative arts industries

Original sculptures and statuary, in any material (0.035)

A quick check on the location of most of these products in the product space will reveal that they are in the periphery with limited linkages to other products of strategic essence. The few exceptions are products like packaged medicaments and unpackaged medicaments with PCI values of 2.254 and 1.678, respectively. Incidentally, these two products are found among the frontier products identified. The average sophistication level of the priority products list is negative, unlike the average sophistication level of the frontier products identified, which is positive. The implications for promoting the priority list products would be that the extent of the complex network structures to be engendered by developing and exporting them would not be what could create the opportunities for setting the momentum for further export diversification. Indeed, with these products, the prospects of exploiting the value chain spectrum are constrained and undermined. The study by Hausmann and Jasmina, (2015) on Rwanda demonstrate that the products identified largely by using the above approach corresponded with the non-traditional export products being promoted by their export

promotion agency although the criteria and methodologies used were different. Ghana's case is markedly different.

Flowing from the ensuing discussion, it may be imperative for Ghana to reexamine its priority lists products in the light of the frontier products identified to establish a clear strategic agenda for export promotion. This must be grounded on its current capabilities and possibilities, for which the level of sophistication of its export can be enhanced at minimal coordination costs. It is worth noting that under the theoretical model it has been stressed that the nature of such 'frontier' products are such that they have spillover effects in terms of the benefits, which can encourage free-riding tendencies, but the costs, especially the sunk costs being borne solely by the inventor, more especially in situations of failure. Hence, some government intervention by way of a deliberate policy to encourage firms to innovate and invent could be the catalyst to ensure speedy maximisation of the benefits of investing in the development of these 'frontier' products.

One of the key limitations of this study is that we have not considered possible tariff escalation due to the relatively higher level of technology associated with the frontier products and the possibility of relatively higher tariffs, which could make them not competitive. This issue can be partly addressed if Ghana can exploit the ECOWAS sub-region market and take advantage of the regime of the Common External Tariff prevailing, where some progress and subsequent gains can be accomplished. As indicated above, we calculated import intensities for each of the imported products for the ECOWAS sub-region in 2016, using the RCA concept, (Hausmann and Jasmina, 2015). Thus, in Table 5.5 we present the frontier products generated with the condition that the comparable import intensity ( $RCA_m$ ) for each product within the ECOWAS sub-region is greater one ( $RCA_m > 1$ ) and the total import value is also greater than US\$1000. As a result, 50 frontier products are identified. It would be observed from table 5.5 that whilst the ECOWAS sub-region export largely fruits and vegetables as well as primary products as

previously indicated, their imports are largely high technology goods, processed goods, and automotive products, among others. However, the suggestion is that for these 50 frontier products, Ghana can develop and export them to the ECOWAS sub-regional market. This will promote the spirit of sub-regional trade and integration with the potential for enhancing industrialisation in the sub-region and opportunity for value addition and job creation.

The success of such a trade strategy would largely hinge on efforts at containing costs and reliability of logistics within the sub-region as well as the requisite trade facilitation structures to minimise transaction costs and make the trade in the sub-region competitive.

**Table 5.5: ‘Frontier’ Products Capable of Engendering Regional Trade (Using 2016 Export Basket) And Ecowas Import Intensity Indices**

Products					ECOWAS		WORLD IMPORTS		PRODUCT COMMUNITY	LALL CLASSIFICATION
	PCI	DISTANCE	OPGAIN	RCAm	EXPORT VALUE (US\$)	EXPORTS (US\$)	ECOWAS IMPORTS (US\$)	(US\$)		
Packaged Medicaments	2.2539	0.9533	0.8390	1.1560	56,000,000	71,000,000	2,300,000,000	320,000,000,000	Chemicals & allied industries	HT2: Other high technology
Excavation Machinery	2.2016	0.9513	0.8795	1.9509	6,800,000	33,000,000	570,000,000	47,000,000,000	Machinery/electrical	MT3: Engineering industries
Other Iron Products	2.3390	0.9535	0.7910	1.2386	2,200,000	11,000,000	320,000,000	41,000,000,000	Metals	LT2: Other low technology
Pesticides	1.7941	0.9505	0.7627	3.0863	2,000,000	9,200,000	570,000,000	30,000,000,000	Chemicals & allied industries	MT2: Process industries
Iron Cloth	1.4616	0.9515	0.5969	2.1453	1,900,000	2,500,000	52,000,000	3,900,000,000	Metals	LT2: Other low technology
Cleaning Products	1.0548	0.9389	0.5322	1.2595	1,700,000	18,000,000	230,000,000	29,000,000,000	Chemicals & allied industries	MT2: Process industries
Nonaqueous Paints	1.4649	0.9457	0.7254	1.3632	1,600,000	8,400,000	100,000,000	12,000,000,000	Chemicals & allied industries	MT2: Process industries
Iron Structures	1.6550	0.9413	0.5147	2.6352	1,400,000	24,000,000	680,000,000	41,000,000,000	Metals	LT2: Other low technology
Plastic Building Materials	1.8630	0.9487	0.6259	1.2527	1,000,000	1,500,000	73,000,000	9,300,000,000	Plastics/rubbers	LT2: Other low technology
Hot-Rolled Iron Bars	1.4753	0.9491	0.6281	3.2710	1,000,000	7,000,000	160,000,000	8,100,000,000	Metals	LT2: Other low technology
Surveying Equipment	2.2749	0.9550	0.9723	1.0748	792,308	4,000,000	47,000,000	7,000,000,000	Misscelaneous	HT2: Other high technology
Prefabricated Buildings	1.4512	0.9447	0.5003	3.5464	745,489	6,000,000	160,000,000	7,300,000,000	Misscelaneous	RB1: Agro/forest based products
Dental Products	1.3138	0.9487	0.5478	2.1808	427,660	1,800,000	66,000,000	4,800,000,000	Chemicals & allied industries	MT2: Process industries
Buses	1.5740	0.9503	0.6409	4.3543	401,132	3,000,000	420,000,000	16,000,000,000	Transportation	MT1: Automotive products
Other Cast Iron Products	1.4855	0.9549	0.5615	1.1709	322,762	395,831	42,000,000	5,800,000,000	Metals	LT2: Other low technology
Organic Composite Solvents	1.0247	0.9418	0.6206	3.0734	318,986	901,272	27,000,000	1,400,000,000	Chemicals & allied industries	MT2: Process industries
Sodium or Potassium Peroxides	1.0718	0.9553	0.7823	3.2095	307,610	2,100,000	94,000,000	4,700,000,000	Chemicals & allied industries	RB2: Other resource based products
Uncoated Paper	1.9595	0.9535	0.6552	1.8057	258,045	796,372	200,000,000	18,000,000,000	Wood & wood products	RB1: Agro/forest based products
Brochures	1.1414	0.9504	0.6008	1.2721	242,437	2,400,000	120,000,000	15,000,000,000	Wood & wood products	Other
Shaped Paper	1.7341	0.9557	0.8253	1.2756	238,478	851,682	92,000,000	12,000,000,000	Wood & wood products	LT2: Other low technology
Aluminium Structures	1.5980	0.9442	0.5287	1.8358	231,280	512,517	110,000,000	10,000,000,000	Metals	LT2: Other low technology
Trailers	2.5090	0.9552	0.9216	1.5619	217,584	5,600,000	220,000,000	22,000,000,000	Transportation	MT2: Process industries
Synthetic Monofilament	1.5746	0.9543	0.8259	2.6078	170,427	352,356	20,000,000	1,200,000,000	Textiles/clothing	LT1: Fashion cluster
Aluminium Bars	1.4349	0.9482	0.5009	1.9552	157,624	448,232	200,000,000	17,000,000,000	Metals	Other primary products
Tractors	2.0854	0.9567	0.8545	1.4547	151,717	6,300,000	380,000,000	42,000,000,000	Transportation	MT3: Engineering industries

Source: Authors calculations

**Table 5.5: ‘Frontier’ Products Capable of Engendering Regional Trade (Using 2016 Export Basket) And Ecowas Import Intensity Indices cont’d**

Products	ECOWAS				EXPORT VALUE (US\$)	EXPORTS (US\$)	ECOWAS IMPORTS (US\$)	WORLD IMPORTS (US\$)	PRODUCT COMMUNITY	LALL CLASSIFICATION
	PCI	DISTANCE	OPGAIN	RCAm						
Small Iron Containers	1.1318	0.9398	0.5197	1.1376	117,191	4,300,000	39,000,000	5,500,000,000	Metals	LT2: Other low technology
Used Rubber Tires	1.1431	0.9509	0.6491	3.1262	109,584	620,635	46,000,000	2,400,000,000	Plastics/rubbers	RB1: Agro/forest based products
Other Iron Bars	1.7205	0.9531	0.6454	1.7922	58,715	7,000,000	24,000,000	2,100,000,000	Metals	LT2: Other low technology
Polishes and Creams	1.2663	0.9482	0.7245	1.4897	56,424	369,555	18,000,000	2,000,000,000	Chemicals & allied industries	MT2: Process industries
Antifreeze	1.8290	0.9522	0.7853	1.0535	54,740	78,932	7,100,000	1,100,000,000	Chemicals & allied industries	MT2: Process industries
Asbestos Cement Articles	1.3486	0.9437	0.5341	1.2765	45,053	814,432	8,600,000	1,100,000,000	Stone/glass	RB2: Other resource based products
Opto-Electric Instrument Parts	2.5722	0.9555	1.0058	3.0803	31,762	63,331	53,000,000	2,800,000,000	Misscelaneous	HT2: Other high technology
Carbides	1.1737	0.9566	0.5160	1.1649	30,355	76,686	12,000,000	1,700,000,000	Chemicals & allied industries	RB2: Other resource based products
Plastic Wash Basins	1.7683	0.9528	0.6912	1.3626	28,435	73,276	29,000,000	3,400,000,000	Plastics/rubbers	LT2: Other low technology
Letter Stock	1.2886	0.9441	0.5159	1.0657	27,009	192,296	6,300,000	960,000,000	Wood & wood products	LT2: Other low technology
Cigarette Paper	1.1581	0.9497	0.6096	1.1739	24,191	51,423	14,000,000	2,000,000,000	Wood & wood products	LT2: Other low technology
Military Weapons	1.9048	0.9548	0.6487	26.1174	21,317	31,000,000	190,000,000	1,200,000,000	Misscelaneous	MT3: Engineering industries
Water and Gas Generators	1.7626	0.9523	0.7515	15.2975	19,016	335,492	80,000,000	840,000,000	Machinery/electrical	MT3: Engineering industries
Coated Metal Soldering Products	1.5997	0.9490	0.6352	3.1285	15,283	303,718	53,000,000	2,700,000,000	Metals	LT2: Other low technology
Metal Stoppers	1.5474	0.9513	0.6409	1.5513	11,792	1,900,000	56,000,000	5,800,000,000	Metals	LT2: Other low technology
Other Paints	1.4654	0.9468	0.6616	2.1975	11,013	243,171	10,000,000	740,000,000	Chemicals & allied industries	MT2: Process industries
Iron Sheet Piling	1.5507	0.9500	0.6599	1.2551	9,293	602,038	14,000,000	1,800,000,000	Metals	LT2: Other low technology
Friction Material	1.2546	0.9566	0.8370	1.1042	5,981	14,367	9,700,000	1,400,000,000	Stone/glass	RB2: Other resource based products
Chalk	1.2177	0.9538	0.7061	1.5857	5,696	175,729	1,500,000	150,000,000	Mineral products	Other primary products
Cellulose Fibers Paper	1.5471	0.9556	0.7632	2.0846	5,692	131,657	170,000,000	13,000,000,000	Wood & wood products	RB1: Agro/forest based products
Other Uncoated Paper	1.1921	0.9469	0.5442	1.2425	5,376	1,000,000	77,000,000	9,900,000,000	Wood & wood products	RB1: Agro/forest based products
Metal Signs	1.3090	0.9493	0.6309	1.6121	4,872	114,306	6,500,000	640,000,000	Metals	LT2: Other low technology
Granulated Slag	1.2569	0.9554	0.5094	1.5516	2,277	2,277	5,600,000	580,000,000	Mineral products	Other primary products
Cement Articles	2.0893	0.9512	0.7986	1.6356	1,600	250,559	79,000,000	7,700,000,000	Stone/glass	RB2: Other resource based products
Vegetable Fiber	1.6062	0.9495	0.6097	1.0623	1,002	12,976	2,600,000	390,000,000	Stone/glass	RB2: Other resource based products

Source: Authors calculations

## 5.4 Conclusions

Previous studies have espoused the importance of export diversification, a product of structural transformation of economies, leading to economic expansion and shared growth. This is more pertinent when such structural transformation places a country on the path of exploiting the benefits of the value chain spectrum. Yet most of the classical trade theories did not give space to the role export diversification plays in the process of economic growth. Most of the subsequent studies that espoused the importance of export diversification dwelled largely on the determinants of export diversification, given the impression that once those imperatives were available, diversification would occur. However, the studies of Hausmann et al., (2007) and Hidalgo et al., (2007) and many others have made the case that the nature of the products constituting a country's export basket, which reflects the productive capabilities acquired over the years, matters a lot in any diversification effort. These productive capabilities for any country are captured in its ECIs. The focus of this study is to assess the challenges Ghana has encountered in its diversification agenda with reference to the productive know-how embedded in its export basket and how this inherent knowledge base has been deployed to achieve structural transformation of the economy. Hence, this thesis employs the concepts of ECI and PCI, Product Space and RCA on trade data at the HS 4-digit classification level for 1240 products, for the period 1995 to 2016, to undertake comparative analyses between Ghana and some selective countries (Nigeria, Singapore and Malaysia) to address the question relating to why Ghana's export basket is less diversified. The study also examines sectors that have emerged from the products that the country has established comparative advantage and how that has contributed to its structural transformation effort. The study further identifies new products of strategic value that Ghana could easily deploy its acquired productive knowledge to promote for future export diversification effort and at the same time develop such products for the ECOWAS market.

The results from the study suggest that Ghana's average level of sophistication (ECI) or collective know-how for the period 1995 to 2016, is not only low but also negative, like that of Nigeria. Besides, the evolution of its ECI has been quite uneven with no discernible trend. Indeed, both the trajectories for the ECIs for the ECOWAS sub-region and sub-Saharan Africa have generally been on the declining trend, suggesting that the productive capabilities of the sub-region could not offer much hope for significant structural transformation. On the contrary, countries in the East & Pacific regions, in general, demonstrate continuous improvement in the level of sophistication of their export baskets and for that matter the level of productive capabilities or collect know-how offer hope for more structural transformation. Specifically, for countries like Singapore and Malaysia, the average levels of sophistication have been high and quite impressive. With low ECI, signifying a low productive knowledge with limited capabilities to create enough complex network of interactions that can facilitate both backward and forward linkages, this can possibly lend credence to the reason why Ghana can be classified as less diversified and incapable of matching up to countries like Singapore and Malaysia. The quest for diversification of Ghana's export basket is further constrained by the evidence from Chapter four of this thesis, where it was observed that there is low income elasticity of foreign demand for Ghana's export, except cocoa beans, in the long run.

Results from the descriptive analyses suggest that both Ghana and Nigeria have established RCA in sectors that focus on the production and export of vegetables, foodstuffs, and minerals. Due to the low levels of PCIs associated with most of these products, the prospects of scaling up value addition in sectors that have the potential to propel industrialisation and facilitate the diversification of the export base of these economies at the extensive margin appear to be blurred. Indeed, the sectors that emerged over the period to reflect their respective acquired productive capabilities equally focused on the production of vegetables, foodstuff, and

minerals. Ghana gained some RCA in the chemicals & allied sectors that could be exploited for further gains. The results may suggest that unless a paradigm change is implemented, the prospects of Ghana achieving any significant diversification of its export base is likely to be a mirage. And for Nigeria, the point may be made that its huge comparative advantage in the production and export of a product like crude oil is not translated into strength, notwithstanding its less ubiquitous nature. Since the value of PCI associated with crude oil is low, the strategic prospects can only be realised with judicious utilisation of the income flows from this natural resource to support the discovery of products with relatively better strategic value to explore the value chain spectrum and a more diversified economy. The narrative is different for Singapore and Malaysia. These countries established RCA in the machinery/electrical, chemicals and allied as well as the miscellaneous sectors, among others. With the level of sophistication and the complex network structures engendered by the production and export of these products, it is not surprising that these countries have not only exploited the value chain spectrum to their advantage but have ensured broad-based diversified economies that foster shared growth.

To identify products that possessed the desirable characteristics Ghana may latch on to enhance its structural transformation agenda with prospects for a more diversified export base, the study employs a procedure designed by Hausmann and Jasmina (2015) by using a combination of the concepts of Proximity, Distance and Opportunity gain within the context of product space network analyses. In this context products that require similar capabilities in their production are considered likely to be co-exported. This is meant to address the issues of factor specificity and coordination problems as well as highlight the fact that development tends to be path dependent. Based on these, the study identifies some ‘frontier’ products (that are currently within Ghana’s export basket, but it does not have RCA), for which Ghana can exploit to underpin its structural transformation and diversification drive. About 131 products (later

limited to 91 products based on an export value threshold of US\$1,000 and above) are identified to be close to Ghana's current productive knowledge as reflected in its export basket for 2016. These products have the desirable characteristics that they have PCIs greater than one (suggesting relatively higher levels of sophistication with prospects for increasing the average level of sophistication of Ghana's export basket), minimal distance from the country's current export basket (feasible for exploitation at minimal effort) and relatively higher opportunity gains (prospects for opening new paths for diversification). Another important observation about these products is that not only do they possess the potential to help the country's structural transformation effort through the exploitation of the value addition spectrum in sectors that produce and export chemicals & allied products, plastic/rubber, stone/glass, and wood & wood products, but also offer the opportunity to mainstream technology in the industrialisation agenda of the country. In deed, it is expected that the inclusivity engendered as a result of the process of multidimensional interactions involved in the production of such complex products helps in optimising the benefits to be derived along the value addition spectrum.

To assess how the identified products may be promoted within the ECOWAS sub-region, the study generates import intensity ratios like the RCAs for the imported products in the sub-region. The identified 'frontier' products are whittled down to 50 products after aligning them to the products that are intensively imported within the ECOWAS sub-region to guide any effort at exploiting the sub-regional competitive advantage.

Although these identified 'frontier' products may have the potentials to prop up the industrialisation agenda of the country, one must be guided by the conceptual framework underpinning this analysis that stresses the uncertainties associated with the process of discovering these new products. It is worth noting that the successful discovery of these products comes with it some positive spillover effects beyond the firm which may have

incurred the initial sunk cost for the venture. This is likely to expose the benefits to free riding. At the same time failure to achieve success from the investment becomes a private cost. The emerging uncertainties likely to be associated with such activities may discourage firms from deciding to undertake such risky yet potentially profitable ventures. This is where the lessons from Malaysia and Singapore come in handy, where there was deliberate activist industrial policy by the governments to use domestic resources to partner the private sectors in terms of research and development and the provision of the critical enabling economic, social and political conditions and institutional infrastructure, to enhance long term financing and attract foreign direct investment.

This thesis is not oblivious of the elaborate policy initiatives and proposed interventions spelled out in the Ghana National Export Strategy Plan, which was launched in 2012, for an implementation period of five years, commencing 2013 to 2017, with a target of US\$ 5billion for Non-traditional export (NTEs), as the main driver of Ghana's export diversification effort. Unfortunately, by the end of 2017, the target for NTEs has not been met and the pace of growth in NTE from 2013 to 2017, has been quite sluggish (check Table 1.1). This is the focus of the next part of the thesis to undertake an enquiry into the key drivers of the performance of NTEs whose efforts are supposed to underpin the success of the Ghana National Export Strategic programme. This is done from the perspective of examining the key predictors of export performance at the firm-level and the adequacy of the institutional arrangements put in place to support the programme and that of the firms involved regarding their key constraints. Specifically, the study investigates some of the key determinants of NTEs performance with an emphasis on the role of exchange rate volatility within the context of macroeconomic uncertainties.

## **CHAPTER SIX**

# **FIRM-LEVEL ASSESSMENT OF THE EFFECT OF EXCHANGE RATE UNCERTAINTY ON GHANA'S NON-TRADITIONAL EXPORT PERFORMANCE**

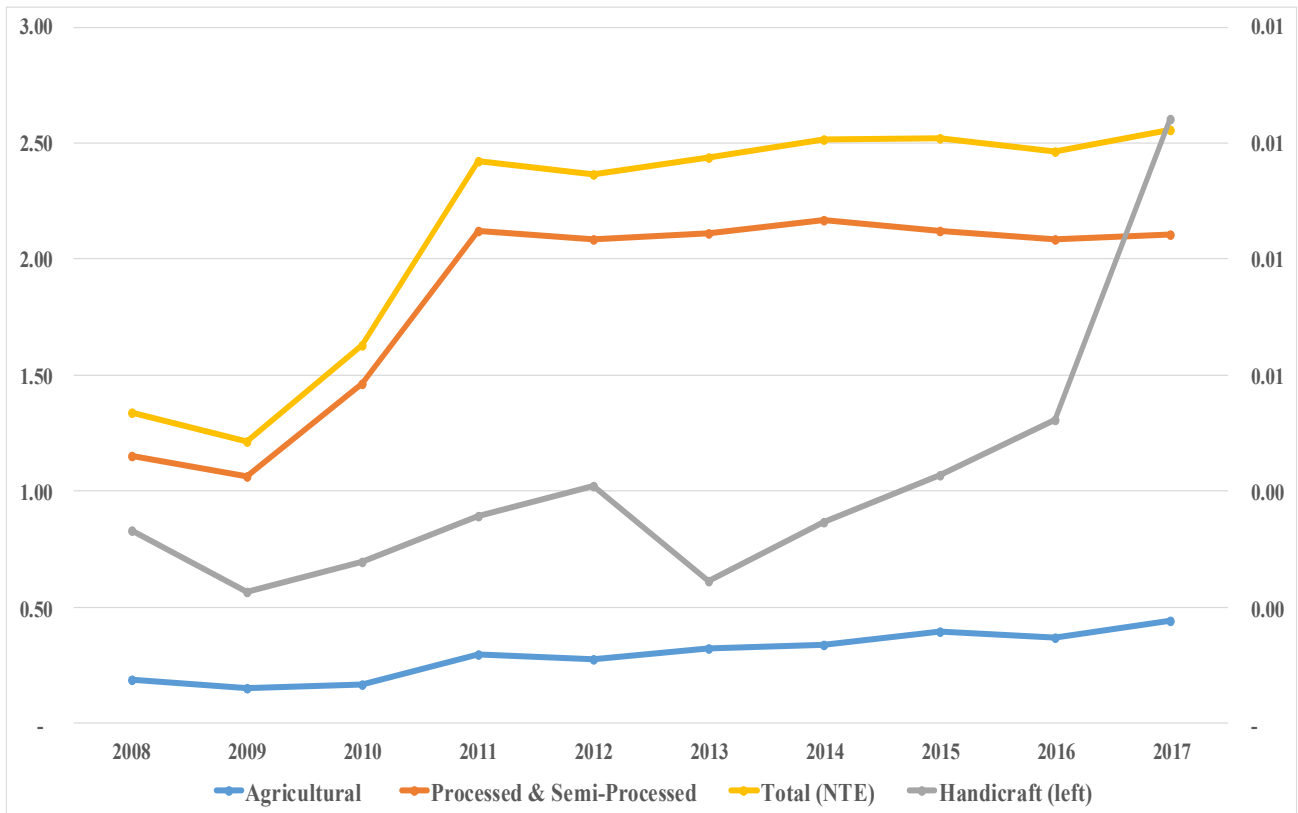
### **6.1 Introduction**

The importance of export in contributing to the economic performance of nations through improvement of the external sector, enhancing economic growth and engendering structural transformation for improved standard of living has been extensively espoused in the international trade literature, (Kahiya et al, 2010; Pineda and Manuel, 2017; and Reis and Forte, 2014). Likewise, at the national level, improvement in export performance leads to the narrowing of the foreign exchange resources gaps, increased employment, and improvement in the general welfare of citizens. It can be said that any analysis conducted on export performance will not only be relevant to firms engaged in the export business but also to governments in terms of their efforts at promoting export to rein in the benefits as aforementioned, (Reis and Forte, 2014). Ayan and Percin (2005) have argued that in a competitive international market where firms have to stay afloat, there is the need for them to identify the factors that instigate success in export ventures, improve efficiency in production and at the same time help in the attainment of their financial and strategic targets.

Ghana's current vision for an improved and diversified export base is anchored on the Ghana National Export Strategy document, launched in 2012, with an implementation period spanning five years, starting from 2013. The strategic document envisaged a Non-traditional Export (NTEs) target of US\$ 5billion by the end of 2017. The attainment of this target was expected to translate into some desirable development outcomes leading to improved general economic welfare through a possible increase in jobs and wealth creation. Specific programmes and

interventions at the firm and institutional levels as well as the general macroeconomic environment were designed and supposed to be deployed to address some perceived constraints to enhance the attainment of the objectives specified in the export strategic document.

**Figure 6.1: Ghana’s Non-traditional Export (in US\$’ billion)**



Source: GEPA and Author’s Calculations

By the end of 2017, data from the Ghana Export Promotion Authority (GEPA) suggests that total NTEs amounted to US\$ 2.56 billion compared to US\$ 2.36 billion at the end of 2012. This indicates that the pace of growth in the NTEs has slowed down. This falls short of the US\$ 5 billion target expected by the end of 2017, calling into question the factors accounting for the slow pace of NTE performance as well as the failure to achieve the target as set out in the national strategic plan for promoting NTEs. From Figure 6.1 we observe that Handicraft export witnessed an initial decline in the year 2013 but subsequently assumed an upward

trajectory. The agricultural and processed & semi-processed export virtually plateaued in terms of expansion from 2012.

## **6.2 Research Motivation and Questions**

Though varied reasons may be assigned for the lack of performance or otherwise of exporters in general and NTEs in particular, it is imperative to subject this phenomenon to some empirical test in the light of what the extant literature prescribes as the key drivers of export performance at the firm-level. According to Dijk (2002), the importance of understanding the factors that influence export performance will help policymakers in the formulation of trade and industrial policies aim at stimulating export growth. He further argues that the availability of micro-datasets has reshaped the focus on export performance at the industry and country levels to firm-level analysis.

Against this backdrop, the following pertinent questions are raised for investigation: What are the key drivers of firm-level export performance in Ghana? Does the potential risk emanating from macroeconomic uncertainty, largely from exchange rate volatility have any role to play? What reasons, from the institutional perspective, could account for the suboptimal performance of NTEs under the Ghana national export strategy plan (2013-2017)?

A study to investigate the above issues will help policymakers to reflect on the contents of current national strategic policy documents, identify other important factors that are yet to be considered to inform future design and implementation of policies. On the critical question of the role of exchange volatility, within the context of macroeconomic uncertainties, in influencing firm-level performance, evidence from Figure 1.1 suggests that historically the trajectory of Ghana's exchange rate developments has been unstable with dire implications for

other macroeconomic conditions. These adverse macroeconomic conditions can create uncertainties likely to discourage risk taking ventures such as exporting<sup>59</sup>.

A lot of academic studies have been conducted to investigate the relationship between export performance and its key predictors, (Beleska-Spasova, 2014; Carneiro, Rocha, and Silva, 2011; Katsikeas and Morgan, 2014; and Nazar and Saleem, 2011; Sharma, 2003). For these studies, both internal and external factors have been considered and identified as the likely drivers of export performance. Studies like Carneiro et al. (2011) and Chetty and Hamilton (1993) have examined how the combination of the external environment, firm characteristics and firm strategy impact on firm-level export performance. In considering the external factors, the studies focus largely on the structure and the type of industries within which firms operate with less emphasis on macroeconomic conditions that may evoke uncertainties. In analysing firm-level characteristics, Carneiro et al. (2011) fail to go beyond the attitude of managers towards risk and tolerance for ambiguity. Also, part of the study of Beleska-Spasova (2014) make reference to the economic similarity in discussing export market characteristics, however, the study stop short of discussing the dimensions of this economic similarity construct.

Thus, the issue of uncertainty as pertained to adverse macroeconomic conditions with a specific focus on exchange rate volatility has not been given much prominence or explicit consideration in the extant literature on firm-level predictors of export performance. Though a lot of studies have explored the relationship between exchange rate volatility and export performance using broad national statistics largely at the macroeconomic level, there is paucity of research on the same subject matter at the firm-level. The fact remains that Ghana's external position has been highly susceptible to the vagaries of global commodity prices because of being a major producer of natural resources and primary commodities. Accordingly, the exchange rate must

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<sup>59</sup> Exchange rate developments and Macroeconomic conditions are highlight under both the introductory chapter and chapter two of this thesis

normally adjust in line with swings in the external position. Thus, rendering the exchange rate quite volatile. The exchange rate volatility further interacts with other prevailing weak macroeconomic conditions to engender uncertain conditions. The ensuing uncertainties hurt economic activity in the economy, especially that of the NTEs. Non-traditional exporters may suffer in terms of predicting the profitability of their export ventures or activity.

### **6.3 Research Objective**

Based on the questions raised and the ensuing discussions, this segment seeks to address the third objective of this thesis as stated in section 1.4.

The rest of the chapter is organised as follows. Section 6.4 presents a brief overview of macroeconomic conditions underpinning the NTE activity. Section 6.5 examines the empirical strategy used for the analysis. Section 6.6 focuses on the results of the descriptive and econometric analysis and Section 6.7 concludes.

### **6.4 A Brief Overview of Macroeconomic Conditions**

Both the introductory chapter and chapter two of this thesis give a brief overview of the macroeconomic conditions characterising the environment within which NTEs have operated from 1960 to 2016. These conditions have created a lot of uncertainties with accompanying risk in the macroeconomic space. The unstable macroeconomic conditions have affected credit assessors' perceived risk of real sector activities such as exporting. Hence, both the general levels of interest rates (costs of capital) and the volumes of credit allocated to support export activity have been adversely affected. In terms of credit allocation to the various sectors of the economy, the Commerce and Finance sector gets the lion's share, attracting an average of 28.5 percent of the total banking sector credit to the economy.

**Table 6.1: Composition of Credit Allocation and Finance**

	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018
COMMERCE & FINANCE	100	100	N/A	100	100	100	100	100	100	100	100	100
(i) Import Trade	15.1	15.4	N/A	18.4	33.9	30.1	33.8	37.8	35.2	25.8	22.8	13.1
(a) Motor Vehicle Import & Declaration	4.5	3.9	N/A	5.2	7.5	6.0	5.4	3.8	4.4	4.1	3.7	3.8
(b) Machinery & Heavy equipment	1.0	1.7	N/A	3.0	3.6	2.4	1.6	1.3	1.3	1.0	0.9	1.4
(c) Other Import Items	9.6	9.8	N/A	10.2	22.8	21.7	26.8	32.7	29.5	20.7	18.1	8.0
(ii) Export Trade	5.2	4.1	N/A	6.2	4.4	4.3	4.3	3.9	2.0	3.4	3.3	1.4
(a) Cocoa Exports	1.8	1.4	N/A	2.8	1.6	1.0	1.7	1.5	0.6	0.8	0.4	0.4
(b) Timber Export	0.8	0.5	N/A	0.3	1.0	0.9	0.9	0.5	0.2	0.4	0.2	0.1
(c) Other Export Items	2.6	2.2	N/A	3.1	1.8	2.4	1.8	1.9	1.2	2.2	2.6	0.9
(iii) Cocoa Marketing	8.5	5.3	N/A	9.4	9.9	8.4	5.9	5.5	11.2	11.5	12.8	7.9
(iv) Timber Marketing	0.1	0.4	N/A	0.5	0.2	0.2	0.2	0.1	0.1	0.0	0.0	0.0
(v) Diamond Marketing	0.1	0.0	N/A	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.1
(vi) Mortgage Financing	4.6	4.5	N/A	4.6	5.4	5.4	5.4	5.2	5.1	4.8	5.0	11.8
(vii) Other Financial Institutions	2.3	1.9	N/A	4.8	2.7	5.0	4.9	3.1	2.2	3.3	3.9	6.3
(a) Hire Purchase Companies	1.4	1.1	N/A	1.1	1.2	1.0	0.9	0.4	0.4	2.0	0.8	2.5
(b) Insurance Companies	0.1	0.2	N/A	0.4	0.2	2.0	2.6	1.6	0.9	0.8	2.6	3.0
(c) Building bodies and Corporations	0.8	0.6	N/A	3.3	1.2	2.0	1.4	1.1	0.8	0.5	0.4	0.8
(viii) Other Unclassified	64.1	68.4	N/A	56.3	43.4	46.5	45.4	35.0	34.1	45.6	47.2	51.9

**Table 6.2: Lending Rates**

i. Agriculture, Forestry & Fishing	23.8	27.3	32.8	27.6	25.9	25.7	25.6	29.0	27.5	31.7	29.3	26.9
ii. Export Trade	24.3	27.3	32.8	27.6	25.9	25.7	25.6	29.0	27.5	31.7	29.3	26.9
iii. Manufacturing	24.3	27.3	32.8	27.6	25.9	25.7	25.6	29.0	27.5	31.7	29.3	26.9
iv. Mining & Quarrying	24.3	27.3	32.8	27.6	25.9	25.7	25.6	29.0	27.5	31.7	29.3	26.9
v. Construction	24.3	27.3	32.8	27.6	25.9	25.7	25.6	29.0	27.5	31.7	29.3	26.9
vi. Others	24.3	27.3	32.8	27.6	25.9	25.7	25.6	29.0	27.5	31.7	29.3	26.9
Average Lending Rates	24.2	27.3	32.8	27.6	25.9	25.7	25.6	29.0	27.5	31.7	29.3	26.9
C. Base Rates (%)	18.8	27.2	31.4	25.8	22.5	21.5	21.5	25.7	26.9	26.7	24.9	21.9

Source: Bank of Ghana and Author's calculations

Table 6.1 presents how the portion of total credit allocated to the commerce and finance sector is distributed to various activities in the economy. Because of the perceived high risk of export activities, the sector is starved in terms of credit compared to import activities<sup>60</sup>. An average of 25.6 percent of the total credit allocated to the Commerce and Finance sector was deployed to support import trade compared with an average of 3.9 percent for export trade for the period

<sup>60</sup> It is also not that the nature of the financing instrument used can explain the relatively larger credit for imports. Import letters of credit may be relatively easier to grant than export letters of credit. It is easier to exercise oversight on imports than on exports (which requires more foreign collaboration- in the area of exports and of uptake of exports and export revenue receipts)

2007 to 2018. For the same period, the average lending rate was 27.8 percent, (check table 6.2). These developments results in scarcity of financial resources to support export trade and the same time render the costs of mobilising these resources to be equally prohibitive.

Together with other debilitating factors as reflected in the costs of doing business in Ghana, the competitiveness of the products exported by Ghanaian exporters to the global market is adversely affected<sup>61</sup>. Apart from the profitability of doing export business standing the chance of being impinged by these factors, potential investment plans can equally be stalled. This situation may be further aggravated by an era characterised by sporadic exchange rate volatility that can evoke uncertainties with potentially dire implications for export ventures.

## **6.5 Empirical Strategy**

In this section, we focus on the data generation processes and the methodology adopted to address the objectives of this study.

### **6.5.1 Survey and Data Collection**

Data for this study was extracted from primary sources for the period August 2018 to February 2019. A survey was conducted on non-traditional exporters mainly within Accra, Tema, Kasoa, Nsawam, Kumasi, and Takoradi<sup>62</sup>. Responses from these exporters constituted the data for constructing the measures for export performance and its determinants. Besides, another questionnaire was administered to elicit information from some government institutions charged with the responsibility of promoting NTEs. The use of primary data from the survey was necessitated by the unavailability of secondary data that could be used to address the objectives of this study and adequately answer the research questions raised. Currently, the

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<sup>61</sup> Check Appendix 2

<sup>62</sup> The choice of location was influenced by concentration of exporters in Accra and Tema

most reliable firm-level data is provided by the Enterprise Survey data conducted by the World Bank. However, this survey does not address the issue of macroeconomic uncertainty (with a focus on exchange rate volatility) and how it affects firm-level export performance. The survey was governed by a comprehensive and integrated process involving the design of questionnaires, pretesting of the instruments, and ethical clearance from the University of Ghana Ethics committee and eventual data collection from the fieldwork.

#### **6.5.1.1 Questionnaire Design**

Two sets of questionnaires were designed for the survey<sup>63</sup>. One set for the exporting firms and the other for the relevant government agencies responsible for NTE activities (MoTI, GEPA, GSA, GFTZB, Ghana EXIM Bank). Sraha (2016) designed a questionnaire for studying the determinants of export performance in Ghana which became a useful reference point to inform the design of the questionnaires for the firms in this study.

The structured questionnaire for the exporting firms was designed to elicit responses to a variety of statements that helped in constructing both the measures of export performance and some of the key predictors as highlighted under the literature review. Since we adopted subjective measures for both the export performance indicators and the predictors, the Likert (1932) rating scale framework that reflects people's revealed perception of issues is applied. The framework has been employed in similar studies seeking to construct measures for both the export performance and the determinants by asking respondents to indicate their degree of agreement or disagreement to some statements, (Bekele and Kaur, 2018; Boubakri et al., 2013; Egyir et al., 2012; Sraha et al., 2017). To increase the extent of variability in the data for analysis, and to enhance the validity of the results, a five-point scale is adopted. There is a raging debate in the literature amongst researchers as to whether one can use a parametric test

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<sup>63</sup> Samples of these questionnaires can be found at Appendix C (AC1 and AC2)

to analyse the Likert scale due to its ordinal nature. Some have argued that parametric test is rendered less useful because it requires data of interval or ratio nature but not ordinal, and the fact that means and standard deviations relative to the Likert scale are unclear, (Sullivan and Artino, 2013; and Wadgave and Khairnar, 2016). On the other hand, other researchers like Norman (2010) have argued that parametric test is more robust than non-parametric test regarding the use of ordinal data and this is the position subscribed by this thesis.

The survey instrument was pretested to ensure clarity and comprehension of the questions. Also, we had the opportunity to identify and address flaws in the design of the framework. The pretesting was conducted on a few export managers, enumerators, and Ph.D. students. The feedback from the managers was used to improve some of the statements and structure of the survey instrument<sup>64</sup>. A drop-and-pick approach was used to administer the survey instrument. This was because anecdotal evidence suggested that most respondents in Ghana generally tended not to be receptive in responding to questionnaires either by posting or using the internet through emails. This could also be attributed to the fact that Ghana does not have a good postal network with low internet penetration and usage.

The second survey instrument aimed at eliciting responses to address the issues of institutional constraints that could inhibit the performance of government agencies. Hence the instrument was administered to government agencies, such as the Ministry of Trade and Industry, GEPA, GSA, GFZB, and GEXIM.

#### **6.5.1.2 Sampling Method**

As already suggested the focus of this analysis is on non-traditional exporting firms in Ghana. The rationale is that the success of Ghana's export promotion agenda hinges on the performance of NTEs. Hence, the population for the study emerged from a list of regular NTE

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<sup>64</sup> The pretesting was done in Accra and Tema with seven firms

exporters provided by the GEPA and a list of exporters extracted from the database of the Ghana Community Network Services Limited (GCNET). In all the population was 329 exporters comprising 273 of regular exporters from the GEPA list and 56 exporters extracted from the GCNET database.

To determine the sample size, the following formula in Ozer (2014) was used

$$\frac{NPQZ^2}{(N - 1)d^2 + PQZ^2}$$

n= sample size

N= Population of regular exporters and some exporters from GCNET database

P= Probability of Occurrence for a given event

Q= 1-P

Z= test statistic at a level of (1-  $\sigma$ )

$\sigma$ = Significant level

d= tolerance

The sample size considered with standard statistics for the above variables was therefore

$$\frac{329(0.5)(0.5)(1.9)^2}{(328 - 1)(0.05)^2 + (0.5)(0.5)(1.9)^2} = 183$$

The sample size calculated was rounded off to 190 exporters.

A combination of stratified random sampling and a purposive sampling were adopted to implement the survey. The stratified random sampling was based on the activity of the firms, i.e. agriculture, manufacturing, and handicrafts. The sample also covered a broad range of firm sizes in terms of employment, where 1- 5 employees are considered as Micro enterprise, 6-29 employees as Small enterprise, 30-99 employees as Medium enterprise and above 99 employees as Large enterprise. The purposive sampling approach involved identifying relevant managers with experience in exporting in the various firms as the respondents.

### **6.5.1.3 Construction of Indicators for Export Performance and the Determinants**

This section presents how the data generated from the survey responses are used to construct the measures of export performance and the determinants of export performance used for the quantitative analysis.

#### ***Constructing Measures of Export Performance***

The indicators for the export performance measures are latent variables derived from subjective questions directed at exporting firms. Two sets of composite measures of export performance (EXPERFORM 1 and EXPERFORM 2) are constructed by using some indicators of export performance suggested in the literature, being: export sales volume, export market share, export profitability, return on investment, and export sales intensity. For EXPERFORM 1, respondents were asked to choose on a scale from 1 representing low to 5 representing very high, a rating of their performance. Based on the responses, a composite indicator of export performance is constructed by incorporating and consolidating variations in all the measures (export sales volume, export market share, export profitability, return on investment, and export sales intensity). To generate the threshold values for the export performance measure, we adopt the cumulative frequency approach of categorizing indicators by Al Rubaish (2010). With this approach, after consolidating the items on the Likert scale responses, values that exceed 80 percent are rated as “High Performance”, values between 60 percent and 80 percent are rated as “Moderate to Average Performance” and values below 60 percent are considered “Low Performance”. This categorisation scheme is selected because it is considered superior to the mean approach that treats categorical variables as if they are continuous values, thus rendering them meaningless and lending credence to the criticism of using a Likert scale.

The second measure of export performance is introduced. In this case, the same indicators of export performance are used.<sup>65</sup> However, the approach for constructing this measure of export performance is different. In this case, two sets of questions are asked for each of the export performance measures. Respondents are initially asked about their expectations or expected performance by the end of 2018. For the next question, they are asked to assess the realization of their expectations by the end of 2018. The categorisation scheme designed for this export performance measure is found in table 6.3 below. For instance, for respondents who had same to higher expectations and who further responded that they either met or exceeded their expectation, this was taken as high performance which was assigned both a score and index value of 2, but the reverse is interpreted as low performance and assigned a value of zero, i.e. for a situation where the respondents fell short of same or higher realisation

It is worth noting that the first performance measure using the cumulative frequency categorisation scheme is used for the empirical analysis since it produced relatively better empirical results.

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<sup>65</sup> Export sales volume, export market share, export profitability and export sales intensity. Except that employment was included

**Table 6.3: A Categorization Scheme for Deriving a Composite Export Performance Indicator**

Expectation for 2018 A	Actual Performance for 2018 B	Score	Index
A Much higher level A Somewhat higher level About the Same Level	Greatly Exceeded Expectations Somewhat Exceeded Expectation Close to my Expectations	2	2
A Somewhat Lower level A Much Lower level	Greatly Exceeded Expectations Somewhat Exceeded Expectation Close to my Expectations	0	0
A Much higher level A Somewhat higher level	Somewhat Less than Expectations Much less than my Expectations	2	2
About the Same Level A Somewhat Lower level A Much Lower level	Somewhat Less than Expectations Much less than my Expectations	0	0
About the Same Level	Close to my Expectations	1	1

Author generated from survey data, 2019

***Constructing Measures for Determining/Predicting Export Performance***

From both the perspective of the resource-based view and the contingency theories that motivate this research, the determinants of firm-level export performance can be categorised into firm demographics, firm's competence reflecting capabilities and the external environmental factors. For the firm demographics, the variables considered are firm age, firm size, ownership structure and qualification of export managers. Under the firm's competence, we consider managerial international experience, export commitment, and product development capabilities. Finally, the factors considered under external conditions are macroeconomic uncertainty, export promotion programmes, and locational factors. Notwithstanding this plethora of factors adduced as the predictors of firm-level export performance, four key factors, export commitment, product development capabilities, macroeconomic uncertainty (which is the variable of interest) and export promotion programs

are used to estimate the model and for analysis<sup>66</sup>. The basis for this position is due to data constraints in terms of the limited number of observations secured in the survey and the need to secure a parsimonious model after undertaking an exploratory exercise, where most of the predictors were identified not to produce robust statistical results.

Since the same Likert scale framework is used to elicit responses to construct the four predictors used for estimating the model, the same cumulative frequency approach is used to categorise the measures for predicting export performance.

Export commitment is expected to positively impact on export performance. It demonstrates the export manager's propensity to proactively initiate efficient and effective actions that translate into boosting the performance of the firm. The dimensions of export commitment are reflected in the firm establishing an appropriate organisational structure to deal with all export activities and ensuring that the firm's executives undertake frequent travels to export markets. The firm also ensures that adequate funds are set aside to develop overseas markets with a deep commitment to learning about export procedures and documentation. All these factors ensure that export activities are accorded high priority, which ultimately translate into improved performance, (G. Sraha et al., 2017; Zou and Stan, 1998).

Similarly, product development capabilities are expected to translate into improved export performance. It can be perceived in the light of improved innovation capacity with dimensions such as learning, research and development, marketing, organisation, resource allocation and strategic planning (Guan & Ma, 2003). Therefore, in this specific case, the firm's capabilities to develop new products for its customers, research into new products and speedily develop

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<sup>66</sup> Macroeconomic uncertainty here comprises the following elements: Exchange rate volatility (largely), deterioration in external demand conditions, deterioration in global financial conditions, distorted incentive regime from Government's fiscal policy and unfavourable Monetary and financial conditions

new products for the export market are considered. Prominence is equally accorded the firm's capacity to improve or modify existing products as well as its malleability to adapt to new methods or ideas in production. These collective actions enhance the quality and the competitiveness of the export, leading to improved performance, (Nazar et al., 2009).

Gathering information on market access, trade facilitation issues, access to trade finance and participation in trade fairs, among others is a herculean task not only for startups but also in most cases for established firms. This is more germane in the case where the sunk costs for mobilising enough data to prospect for new markets and other trade support services may compromise firms' ability to secure extra resources to focus on their core operations. Though the current state of the literature on the effect of export promotion programmes is mixed, it is the expectation that for developing countries like Ghana, the availability of such trade backstops managed by authorities on a more coordinated and sustainable basis, provide the necessary impetus to prop up export activity. Thus, it is more likely that firms that avail themselves of the opportunities provided by the Ghana Export Promotion Authority and adapt them extensively will experience improved export performance. The export promotion activities include organising export seminars/conferences, training activities specialising in exporting, training on export documentation, provision of counselling advice on export business, general knowledge about doing business in a specific country and linking to easy sources of financing export business, (Nazar et al., 2009).

Stable macroeconomic environment, anchored on sound and effectively coordinated monetary and fiscal policies, supported by benign external conditions translate into stability in the key prices of the goods, money and foreign exchange markets, being the inflation rate, interest rates, and exchange rates. These favourable macroeconomic conditions boost investment by way of enhancing long term planning and assurance of some certainty on returns on investment. It is against this background that macroeconomic uncertainty induced by the combined effects

of deteriorating domestic economic conditions and exacerbated by unfavorable external conditions are likely to negatively affect the sentiments of exporters and restrain their propensity to invest in export business. These developments will ultimately undermine export performance. Since the focus of this study is to investigate the role of exchange rate volatility induced uncertainty on firm-level export performance, we also consider the view that uncertainty can be a composite construct of various dimensions. Therefore, exchange rate volatility interacts with other potential uncertainty induced conditions such as distortions in the incentive regime by the government's fiscal policy, unfavourable monetary and financial conditions, deteriorations in external demand and financial conditions to assess how they collectively affect export performance.

## **6.5.2 Methodology**

For this study, we adopt a quantitative approach comprising descriptive analysis involving frequency distributions and Cross-tabulations, and an econometric modelling analysis.

### ***6.5.2.1 Descriptive Analysis***

In all, 87 firms responded to the survey, representing a response rate of 45.8 percent. Table 6.4a & b report the dependent (response) and the independent (predictors) variables, their respective categorisation and the percentage frequencies from the survey responses. For the first measure of export performance construct, which is incidentally used for the econometric estimation, the categorisation approach used suggests that almost 61 percent of the respondents indicated a low level of performance, some 6 percent posting average performance, and 33 percent registering a high level of performance. Though the distribution of the second measure for export performance is largely balanced, its statistical performance in the empirical work is quite weak.

Reflecting on the firm's demographics, the average age of the firms surveyed is almost 19 years. In terms of activity, some 50.6 percent are in the manufacturing sector, followed by the agriculture sector with 26.4 percent, 12.7 percent for others including services and 10.3 for the handicraft sector. About 64 percent of the firms are wholly Ghanaian owned, with wholly foreign ownership constituting some 20 percent and the rest is a joint venture, foreign subsidiaries and other forms of ownership. By using the number of employees to categorise the size of the firms, it came up that 31 percent apiece represented the small and large enterprises, with 24 percent being micro-enterprises and 14 percent representing medium-sized enterprises.

**Table 6.4 a: Frequencies of Both Dependent and Independent Categorical Variables**

<b>VARIABLES</b>	<b>DETAILS</b>	<b>CODES AND VALUE NAMES</b>	<b>RESPONSES PERCENT</b>
<b>RESPONSE VARIABLES</b>			
EXPERFORM1	Measure of Export Performance using cumulative percent to derive threshold values	2= High Performance	<b>33.3</b>
		1= Average Performance	<b>5.8</b>
		0= Low Performance	<b>60.9</b>
EXPERFORM2	Measure of Export Performance using expectations and realisations	2= High Performance	<b>40.2</b>
		1= Average Performance	<b>20.7</b>
		0= Low Performance	<b>39.1</b>
<b>PREDICTORS</b>			
FirmSize	Size of firm measured by the number of employees	1=Micro Enterprise	24.1
		2 =Small Enterprise	31
		3 = Medium Size Enterprise	13.9
		4=Large Enterprise	31
Qualification	Educational qualification of Export Managers	0 =No Education	1.2
		1= Basic Education	4.6
		2= Secondary Education	8.1
		3= Vocational training	5.7
		4= Tertiary	55.2
		5= Professional"	25.3

Source: Author generated from Survey on Exporting Firms

**Table 6.4 b: Frequencies of Both Dependent and Independent Categorical Variables**

<b>VARIABLES</b>	<b>VARIABLES</b>	<b>CODES AND VALUE NAMES</b>	<b>RESPONSES PERCENT</b>
Ownership	Ownership structure of firms	1 =Wholly Ghanaian owned	64.4
		2 = Wholly Foreign owned	19.5
		3 =Joint Venture (Foreign and Ghanaian)	10.3
		4 = Foreign subsidiary	4.6
		5 = “Other”	1.2
Firm Age	Number of years in operation		
MAINEX	Managerial International Experience	2= Substantial Experience	60.9
		1= Average Experience	12.6
		0= No Experience	26.5
EXPCOM	Export Commitment	2= High Commitment	64.4
		1= Moderate to Average Commitment	17.2
		0= No Commitment	18.4
PRODEVCA	Product Development Capabilities	2= High Capabilities	74.7
		1= Moderate to Average Capabilities	4.6
		0= No Capabilities	20.7
UNCERTY	External and Internal Conditions that evoke Uncertainties	2= High Adverse Effect	62.1
		1= Moderate to Average Effect	18.4
		0= No Adverse Effect	19.5
LOC	Locational factors	2= Positive Externalities	86.2
		1= Average to Moderate Externalities	6.9
		0= No Externalities	6.9
EXPRO	Export Promotion Programmes	2= High Adoption	42.5
		1= Moderate to Average Adoption	15
		0= No Adoption	42.5

Source: Author generated from Survey on Exporting Firms

About 65 percent of the respondents are owners, export managers and chief executive officers with close to 62 percent of them either holding a degree at the tertiary or professional levels. Most of the firms ply their trade in the ECOWAS region, followed by Europe, the Americas, and others.

For the next level of descriptive analysis, we use cross-tabulations to establish some relationship between the dependent variable (EXPERFORM1) and the other independent variables. We first focus on the variables of interest, which are the measures for exchange rate volatility and macroeconomic uncertainty, followed by the relationship with the other independent variables.

From table 6.5, about 51.7 percent of the firms that post a low level of export performance collectively agree and strongly agree to the assertion that exchange rate volatility has adverse effects on export performance. This compares to 26.6 percent of the firms that posted a high level of export performance. Similarly, from table 6.6, whilst 50.6 percent of the firms that post low level of export performance subscribe to the view that macroeconomic uncertainty has moderate to a high adverse effect on export performance, only 24.1 percent of the firms that posted high performance subscribed to that position. This may suggest that exchange rate volatility as well as weak macroeconomic conditions that evoked uncertain conditions may have hurt low performing exporters more than the high performing ones. In other words, there may be some asymmetries in the adverse effects of macroeconomic uncertain conditions on the low and high export performers. Hence, it may be inferred that the adverse effects of deteriorating macroeconomic conditions in general and exchange rate volatility can be muted with increased productivity-enhancing measures that boost firms' performance.

**Table 6.5: Cross-tabulation between Exchange Volatility item and Export Performance Measure**

Adverse Effect of Exchange Rate Uncertainty on NTEs Performance	Measure for Export Performance Using Cumulative Frequency Threshold			
	Low Performance	Average Performance	High Performance	Total
Strongly disagree	0.00	0.00	2.30	2.30
Disagree	4.60	0.00	2.30	6.90
Neutral	4.60	0.00	1.15	5.75
Agree	21.84	2.30	6.90	31.03
Strongly Agree	29.89	3.45	20.69	54.02
Total	<b>53</b> 60.92	<b>5</b> 5.75	<b>29</b> 33.33	<b>87</b> 100.00

Note: all values are in percent except the bold figures on the total row representing the number of respondents.

Source: Author generated from Survey on Exporting Firms

**Table 6.6: Cross-tabulation between Measures of Macroeconomic Uncertainty and Export Performance**

Measure for Macroeconomic Uncertainty	Measure for Export Performance Using Cumulative Frequency Threshold			
	Low Performance	Average Performance	High Performance	Total
No Adverse Effect	10.34	0.00	9.20	19.54
Moderate to Average Effect	12.64	2.30	3.45	18.39
High Adverse Effect	37.93	3.35	20.69	62.07
Total	<b>33</b> 60.92	<b>5</b> 5.75	<b>29</b> 33.33	87 100

Note: all values are in percent except the bold figures on the total row representing the number of respondents.

Source: Author generated from Survey on Exporting Firms

Tables 6.7 to 6.10 present the relationship between export performance and some productivity-enhancing measures such as management's export commitment, managerial international experience, product development capabilities, and locational factors. In general, it would be observed that for both the firms that reported low and high levels of performance a relatively higher proportion believes that moderate to high levels of these qualities have positive impact on export performance.

**Table 6.7: Cross-tabulation between Measures of Export Commitment and Export**

Measure for Export Commitment	Measure for Export Performance Using Cumulative Frequency Threshold			
	Low Performance	Average Performance	High Performance	Total
No Commitment	16.09	0.00	2.30	18.39
Moderate to Average Commitment	8.05	3.45	5.75	17.24
High Commitment	4.60	0.00	1.15	64.37
Total	<b>53</b> 60.92	<b>5</b> 5.75	<b>29</b> 33.33	87 100

Note: all values are in percent except the bold figures on the total row representing the number of respondents.

Source: Author generated from Survey on Exporting Firms

**Table 6.8: Cross-tabulation between Measures of Managerial International Experience and Export Performance**

Measure for Managerial International Experience	Measure for Export Performance Using Cumulative Frequency Threshold			
	Low Performance	Average Performance	High Performance	Total
No Experience	20.69	1.15	4.60	26.44
Average Experience	8.05	0.00	4.60	12.64
Substantial Experience	32.18	4.60	24.14	60.92
Total	<b>53</b> 60.92	<b>5</b> 5.75	<b>29</b> 33.33	87 100.00

Note: all values are in percent except the bold figures on the total row representing the number of respondents.

Source: Author generated from Survey on Exporting Firms

It is expected that substantially high level of managerial international experience translates into high performance. However, if other conditions are not enabling this factor alone may not be enough. It must also be noted that within the categories, 52.8 % of those who reported low performance had substantial managerial experience whilst 72.4% of those who reported high performance had substantial managerial international experience.

From Table 6.9 below, within the categories, those with high product development capabilities that reported low performance constitute 69.9 % but the proportion for high performance is 79.3%.

**Table 6.9: Cross-tabulation between Measures of Product Development Capabilities and Export Performance**

Measure for Product Development Capabilities	Measure for Export Performance Using Cumulative Frequency Threshold			
	Low Performance	Average Performance	High Performance	Total
No Capabilities	16.09	0.00	4.60	20.69
Moderate to Average Capabilities	2.30	0.00	2.30	4.6
High Capabilities	42.53	5.75	26.44	74.71
Total	<b>33</b>	<b>5</b>	<b>29</b>	87
	60.92	5.75	33.33	100

Source: Author generated from Survey on Exporting Firms

**Table 6.10: Cross-tabulation between Measures of Location Factors and Export Performance**

Measure for Location Factors	Measure for Export Performance Using Cumulative Frequency Threshold			
	Low Performance	Average Performance	High Performance	Total
No Externalities	6.90	0.00	0.00	6.9
Average to Moderate Externalities	5.75	0.00	1.15	6.9
Positive Externalities	48.28	5.75	32.18	86.21
Total	<b>53</b>	<b>5</b>	<b>29</b>	87
	60.92	5.75	33.33	100

Source: Author generated from Survey on Exporting Firms

From Table 6.10 an examination within the categories point out that those indicating positive externalities for locational factor that reported low performance constitute 79.2% compared to 96.5% for those that reported high performance.

**Table 6.11: Cross-tabulation between Measures of Export Promotion Programmes and Export Performance**

Measure for Export Promotion Programmes	Measure for Export Performance Using Cumulative Frequency Threshold			
	Low Performance	Average Performance	High Performance	Total
No Adoption	33.33	1.15	8.05	42.53
Moderate to Average Adoption	9.20	0.00	5.75	14.94
High Adoption	18.39	4.60	19.50	42.53
Total	<b>53</b>	<b>5</b>	<b>29</b>	87
	60.92	5.75	33.33	100

Source: Author generated from Survey on Exporting Firms

Table 6.11 presents the extent of the adoption of export promotion programs on export performance. From the results, whilst most of the firms that report low performance indicate the absence of adopting the export promotion programmes, the reverse is the case for firms with high performance. This may suggest that these low performing firms are likely to either have some constraints in accessing these export promotion programmes or the promotion programs may not be relevant for their purposes.

Also, a comparison within categories reveal that those with high rate of adoption of export promotion programmes that reported low performance constituted 30.2%, which was 58.6% for those that reported high performance.

#### ***6.5.2.2 The Econometric Modelling***

The descriptive analysis suggests that there are some linkages between the three categories of the export performance measure (low, average, and high) and the various categories of independent variables examined above. Hence, we apply an econometric analysis to investigate the extent of the association and whether these relationships are statistically significant.

The ordinal logit model is the preferred technique because the export performance measure is an indicator variable with more than two categories. The values of the categories are arranged in sequential order, from the higher values to the least, where the intervals between categories may not necessarily be equal. In this case, we are dealing with polychotomous responses as opposed to dichotomous responses. When response variables assume this nature, Least Square regressions suffer from some shortcomings such as heteroscedasticity and predicted probabilities are likely to lie outside the unit interval. Thus, the appropriate model selected for this analysis is the Ordered Logit model.

McCullagh (1980) propose the “proportional odds” model which is the most used logit model for ordinal dependent variables. The proportional odds model assumes that the cut points between categories are not known to forestall any arbitrariness in the choice of scores for the

categories (Fullerton, 2009). Another fundamental assumption supporting the proportional odd model is the equality of the logit coefficients across logit equations for the different cut points, which suggests that the coefficients that describe the relationship between, say, the lowest versus all higher categories of the response variable are the same as those that describe the relationship between the next lowest category and all higher categories, in that order. In this case, it is only the intercept (cut point) that changes across logit equations, allowing for a single set of coefficients for each variable to be presented. This assumption has the advantage of allowing for a more parsimonious model and presentation of results that ensure the ordinality of the dependent variable.

The central idea behind the ordinal outcomes is that there is a latent continuous metric defined as  $y^*$  underlying the observed responses and that  $y^*$  is an unobserved variable, but its value is only known when it crosses thresholds, (Cameron & Trivedi, 2005).

Therefore, the export performance measure which is the response latent variable is represented by  $y^*$ . Thus, in modelling the predictors of export performance, once  $y^*$  crosses a certain value, we declare “high performance”, then, “average performance”, then “low performance”. Following Cameron and Trivedi (2005), for an individual firm  $i$ , we can specify a latent variable model as:

$$y_i^* = x_i'\theta + \varepsilon_i \quad 6.1$$

$$y_i = j \text{ if } \alpha_{j-1} < y_i^* \leq \alpha_j, \text{ where } i = 1, \dots, N$$

where  $j$  is a particular category for the response variable,  $\theta$  are regression parameters,  $\alpha_j$  the threshold parameters and  $\varepsilon_i$  is the error term

The regressors  $x_i'$  are normalised to exclude an intercept. For very low  $y^*$ , export performance status is rated “low performance”, for  $y^* > \alpha_1$ , export performance is rated “moderate to average performance”, and for  $y^* > \alpha_2$ , export performance is rated “high performance”.

The probability that observation  $i$  will select alternative  $j$  is:

$$p_{ij} = p(y_i = j) = p(\alpha_{j-1} < y_i^* \leq \alpha_j) \quad 6.2$$

$$= p(\alpha_{j-1} < x_i' \theta + \varepsilon_i \leq \alpha_j) \quad 6.3$$

$$= p(\alpha_{j-1} - x_i' \theta < \varepsilon_i \leq \alpha_j - x_i' \theta) \quad 6.4$$

$$= F(\alpha_j - x_i' \theta) - F(\alpha_{j-1} - x_i' \theta) \quad 6.5$$

where  $F$  is the cumulative distribution function (c.d.f.) of  $\varepsilon_i$ <sup>67</sup>.

To obtain the regression parameters,  $\theta$  and the threshold parameters,  $\alpha_j$  we maximise the log-likelihood with  $p_{ij} = p(y_i = j)$ .

For the ordered logit model,  $\varepsilon$  it is logistically distributed with  $F(z) = e^z / (1 + e^z)$ . The sign of the regression parameters  $\theta$  can be immediately interpreted as determining whether the latent variable,  $y^*$  increases with the regressor. If  $\theta_i$  is positive, then an increase  $x_{ij}$  necessarily decreases the probability of being in the lowest category, in this case ( $y_i = 0$ ) and increases the probability of being in the highest category, in this case ( $y_i = 2$ ).

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<sup>67</sup> Ordered logistic regression builds on the idea behind binary logistic regression working with log-odd transformation of the probabilities. The focus is on cumulative probabilities instead of individual category probabilities. Therefore, this technique requires the dependent variable to be ordinal, so that one can talk about cumulative probability of attaining at least a given category.

**Marginal Effects for the ordered logit Model**

The marginal effect of an increase in a regressor  $x_m$  on the probability of selecting an alternative  $j$  is:

$$\partial p_{ij} / \partial x_{mi} = \{F'(\alpha_{j-1} - x_i' \theta) - F'(\alpha_j - x_i' \theta)\} \theta_m \quad 6.6$$

The marginal effects on the different alternatives by each variable will sum up to zero. As regards the interpretation of the marginal effects, each unit increase in the independent variable increases/decreases the probability of selecting alternatives  $j$  by the marginal effect expressed as a percent, (Cameron & Trivedi, 2005).

**General Logistic Regression Model**

In the spirit of Sterlacchini (2001), the model we employ is not supposed to be an empirical counterpart to a theoretical model, but rather the coefficients are estimates of the parameters of the cumulative probability of predicting a particular categorical variable given the whole set of independent variables. Hence, we seek to probe further the distribution of the independent variables across the three categories of the response variable by using the Ordered logistic estimator. Following Boes, Winkelmann, and Liu (2009) the logistic regression model can be specified as:

$$\text{Ln}(Y^*) = \text{logit}[\pi(x)] \quad 6.7$$

$$= \ln \left[ \frac{\pi(x)}{1 - \pi(x)} \right] \quad 6.8$$

$$= \phi + \theta_1 X_1 + \theta_2 X_2 + \dots + \theta_p X_p \quad 6.9$$

where  $\theta_i$  are regression coefficients and  $X_i$  are independent variables.

To estimate the ln (odds) of being at or below the  $j^{\text{th}}$  category, the logistic model can be written as:

$$\text{logit} \left[ \pi(Y \leq j | x_1, x_2, \dots, x_p) \right] \quad 6.10$$

$$= \ln \left[ \frac{\pi(Y \leq j | x_1, x_2, \dots, x_p)}{\pi(Y > j | x_1, x_2, \dots, x_p)} \right] \quad 6.11$$

$$= \phi_j + (-\theta_1 X_1 - \theta_2 X_2, \dots - \theta_p X_p) \quad 6.12$$

Hence, according to them, this model predicts cumulative logits across  $j - 1$  responses categories. The estimated cumulative odds and the cumulative probabilities of being at or below the  $j^{\text{th}}$  category can be obtained by transforming the cumulative logits.

### 6.5.2 .3 ANALYSIS OF ECONOMETRIC RESULTS

Table 6.12 reports the regression results for both the ordered logit model and the odds ratios. The estimation technique goes through an iteration process which is indicated below<sup>68</sup>. Likewise, the log-likelihood ratio chi-square test with 8 degrees of freedom,  $LR\chi^2_{(8)} = 18.91$ ,  $p = 0.0153$ , suggest that the model with four predictors produced a better fit than the null model with no independent variables in predicting the cumulative probability for export performance. The  $Cut1 = 1.686$  and  $Cut2 = 1.990$  are the cut points for the latent variable (Export Performance measure). They are used to differentiate the adjacent levels of categories of export performance. In this case, when the response category reflects low performance, the export performance measure falls at or below the first cut point. The export performance measure falls between the first cut point and the second cut point in the case of the average performance category. In addition, the export performance measure falls beyond cut 2 in the case of the high-performance category (Boes et al., 2009).

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<sup>68</sup> Starting with iteration 0, stata fits a null model with only an intercept. Subsequently it fits the full model and stop the iteration process once the difference in log likelihood between successive iterations become sufficiently small (in this case at iterative 4).

Consistent with their a priori expectations, the signs for the coefficients of the predictors, except macroeconomic uncertainty, were positive. The standard errors are reported in parenthesis. We initially focus on the first column that reports the coefficients in log odds, where the magnitudes do not matter for inferential analysis, but one can only indicate either the more likelihood or less likelihood to be in any of the categories, be it low, average or high levels of export performance.

**Table 6.12 Results of Ordered Logit Model and Odd Ratios for Export Performance**

<u>Export Performance</u>	<u>Ordered Logit</u> <u>Coefficients</u>	<u>Odd Ratios</u> <u>Coefficients</u>
<u>Export Commitment</u>		
Moderate to Average Commitment	1.8591* (1.0320)	6.4177* (6.6228)
High Commitment	0.6906 (0.9409)	1.9949 (1.8770)
<u>Product Development Capabilities</u>		
Moderate to Average Capabilities	2.1929* (1.2772)	8.9609* (11.4451)
High Capabilities	0.8089 (0.7202)	2.2320 (1.6074)
<u>Macroeconomic Uncertainty</u>		
Moderate to Average Adverse Effect	-2.2056** (1.0207)	0.1102** (0.1125)
High Adverse Effect	-1.4270** (0.6908)	0.2400** (0.1658)
<u>Export Promotion</u>		
Moderate to Average Adoption	0.8971 (0.8151)	2.4525 (1.9991)
High Adoption	1.7106 *** (0.6522)	5.5323 *** (3.6081)
/Cut 1	1.6858 (0.9891)	1.6858 (0.9891)
/Cut 2	1.9900 (0.9946)	1.9900 (0.9946)
Iteration 0: log likelihood	-72.409766	-72.40977
Iteration 1: log likelihood	-63.430336	-63.43034
Iteration 2: log likelihood	-62.956615	-62.95662
Iteration 3: log likelihood	-62.953762	-62.95376
Iteration 4: log likelihood	-62.953763	-62.95376
Number of Observations	87	87
LR chi2 (8)	18.91	18.91
Prob > chi2	0.0153	0.0153
Pseudo R2	0.1306	0.1306

i. standard deviation in brackets

ii. where \*\*\*, \*\*, \* are 1% ,5%, 10% levels of significance respectively

According to the results, the log odds of export performance improves (from low to average and high performance) with moderate to average improvement in export commitment controlling for other factors. In other words, moderate to an average level of export commitment is more likely to translate into high export performance, *ceteris paribus*. This relationship is statistically significant at 10 percent. Though the same could be said of a high level of export commitment being more likely to be associated with high export performance, this relationship is not statistically significant. The supposition that some moderate to average improvement in the level of export commitment may enhance the likelihood of predicting high export performance is consistent with studies like, G. Sraha et al. (2017) and Aaby and Slater (1989) who argue that improvement in export commitment affects resources release to support export enhancing activity.

Similarly, improved export performance is more likely to be associated with moderate to an average level of product development capabilities all other things held constant. This relationship is equally significant at 10 percent level. This outcome is consistent with the view that in a world of increasing competition with evolving consumer taste and preferences coupled with the desire for varieties, producers must correspondingly innovate their products and processes to increase their productive capabilities which will help them stay afloat in business (Guan and Ma, 2003; Rajapathirana and Hui, 2018). Related to this, Aaby Slater (1989) argue that depending on the export destination, if the recipients of the export products are from developed countries, they are likely to be interested in improvement in product development and innovations that improve the level of technology associated with the exported products, whilst recipients of export from developing countries are likely to be more inclined to improved product development capabilities that reflect in competitive prices.

The results further suggest that export performance dampens (reversing from high to average and low levels of performance) with elevated levels of macroeconomic uncertainty, all other

factors held constant. In this case, both moderate to average and high adverse effects from macroeconomic uncertainty are more likely to predict low levels of export performance. For both categories, the relationships are statistically significant at 5 percent level. This is consistent with the argument that risk emanating from adverse macroeconomic conditions can potentially cause producers to be less optimistic and entertain negative attitudes towards returns on investments and planning for future execution. Export performance is eventually compromised because firms hold back on investments, more especially for irreversible investments. This situation is worsened where producers either lack the financial capability to mitigate against risk from the effects of macroeconomic uncertainty or such schemes for risk mitigation may not be available, ( Garret and Andrea, 2016).

The results also suggest that the increased pace of adopting export promotion programmes is more likely to predict improvement in export performance (from low to average and high levels of performance), holding other factors constant. The association between a high rate of adoption of export promotion programmes and high export performance is statistically significant at 1 percent. This result is at variance with the findings of Wolf (2007), where such a relationship is absent in a study conducted to examine the relationship between export promotion programmes and export performance of the horticultural industry in Ghana. The result is rather consistent with the findings of Munch and Schaur (2015) that suggest that export performance are boosted among small exporters in Denmark who resort to export promotion activities.

Another way of examining the relationship between the export performance categories and the predictors is to look at the odds ratios reported in the second column of Table 6.12.

From the results the odds in favour of reporting high export performance (from low to average, then to high) increases by 6.4 units with a unit increase in export commitment (in whatever units it is measured), going from low to moderate and average level of export commitment,

given that all the other variables in the model are held constant. Likewise, it can be suggested that the possibility of reporting high export performance (from low to moderate and average, then high) increased by 8.96 units with a unit increase in product development capabilities, going from low to moderate and average product development capabilities levels, given that all other variables in the model are held constant. Also for export promotion programmes, it would be observed that the possibility of predicting a high level of export performance increased by 5.5 units owing to a unit increase in the adaptation rate of export promotion programmes from low to high, with other variables held constant.

However, the odds in favour of reporting high export performance level (from low to moderate and average, then high) deteriorated by 89 percent with each incident of moderate to average adverse effect of macroeconomic uncertainty, holding other variables constant. Similarly the odds in favour of reporting high export performance level deteriorated by 76 percent with each additional incidence of a high adverse effect of macroeconomic uncertainty. These revelations, coupled with the outcomes of the relationship established between export performance on one side, and exchange rate volatility and macroeconomic uncertainty on another side, under the descriptive analysis, demonstrate that the risk imbedded in adverse macroeconomic uncertainty is high and potentially detrimental to any improved export performance effort. This requires some critical examination of the various dimensions of conditions that precipitate macroeconomic uncertainty, with the view to seeking the appropriate coordinated set of policy measures to subdue their harmful impact.

Table 6.13 reports on a question asking firms to rank in order of importance the factors that constraint export business in Ghana.

**Table 6.13 Ranking of factors Constraining Export Business in Ghana**

Rank	Factors
1	Limited access to finance or loan
2	Exchange Rate volatility
3	Monetary Conditions
4	Government's Fiscal Policy
5	Limited access to Land
6	Limited access to technology
7	Problems with electricity supply
8	Inadequately educated workforce
9	Problems with the water supply

Source: Author generated from Survey of NTE firms

The evidence above supports the fact that these macroeconomic conditions are ranked among the first four most important factors that are of concern to exporters. Reinforcing the need to find ways to address the unfavourable macroeconomic conditions that pose risk to exporting activity and discourage investment into that sector.

### ***Marginal Effects***

Table 6.14 reports the marginal effects of the ordered logit model. As explained under section 6.5.2.2, unlike the ordered logit and the odd ratios models, the marginal effects logit model helps in identifying how changes in each of the independent variables predict a category of the export performance (low, average and high performances). In other words, they reflect the changes in the slope of the various response categories relative to the predicted variables. In this case when a particular independent variable is less likely to predict a particular response category then it stands to reason that it may be more likely to predict a different category, in which case the net effect will be zero.

**Table 6.14 Marginal Effects for The Ordered Logit**

<b>Export Performance</b>	<u>Low Performance</u>	<u>Average Performance</u>	<u>High Performance</u>
<u>Export Commitment</u>			
Moderate to Average Commitment	-0.41378**	0.03084	0.38294**
High Commitment	-0.13097	0.01959	0.11138
<u>Product Development Capabilities</u>			
Moderate to Average Capabilities	-0.49171*	0.02227	0.47090*
High Capabilities	-0.16062	0.02205	0.13857
<u>Macroeconomic Uncertainty</u>			
Moderate to Average level	0.48203***	-0.03223	-0.44979***
High level	0.34196**	-0.01010	-0.33186**
<u>Export Promotion</u>			
Moderate to Average adoption rate	-0.17034	0.025046	0.14530
High adoption rate	-0.36890***	0.035093*	0.33381*** <sup>a</sup>

Level of Significance: \*\*\*= 1%, \*\*= 5%, \*= 10%

The results suggest that a unit improvement in the moderate to average level of export commitment decreases the probability of predicting low export performance by 41 percent and at the same time increases the probabilities of predicting both average and high levels of export performance by 3 percent and 38 percent respectively and this is statistically significant at 5 percent<sup>69</sup>. This reinforces the position adduced earlier that firms that put in place concrete measures, such as scaling-up resources to export activity, having a dedicated outfit involved in market explorations and other such engagements to demonstrate a commitment to export activities are the ones likely to be posting average to high levels of export performance. Likewise, an improvement in the moderate to average levels of product development

<sup>69</sup> Though the marginal impact for the average performance is not statistically significant

capabilities is less likely to predict low export performance category by 49 percent, but more likely to predict both average and high-performance categories by 2 percent and 47 percent respectively<sup>70</sup>. Suggesting that firms that aspire to improve on the level of their export performance have to differentiate themselves by way of investing in innovations that enhance their product development capabilities. The results also suggest that the probabilities of moving into the average and high export performance categories increase by 4 percent and 33 percent respectively with a unit increase in the high adoption rate of export promotion programmes, but the probability of moving into the low export performance category decreases by 37 percent with a unit improvement in the high adoption rate of export perfection<sup>71</sup>. This supports the need for GEPA to step up their operations to augment the activities of NTE to prop up their performance.

Turning to the issue of macroeconomic uncertain, the results suggest that a unit deterioration from moderate to the average adverse effect of macroeconomic uncertainty increases the probability of predicting low export performance by 48 percent, but decreases the probabilities of predicting average and high export performances by 3 percent and 45 percent respectively. This is statistically significant at 1 percent. Similarly, a unit deterioration due to high adverse effect of macroeconomic uncertainty increases the probability of predicting low export performance by 34 percent but decreases the probabilities of predicting both average and high export performance by 1 percent and 33 percent respectively. This is also statistically significant at 5 percent<sup>72</sup>.

This analysis suggests that macroeconomic uncertainty poses a significant risk and a veritable threat to export performance. The risk is of great concern to exporters because it erodes the possibilities of enhancing export performance. Firms' ability to predict both their income flows

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<sup>70</sup> The marginal effect for the average performance is not statistically significant

<sup>71</sup> The marginal effects for the low and high performances were statistically significant at 1% but that for average performance was 10%

<sup>72</sup> The marginal effects for the average performance are not statistically significant

and investment schedules is unduly undermined during conditions of macroeconomic uncertainty. Hence their performances are equally constrained under such adverse conditions. It further suggests that any coordinated set of export strategic plan that does not have as an essential component, critical policy measures to address conditions that evoke macroeconomic uncertainty may not succeed. Of equal importance is ensuring that constraints that inhibit exporters from increasing the rate of adoption of export promotion programmes are contained to the barest minimum. Likewise, authorities must ensure they implement policy measures that encourage firms to scale up resources to activities that demonstrate their commitment to export and also establish an industrial policy regime that encourages innovations aimed at upscaling the product development capabilities of firms.

### *Comparing Predicted Probabilities with Actual Probabilities*

We now seek to determine if the model reasonably fits the data. To do this, we compare the predicted probabilities for each category of the response variable to the actual probabilities. Table 6.15 reports both the predicted and actual probabilities. The results suggest that the variances between the predicted means (probabilities) and the actual means (probabilities) are minimal. This may suggest that the model fits the data quite well.

**Table 6.15: Results of Predicted and Actual Probabilities**

Dependent (Response) Variable	Predicted Mean	Actual Mean
Low Export Performance	0.6138	0.6092
Average Export Performance	0.0570	0.0575
High Export Performance	0.3292	0.3333

As indicated above, a key assumption underlying the ordered logistic regression is that the relationship between each pair of outcome groups is the same. This assumption is often violated. According to Fullerton (2009) a violation of the proportional odds assumption results in biased estimates with possible implications for hypothesis testing. To find out whether this

assumption has been violated, Brant (1990) proposed a Wald test, which tests for the equality of all the coefficients  $\theta_s$ , collectively and separately. The underlying null hypothesis is that the relationship is proportional; that is, parallel<sup>73</sup>.

**Table 6.16 Results on Omodel Logit to Test Proportionality Assumption.**

	<u>Ordered Logit</u>
<u>Export Performance</u>	<u>Coefficients</u>
Export Commitment	0.2093 (0.3570)
Product Development Capabilities	0.2599 (0.3180)
Macroeconomic Uncertainty	-0.3704 (0.2998)
Export Promotion	0.6687 b (0.2860)
/Cut 1	1.3757 (0.7459)
/Cut 2	1.6569 (0.7512)
Iteration 0: log likelihood	-72.409766
Iteration 1: log likelihood	-66.845834
Iteration 2: log likelihood	-66.75296
Iteration 3: log likelihood	-66.757089
Number of Observations	87
LR chi2 (4)	11.31
Prob > chi2	0.0233
Pseudo R2	0.0781

i. standard deviation in brackets

ii. where a,b,c are 1% ,5%, 10% levels of significance respectively

<sup>73</sup> We adopted a user written command, omodel logit introduced by Wolfe (1997) to implement this test.

Table 6.16 reports the logit model and the associated Brant wald test results for the coefficients collectively and individually.

Approximate Likelihood-ratio test of proportionality of odds across respons categories

chi2 (4)	5.15
Prob > chi2	0.2719

Detail Brant Test of Parallel Regression Assumption

Variable	chi2	Prob > chi2
All	7.37	0.117
Export Commitment	1.42	0.233
Product Development Capabilities	5.25	0.022
Macroeconomic Uncertainty	0.01	0.940
Export Promotion	2.18	0.140

Since the chi-square results for the likelihood ratio test for all the coefficients and the brant test results for the individual coefficients (except for the product development capability measure) are not significant, one can generally conclude that the proportional assumption has not been violated.

### **6.6.3 Descriptive Analysis of Some Institutional and Firm-level Constraints that impinged on the Ghana National Export Strategy Plan, 2013-2017**

In this section, we examine some responses of both the firms and some government agencies to assess the possible reasons or constraints that may have impinged on the outcome of the Ghana National export strategy plan and possibly resulted in the undershoot of the target of US\$ 5 billion export value set for the NTE sector by the end of 2017.

Table 6.17 presents the responses from firms on some questions meant to gain the extent of their involvement in the national export promotion activities. Almost 90 percent of the firms are registered with the GEPA, but about 60 percent are aware of the incentive packages provided by the agency. There was an apparent paucity of awareness of the Ghana National Strategy plan, as some 26.4 percent were not aware of its existence. Interestingly, 52.2 percent claimed to have benefited from the support packages offered under the strategic plan. The firms probably failed to distinguish the incentive packages unique to the strategic plan and the normal ones offered by GEPA.

Access to credit for SMEs, both for the long term and at reasonable costs, has been a bane for SMEs growth, especially those in the export sector. As indicated already, one of the interventions instituted to address this issue was the establishment of EDAIF. However, on a question to the firms as to whether they have benefitted from the EDAIF scheme, some 24.1 percent reported in the affirmative. Some of the reasons assigned for the seemingly low patronage include cumbersome processes, no response from EDAIF, lack of awareness, perceived political influences, collaborating banks rather interested in promoting their products among others. These may suggest that the vehicle to address the issue of funding for export activities may not be effective. And to the extent that exporters are starved of credit at reasonable costs to support their operation, they may not be able to perform to meet targets set for the sector. This calls for a review of the operations of EDAIF, currently subsumed under

the Ghana EXIM Bank to ensure enough awareness and responsiveness to the needs of exporters.

The firms were also asked to indicate some of the problems Ghanaian exporters encounter in the export trade system. In general, the most cited constraints were: complicated customs clearance procedures, time-consuming customs procedures, opaqueness in trade rules and regulations, unclear methods for assessing customs duties, obscurity in the criteria for determining the classification of customs duties, unclear inspection system, high non-tariff barriers, and strict quarantine system.

**Table 6.17: Responses on the extent of NTEs firms' involvement the National Export Promotion Activity**

Questions	Percentages
Is your firm registered with the Ghana Export Promotion Authority?	Yes= 89.7 No=10.3
Is your firm aware of the incentive packages available to exporters under the Ghana Export Promotion regime?	Yes=59.8 No=40.2
In your firm aware of the Ghana National Export Strategy document launched in 2012, for implementation between, 2013-2017?	Yes=26.4 No=76.6
Was your firm able to take advantage of the support packages made available under the Ghana National Export Strategy document?	Yes=52.2 No=47.8
Has your firm benefited from the Export Development and Agricultural Investment Fund (EDAIF)	Yes=24.1 No=75.9

Source: Author generated from Survey data

All these factors tend to increase the costs of doing export business, which tends to undermine effort. Achieving any target under such challenging conditions would be quite difficult. It stands to reason that some structural issues have to be addressed if any export growth agenda can be successful.

We now examine some responses from state institutions to establish the possible challenges encountered in their attempt to implement the Ghana National Export Strategy Plan, 2013-2017. Table 6.18 reports on the responses of these institutions. Out of the five government agencies we contacted, three responded to the questionnaire. In general, the responses suggest that inadequate financial resources to support the implementation of the strategic plan was the major constraint. This may suggest that either the fiscal commitment to allocate resources for the execution was not present or there was no proper financing strategy to support the execution of the strategic plan. Indeed it could be suggested that the Ghana National Export Strategic document was comprehensive in terms of form and substance but deficient in terms of implementation, more especially concerning the availability of financial resources to ensure that the implementing agency undertook the expected interventions towards realising the priority projects. In addition, the responses suggest that there was not effective stakeholders' consultation and coordination to both create awareness and ensure the effective implementation of the strategic plan. Not surprising, the position of Ghana Export Promotion Authority, the implementing agency, that the National Export Strategy was not implemented.

From the perspective of both the firms and the institutions, it could be surmised that the Ghana National Export Strategy Plan for 2013-2017 suffered from both awareness and financial resources deficits. Thus, undermining the attainment of the end 2017 target for non-traditional export of US\$5billion. Setting a national target for export promotion should be mainstreamed into the annual government's budget to ensure enough financial resources to execute the

relevant projects. Appropriate structures to foster institutional coordination to achieve national strategic plans have to be strengthened.

**Table 6.18: Responses from Institutions on Key Constraints on Implementation of the National Export Strategy, 2013- 2017**

Name of Organization	Expected Roles Under the Ghana National Export Strategic Plan (2013-2017)	Performance Relative to Expected Roles	Key Enablers	Key Constraints
Ghana Standard Authority (GSA)			A letter sent to the Commander of CEPS to ensure that exporters obtain export certificates from GSA before exporting boosted export volumes somewhat.	<ul style="list-style-type: none"> <li>- The key constraint relates to balancing the requirements of certification with timely delivery of services to exports</li> <li>- To the extent that export certification is issued based on consignment inspections and laboratory analysis report, many commodities have been refused certificates because they have failed mycotoxin and microbiology tests</li> <li>- Examples of products that normally fail aflatoxin test: groundnut, melon seeds and maize based products</li> <li>- Also some microbiological analysis take a while for confirmatory tests and this creates delays</li> <li>- The Laboratory sometimes delays in conducting analysis</li> <li>- These delays frustrate exporters to the extent that some resort to other means of exporting or stop exporting.</li> </ul>
Ghana Export Promotion Authority	Implementing agency for the Ghana National Export Strategic Plan	The National Export Strategic was not really implemented	There were some resources to revamp Statistics on NTEs, improved working environment with new office premises, retooling and training of staff	Lack of financial resources to execute the various priority action plans
Ministry of Trade and Industry	Provide the following: -Leadership -Resource mobilization for implementation -Coordination -Advocacy	The Ministry provided the needed leadership, coordination and advocacy but was unable to mobilise enough resources for implementation	The key enabler was for each district to produce one commercially viable export product	Limited resources was the key constraint for the implementation of the plan

Source: Survey responses

It is therefore expected that any future revision of the National Export Strategy Plan should take into account the issue of creating enough awareness among the key stakeholders and also

ensure that serious thought is given to funding requirements and constraints both for firms and the implementing agencies.

## **6.7 Conclusions**

The contributions of export firms to economic growth have stimulated a lot of academic studies to investigate the factors that stimulate export performance. A scan through the literature on the determinants of firm-level export performance shows limited prominence accorded to the role of macroeconomic uncertainty as related to exchange rate volatility and other adverse macroeconomic conditions. Hence, considering the numerous expected advantages that may accrue to a country, contingent on implementing the right policies to boost export business within a sound macroeconomic environment, this research set out to investigate the key drivers of NTEs performance in Ghana. Equally so where the evidence point to the fact that the Ghana National Export Strategic plan failed to achieve the intended target of US\$5 billion in export value by the end of 2017. There is a need for some introspection to ascertain the factors likely to have impeded the achievement of this target.

Using both descriptive and econometric analysis some key findings are observed. From the descriptive analysis, there is some evidence of a positive correlation between the measure for export performance and almost all the predictors listed above except macroeconomic uncertainty where a negative and apparent asymmetric relationship based on whether a low or high export performance was observed. To infuse some rigor into the analysis an econometric approach, an ordered logistic model is applied to further examine the extent and significance of the relationships. After some exploratory analysis and due to the small sample size, four out of the six predictors could help in achieving some parsimony.

Firms that demonstrate moderate to average levels of export commitment and at the same time display moderate to average levels of product development capabilities are less likely to report

low export performance but are rather more likely to predict average to high levels of export performance. At the same time, average to high levels of export performance are more likely to be predicted by firms that demonstrate a high rate of adopting export promotion programmes. For the variable of interest, macroeconomic uncertainty, the study finds that moderate to average and high levels of adverse effects from these deteriorating conditions (exchange rate volatility, distorted fiscal regime, unfavourable monetary and financial conditions, deteriorations in both global financial and demand conditions) are more likely to predict low export performance and less likely to predict average to high levels of export performance. This is corroborated, to the extent that firms rank these conditions within the four topmost constraints affecting their business. Thus, suggesting that macroeconomic uncertainty with its various ramifications pose a severe threat and can potentially hurt the export business in Ghana. As such any coordinated set of policies aimed at boosting export performance in Ghana must include specific policies measure to address the debilitating macroeconomic conditions suggested above that evoke macroeconomic uncertainty.

It also emerged from the descriptive analysis on the responses from firms and the government agencies that the Ghana National Export Strategy Plan for 2013-2017 may have failed to achieve the intended target of US\$5 billion value of export by the end of 2017 due to both awareness and financial resources deficits. To the extent that most of the key stakeholders demonstrated limited awareness of the strategic plan, it is equally possible that not many activities have been executed to actualise the objectives as set out in the strategy. Besides the vehicle that is intended to provide funding support for firms, EDAIF appears not to be effective in delivering the volumes of credit required. Meanwhile, the implementing agency, GEPA is equally starved of the requisite funds to executive the priority projects.

## CHAPTER SEVEN

### CONCLUSIONS AND POLICY RECOMMENDATIONS

This concluding chapter offers a brief overview of what this thesis set out to achieve through the three empirical studies undertaken. The gaps in the empirical literature that it seeks to address with the empirical studies are highlighted with the emerging contributions. Finally, this chapter points out the general limitations of this thesis, opportunities for further studies and the policy implications.

#### 7.1 Conclusions

With the preponderance of evidence both from research studies and country experiences pointing to the importance of export growth as a key ingredient to propel economic growth, this thesis set out to investigate the main predictors of export performance in Ghana, from both the macroeconomic and firm-level perspectives. The thesis also seeks to explore the fundamental constraints to Ghana's export diversification effort. The empirical studies are motivated by, first, the theoretical frameworks of De Grauwe (1988) on the relationship between exchange rate volatility and export performance that is supported by the theory of taking decisions under uncertainty, as well as that of Bhagwati (1988) which examines export response to changes in exchange rate policies that creates anti-export bias tendencies; secondly, that of Hausmann et al. (2007) that argue for active government's industrial policy based on the idea that the strategic value of products that countries export can be exploited to make gains along the value addition spectrum, which is also underpinned by the theory of taking decisions under uncertainty; and finally the resource-based view and the contingency theories that examine both the internal and external determinants of firm-level export performance as proposed by Penrose (2009) and Calantone et al. (2006).

The empirical chapter one set out to investigate the role of exchange rate volatility and exchange rate policies on export performance in Ghana. Previous studies on the subject matter, especially the ones done on Ghana, have either examined the responds of total export to exchange rate volatility or the responds of non-traditional export to exchange rate volatility. No attempt, according to my knowledge has been made to investigate how total export and all its components (non-traditional, cocoa beans and natural resources export) respond to exchange rate volatility in tandem. Particularly in the light of addressing the issue of “fallacy of composition” or “error of aggregation”. This is a gap in the literature that this empirical study seeks to address. In addition, the empirical study seeks to address the paucity of a recent study on how exchange rate policies acting as anti-export bias have consequences for export performance in Ghana. Both linear and non-linear ARDL econometrics techniques are employed on quarterly export data from the Bank of Ghana for the period 2000 to 2016 to undertake this investigation.

Results from the linear ARDL technique suggest that total export and its components do not respond to exchange rate volatility in the immediate short run. On the contrary, by using the non-linear ARDL technique, where the exchange rate volatility measure is decoupled into negative and positive effects, a clear evidence of an adverse short-run response of both non-traditional export and total export to negative exchange rate volatility (excessive depreciation) is statistically supported in Ghana. This could be attributed to supply constraints, contractual arrangements, and high costs of imported intermediate inputs that could prevent export firms from taking advantage of the short-lived exchange depreciation. Besides, the results from the non-linear ARDL suggest that exporters of natural resources (gold, crude oil, and other minerals) respond favourably to positive exchange rate volatility (excessive appreciation) in the short run. Since most of the owners of these natural resources are foreigners, they are motivated to increase export of their products in the light of positive exchange rate volatility

that improves their income. This may have implications for capital outflows if appropriate measures are not instituted to check the orderly transfer of such windfall profits. However, neither the linear nor the non-linear ARDL techniques statistically support any response of cocoa beans export to exchange rate volatility in the immediate short run. This outcome could be attributed to the protection offered against short term risk due to the marketing arrangement established by Ghana Cocoa Marketing Board over the years.

In the long run, the results from both the linear and non-linear ARDL techniques provide evidence in support of the argument that exchange rate volatility depressed non-traditional export performance. This gives credence to the argument that highly risk-averse exporters shun from exporting activities in the face of increased exchange rate uncertainty. This finding is however different for the responsiveness of total export conditioned on whether the linear or the non-linear ARDL technique is applied. From the perspective of the linear ARDL technique, the long-run response of total export to exchange rate volatility is positive and statistically significant but the relationship is rather negative when the non-linear ARDL technique is used. In addition, a long-run relationship between exchange volatility and natural resources export is not statistically supported using the linear ARDL technique, however, this relationship is positive using the non-linear ARDL technique and is statistically significant. Just like the short-run effects, the results suggest that the export of cocoa beans does not respond to exchange rate volatility in the long-run notwithstanding the ARDL technique applied.

The preceding discussions suggest that exporters of NTEs are the most affected as far as the issue of uncertainties emanating from exchange rate volatility is concerned, whilst other exporters may be impervious to the effects of exchange rate uncertainties. This could largely be attributed to the risk-mitigating scheme provided to exporters of cocoa beans and possibly the capability of the owners of the natural resources to engage in forward sales or other risk-mitigating mechanisms to absorb shocks from the exchange rate uncertainty. Although Obeng

(2017) reached a similar conclusion concerning the link between exchange rate volatility and non-traditional export, this comparison would only hold under the condition of using the non-linear ARDL technique.

The empirical chapter one also investigates whether exchange rate policies in Ghana, proxied by anti-export bias trade policies, distort the incentive structure and undermine capacity in export activity consistent with the argument of Bhagwati (1988). A proxy calculated from a ratio of real import and export weighted effective exchange rates is used to measure anti-export bias policies. The results from both ARDL techniques support the argument that an increase in anti-export bias policies undermine the performance of non-traditional export. Although the same can be said of the performance of both natural resources and total export, the relationship is not statistically significant. Cocoa beans export seems not to be adversely affected due probably to the protection enjoyed from the purchase's arrangements established by Ghana Cocoa Board as already alluded. Hence, the empirical results from this thesis reinforced the argument that attempts at promoting export driven growth agenda should be guided by the incentive signals emanating from the gamut of government policy imparting on the exchange rate trajectory and the disproportionate perverse response outcomes that could be occasioned. In addition, other predictors of export performance are identified by the study. Focusing on the non-linear ARDL, only Cocoa beans export reacts positively and significantly to exchange rate depreciation both in the short run and long run. This could be explained by the benefits that accrue to cocoa farmers due to increase in the domestic currency value of the foreign exchange receipts because of the depreciation of the exchange rate. NTE responds positively to productivity enhancing measures represented by RCIEA. Except for Cocoa beans exports, total exports and the other components respond positively to the RCIEA measure in the long run. Total exports respond positively to the measure of foreign demand in the short run. But in the long run, only Cocoa beans export responds positively to foreign demand, whereas the rest

respond negatively. This suggests a low-income elasticity of demand for Ghana's exports, especially non-traditional export. Given that the non-traditional export has been targeted to be the main driver of the export diversification agenda for Ghana, there is the need to examine the products in Ghana's export basket to ascertain their strategic value to achieve structural transformation and a more diversified economy, which is the subject matter for investigation in the second empirical chapter.

The empirical chapter two focusses on assessing the fundamental challenges confronting Ghana's quest to achieve a more diversified export base. The study is based on the theoretical argument of Hausmann et al., (2007) and Hidalgo et al., (2007) that the nature of the products constituting a country's export basket, which reflects the productive capabilities acquired over the years, matters a lot for both current and future diversification efforts.

Hence, we apply the concepts of Economic Complexity Index (ECI) and Product Complexity Index (PCI), Product Space and Revealed Comparative Advantage (RCA), which are generated based on trade data at the HS 4-digit classification level for 1240 products, for the period 1995 to 2016, to undertake comparative analyses between Ghana and some selective countries (Nigeria, Singapore, and Malaysia) to address the question relating to why Ghana's export basket is less diversified. The study also examines sectors that have emerged from the products that the country has established a comparative advantage and how that has contributed to its structural transformation effort. The study further identifies new products of strategic value that Ghana can deploy its acquired productive knowledge to promote for future export diversification efforts and at the same time develop such products for the ECOWAS market.

The study provides evidence to show that Ghana and other similar countries in the sub-Saharan African region are caught in the trap of producing and exporting products that are of low sophistication level (low PCIs) reflecting in low and negative ECIs for their export baskets.

The productive capabilities or the collective know-how embedded in these products are limited.

Thus, the opportunity for Ghana to leverage the productive capabilities acquired over the years to explore new paths for both structural transformation and subsequent diversification of its economy becomes constrained. This put Ghana in a vicious circle or quandary as far as its export diversification effort is concerned. Ghana's export diversification effort seems to be further constrained by the evidence from the first empirical study that the income elasticity of foreign demand for Ghana's export, except cocoa beans is low in the long run. Not only is the income elasticity of these products low, but as suggested by the literature, their global prices are volatility and exhibit circular declining trends, exposing countries that produce them to external vulnerabilities. This is in sharp contrast to countries like Singapore and Malaysia where the average levels of sophistication have been high and impressive reflecting in the successes these countries have chalked in their export diversification bids.

Results from a crosstabulation analysis suggest that both Ghana and Nigeria have established a comparative advantage in sectors that focused on the production and export of vegetables, foodstuffs, and minerals. Due to the low levels of PCIs associated with most of these products, the prospects of scaling up value addition in sectors that have the potential to propel industrialisation and facilitate the diversification of the export base of these economies at the extensive margin are blurred. Coupled with these developments, the sectors that have emerged over the period to reflect their respective acquired productive capabilities equally focus on the production of vegetables, foodstuff, and minerals. Ghana gained some RCA in the chemicals & allied sectors that could be exploited for further gains. The results suggest that unless a paradigm change is implemented the prospects of Ghana achieving any significant diversification of its export base may be a mirage. Nigeria is yet to translate its huge comparative advantage in the production and export of a product like crude oil into strength, notwithstanding its less ubiquitous nature, which is just a matter of geology. Since the PCI of crude oil is low, the strategic prospects can only be realised with judicious utilization of the

income flows from this natural resource to support the discovery of products with relatively better strategic value to explore the value chain spectrum and a more diversified economy. The picture is different for Singapore and Malaysia. These countries established RCA in the machinery/electrical, chemicals and allied as well as the miscellaneous sectors, among others. With the level of sophistication and the complex network structures engendered by the production and export of these products, it is not surprising that these countries are not only able to exploit the value chain spectrum to their advantage but also ensure broad-based diversified economies that foster accelerated growth and inclusivity.

We also employ a procedure developed by Hausmann and Jasmina (2015) that involved combining the concepts of Proximity, Distance and Opportunity gain within the context of product space network analyses to identify products that possessed desirable characteristics (like high PCIs) Ghana can latch on to enhance its structural transformation agenda with prospects for a more diversified export base. About 131 products (later limited to 91 products based on an export value threshold of US\$1,000 and above) are identified to be close to Ghana's current productive knowledge as reflected in its export basket for 2016. These products have PCIs greater than one (suggesting relatively higher levels of sophistication with prospects for increasing the average level of sophistication of Ghana's export basket), minimal distance from the country's current export basket (feasible for exploitation at minimal effort) and relatively higher opportunity gains (prospects for opening new paths for diversification). Another important observation about these products is that not only do they possess the potential to help the country's structural transformation effort through the exploitation of the value addition spectrum in sectors that produce and export chemicals & allied products, plastic/rubber, stone/glass and wood & wood products, but also offer the opportunity to mainstream technology into the industrialisation agenda of the country. The study also identifies some 50 products within the "the frontier products" list, consistent with the import

intensity of countries in the ECOWAS sub-region that can be developed to target the regional market and promote the regional trade agenda.

Although the identified ‘frontier’ products may have the potentials to prop up the industrialisation agenda of the country, one must be guided by the conceptual framework underpinning this analysis that stressed on the uncertainties associated with the process of discovering these new products. It is worth noting that the successful discovery of these products comes with it some positive spillover effects beyond the firm that incurred the initial sunk cost for the venture. Thus, exposing the benefits to potential free riding tendencies. At the same time failure to achieve success from the investment becomes a private cost. The emerging uncertainties associated with such activities can discourage firms from undertaking such risky yet potentially profitable ventures. This is where the lessons from Malaysia and Singapore come in handy, where there was deliberate activist industrial policy by the governments to use domestic resources to partner the private sectors in terms of research and development and the provision of the critical enabling economic, social, political and institutional infrastructure as well as conditions to enhance long-time financing and attract foreign direct investment.

Empirical chapter three revisits the exchange rate volatility and export performance nexus, but this time at the firm-level. Here, the exchange rate volatility is interacted with other potentially deteriorating macroeconomic conditions (deterioration in external demand conditions, deterioration in global financial conditions, distorted incentive regime from Government’s fiscal policy and unfavourable Monetary and financial conditions) to constitute macroeconomic uncertainty. After an exhaustive review of the existing literature on firm-level determinants of export performance in Ghana, there was an apparent paucity of, or probably, absence of empirical studies on the link between macroeconomic uncertainty largely the results of exchange rate volatility and export performance at the firm-level. It is this gap in the empirical literature that the third empirical paper seeks to address. In addition, the study set out

to investigate institutional constraints that could have possibly impinged on the Ghana National Export Strategy Plan, 2013-2017, resulting in the undershoot of a target of US\$ 5 billion for NTE by the end of 2017.

A survey was conducted on NTE firms in Ghana to elicit responses, which were used to construct subjective measures for export performance and the key predictors. Some 87 firms responded to the survey, representing a response rate of 45.8 percent. A similar survey was conducted for some institutions to elicit their views on the possible constraints encountered in the implementation of the Ghana National Export Strategic Plan, 2013-2017. In this case, three out of five institutions contacted unreservedly offered their perspectives on the issue.

From both the descriptive and econometric analysis the study provides empirical evidence to support both the resource base view that firms can leverage on their internal resources to enhance their comparative advantage and competitiveness, as well as the contingency theory that assesses the firms' capabilities to over external headwinds.

Specifically, the results from the study suggest that firms demonstrating moderate to average levels of export commitment and at the same time displaying moderate to average levels of product development capabilities are less likely to report low export performance, but rather stand the better chance to predict average to high levels of export performance. At the same time, average to high levels of export performance are more likely to be predicted by firms that demonstrate a high adoption rate of export promotion programmes. The results also demonstrate that the issue of macroeconomic uncertainty is of great concern to NTE exporters. The study finds that moderate to average and high levels of macroeconomic uncertain conditions are more likely to predict low export performance and less likely to predict average to high levels of export performance. This is corroborated by firms ranking the conditions that constitute elements of macroeconomic uncertainty within the four topmost constraints affecting their businesses. Thus, suggesting that macroeconomic uncertainty with its various

ramifications pose a severe threat and can potentially hurt the export business in Ghana. As such any coordinated set of policies that are aimed at boosting export performance in Ghana must include specific policy measures aimed at addressing the debilitating macroeconomic conditions that can evoke macroeconomic uncertainty.

From a descriptive analysis of the responses from firms and the government agencies, the study suggests that the Ghana National Export Strategy Plan, 2013-2017 suffered largely from both awareness and financial resource deficits, which undermined the attainment of the export value target of US\$5billion set for the end of 2017. To the extent that most of the key stakeholders demonstrated limited awareness of the strategic plan, it is equally possible that not many activities were executed to actualise the objectives of the strategy. Besides the vehicle that is intended to provide funding support for firms, EDAIF seems not to be effective in delivering the volumes of credit required. Meanwhile, the implementing agency, GEPA is equally starved of the requisite funds to executive the priority projects.

On the whole, this thesis has adduced evidence to demonstrate that non-traditional export performance and to some extent, the other components of the traditional export (at varying degrees) at the national level are largely driven by appropriate exchange rate policies consistent with either long term stability or real depreciation of the exchange rate; avoiding anti-export bias tendencies; and improvement in economic activity. Most importantly, at both the macroeconomic level of promoting export growth as well as the firm-level performances that are aggregated to constitute a national export performance, exchange rate volatility interacts with other deteriorating macroeconomic indicators to create macroeconomic uncertainties that undermine export activity. Related to the above is the suggestion from the analyses that Ghana's export diversification effort has been constrained by the products it exports, which by their nature possess low sophistication characteristics, suggesting that the embedded

productive capabilities or collective know-how to be leveraged on to chart new paths for structural transformation and diversification are limited.

## **7.2 Policy Recommendations:**

Although the focus of this thesis is on the predictors of export performance in Ghana, some general policy recommendations and lessons, which are equally applicable to other developing countries, can be drawn to inform governments' industrial policy formulation and implementation aimed at structural transformation with the view to achieving a more diverse export base.

Government policy for the export sector in general, but specifically for the NTE sector stands to gain traction from measures aimed at minimising uncertainties associated with exchange rate volatility. The Central Bank should implement appropriate countercyclical policies consistent with the seasonal flows of foreign exchange rate that underpin external real and financial transactions to achieve some stability in the exchange rate market. This is based on the results both from the macro and micro-level analyses of the effects of exchange rate volatility on export performance. Besides, because of the potentially harmful effects of anti-export bias trade measures as established by this thesis, the government through the Central Bank and the Ministry for Trade and Industry must endeavour to avoid exchange rate policies (such as subsidised exchange rates and other favourable trade incentives) that tend to increase the net effective protection to the importables sector at the expense of supporting capacity in export activities. The thesis has highlighted the importance of improved economic activity (RCIEA) on export performance. The government through the Ministry of Energy must ensure constant supply of electricity, a key component of the RCIEA to drive export activity. Also, the Central Bank should ensure that credit allocation to the export sector is improved through improvement in macroeconomic conditions that lower both the perceived risk and the costs of credit for exporters.

With the seemingly low foreign income elasticity for Ghana's non-traditional goods, there is the need to examine critically the nature of goods it showcases at the global front since these products reflect the capabilities embedded in the economy and the potential to diversify into other products. To address the above issue, the Ministry of Trade and Industry through its industrial policy must partner with the private sector to direct the path of industrialisation. Specifically, the government through the Ministry of Finance and Economic Planning can tinker with the fiscal regime (such as tax waivers and holidays) to encourage firms to deploy more resources to boost export activity and promote R&D. In addition, the government through the Ghana Investment Promotion Centre must pursue policies that encourage foreign direct investments in the real sectors of the economy that have the potential to boost technology and skills transfer, but not just in exploiting the exhaustible natural resources of the country. The educational system must be orientated towards improving the know-how (a paradigm shift that involves a "mental wiring" in skills implementation) of citizens. The government through the Ministry of Trade and Industry must promote sub-regional trade by stepping up efforts at reducing costs of doing business (especially transport and logistics, customs facilitation among others) and deepening the recent paperless trade facilitation measures.

From the results of the key drivers of export performance at the firm-level, future national export strategy plan must foster effective collaboration between the Ministries of Finance, and Trade and Industry to ensure that appropriate fiscal measures are implemented to encourage firms to scale up their level of export commitment and boost their product development capabilities. Besides, measures to remove impediments and increase the adoption rate of export promotion programmes must be encouraged. At the same time challenges to firms for their inability to access relatively cheaper and longer duration funding like the EDAIF must be minimised. The issue of macroeconomic uncertainty must be addressed from different dimensions. The Ministry for Finance and Economic Planning and the Central Bank must

address issues of fiscal excesses coupled with monetary accommodation resulting from increased fiscal deficits that fuels debt dynamics and end up in building uncertainties in the horizon. Indeed, the government must contain its expenditures within its resource envelope by respecting best practices for public financial management and improving efficiency in budget implementation through a fair and transparent procurement process. The government's fiscal policy must not promote rent-seeking but must encourage resource deployment to the productive sectors of the economy.

Due to the issues of financial and awareness deficits identified as the possibly causes for the failure of the Ghana National Export Strategic plan (2013-2017) to achieve the expected target, future national export strategy plan, must ensure broad consultation of all the key stakeholders with clearly laid out plans to monitor key milestone and programmes to sustain awareness creation. The government must also make the necessary commitment in terms of the required budgetary resources allocation to ensure the success of future strategic plans.

### **7.3 Contributions to Knowledge**

In general, this thesis has made some contributions to the extant literature from the various empirical studies undertaken. The key contribution of the first empirical study is that, unlike previous empirical studies, especially the ones on Ghana, which did not disaggregate total export into its parts for analysis, the current thesis derived heterogeneous elasticities for the responses of total export and its component to exchange rate volatility to minimise the fallacy of composition. Besides, this thesis contributes to the empirical literature on the link between exchange rate volatility and export activity in Ghana by generating a new set of quarterly NTE data series from the Bank of Ghana. Previous studies were only limited to annual data on NTEs from GEPA. Furthermore, using an anti-export bias measure, proxied by imports and export weighted effective exchange rates, to establish a link between exchange rate policy and export

performance in Ghana regarding the potential distortions in the incentive structure is another contribution to the empirical literature.

The second empirical study contributes to the empirical literature on export diversification by offering a new perspective about the practical realities and imperatives confronting the diversification effort of primary producers like Ghana. Related to the above is applying the concepts of economic complexity and product space to redefine the narrative around Ghana's export diversification strategy. In this case, export diversification is enhanced through the process of acquiring productivity capabilities in the production and export of sophisticated products with comprehensive network structures capable of optimising the value addition spectrum. In addition, the generation of import intensity indices for the ECOWAS sub-region can guide countries in the sub-region on products that can be exploited to enhance their exports, based on their respective comparative advantages. The third empirical study fills a gap in the literature on the paucity of empirical studies in Ghana investigating the effects of macroeconomic uncertainty on firm-level export performance.

#### **7.4 Limitations on the Empirical Studies**

The limitation of the first empirical paper relates to the use of a single equation technique, the ARDL, that suggests only one co-integration relationship for a group of variables, quite at variance with the Johansen multivariate technique where more than one co-integration relationships could be established, though the nature of the data does not make this technique applicable.

Future research may investigate the possibility of getting further disaggregation of export data at the level of non-traditional export with higher frequency data to examine how some specific products respond to exchange rate volatility and exchange rate policies.

The key limitation of the second empirical paper relates to the analytical technique used, which is largely descriptive, suggesting that the conclusions are suggestive, and one cannot infer causality. In addition, the analyses based on the economic complexity and product space concepts are largely tilted to the supply side of boosting export diversification, however this weakness was partly addressed in this study by the calculation of import intensity ratios for the ECOWAS sub-region to guide future promotion of the identified frontier products. With the emerging significance of the services sector in the economy of Ghana, it will be useful for future research to consider a similar analysis of the export of service, when data becomes available.

On the empirical paper three, since the measures of the response variable and the determinants are subjective, inferences made from the results may largely be suggestive. Finally, since the data used is cross-sectional, the analysis of the results may suffer from dynamic effects. In other words, the opportunity for one to observe these responses from firms overtime to determine consistency is lacking.

## Appendix A

**Table 4.A1 Definition of Variables**

Variable	Definition	Computation
REXP	Real Exports	$REXP = \frac{\text{Nominal Exports}}{\text{Consumer Price Index}}$ Nominal Exports= Value of Exports (US\$)* Exchange Rate (Cedi/US\$) Note: The components of exports (Cocoa Bean, Natural resources and Non-traditional Exports) in their real terms were also generated in the same form
RCIEA	Real Composite Index of Economic Activity	<p>The RCIEA is a composite index used by the Bank of Ghana since 2005 to monitor developments in the real economy due to the long lag in getting signals from this sector from the Ghana Statistical Service for the purpose of policy formulation. The RCIEA is composed of ten indicators, however in this study nine indicators are used to exclude exports. The indicators are credit to the private sector, port activities, tourist arrivals, imports of goods and services, industrial consumption of electricity, SNNIT contributions, Domestic Vat, Cement Sales and Sales of Key Manufacturer. The construction of this composite index follows the Conference Board's approach which consists of six distinct steps.</p> <ol style="list-style-type: none"> <li>1. Month –to-month changes are computed for each indicator; for an indicator X a symmetric percent change is calculated as  <math display="block">X_t = 200 * (X_t - X_{t-1}) / (X_t + X_{t-1})</math></li> <li>2. The monthly contributions of the indicators are adjusted to equalise the volatility of each indicator</li> <li>3. The adjusted monthly contribution is added across the components for each month to obtain the growth rate of the index</li> <li>4. The sum of the adjusted contributions, i.e. growth rates, of the composite index is adjusted to equate the trend of the coincident index.</li> <li>5. The level of the index is computed using the symmetric percent change formula</li> <li>6. The index is rebased to average 100 in the base year</li> </ol>
DUM1	Dummy Variable	The period from quarter one of 2011 to quarter four of 2016 was represented by 1 and zero otherwise, to reflect commencement of oil production in Ghana

Source: Author's construct

Variable	Definition	Computation
REER	Real Effective Exchange Rates	<p>For the computation of the REER, the geometric weighted average method was used:</p> $REER_t = \prod_{i=1}^n w_{it} \frac{E_{it} P_{it}^f}{P_t^d}$ <p>Where <math>REER_t</math> is the real effective exchange rate at time t, <math>E_{it}</math> is the bilateral exchange rate index, <math>P_t^d</math> and <math>P_t^f</math> are domestic and foreign prices respectively, <math>w_{it}</math> denotes the weights attached to each trade partner. The trade weights (<math>w_{it}</math>) of the trading partners should sum to one.</p> $w_{it} = \frac{M_{it} + EX_{it}}{\sum_{i=1}^n M_{it} + \sum_{i=1}^n EX_{it}}$ <p>In generating the trading weights, 18 trading partners representing 94 percent of average total trade for the period 2006-2012 were considered.</p> <p><math>EX_{it}</math> = Exports of home to country i at time t  <math>M_{it}</math> = imports of home from country i at time t  <math>\sum_{i=1}^n M_{it}</math> = Imports of home from the n selected trading partners at time t  <math>\sum_{i=1}^n EX_{it}</math> = Exports of home from the n selected trading partners at time t</p>
TRADBIAS	Measure of Trade bias	$Tradbias_t = \frac{REER_m}{REER_e}$ <p><math>REER_m</math> is import weighted real effective exchange rate. The import weight is equal to</p> $\frac{M_{it}}{\sum_{i=1}^n M_{it}}$ <p>And  <math>REER_e</math> is export weighted real effective exchange rate. The export weight is equal to</p> $\frac{EX_{it}}{\sum_{i=1}^n EX_{it}}$
VOL1	Exchange Rate Volatility	Computed using the moving sample standard deviation of the logarithm difference of REER
VOL2	Exchange Rate Volatility	Computed Using the EGARCH approach and since the series were monthly, the monthly series for the last month of each quarter was taken as the quarterly equivalent
VOL3	Exchange Rate Volatility	Computed Using the EGARCH approach and since the series were monthly, the monthly series for the first month of each quarter was taken as the quarterly equivalent
VOL4	Exchange Rate Volatility	Computed Using the TGARCH approach and since the series were monthly, the monthly series for the last month of each quarter was taken as the quarterly equivalent
VOL5	Exchange Rate Volatility	Computed Using the TGARCH approach and since the series were monthly, the monthly series for the first month of each quarter was taken as the quarterly equivalent

Source: Author's construct

**Table 4.A2 Descriptive Statistics**

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis
LRNTE	0.4790	0.4060	1.6950	-0.9786	0.6752	0.0890	1.9640
LREXP	1.9323	1.6765	2.9964	1.0863	0.6476	0.3915	1.5541
LRNATURES	1.1596	0.8730	2.5209	0.1769	0.8453	0.4183	1.4894
LRCOCOBEA	0.2842	0.3313	1.6458	-1.3173	0.6494	-0.2212	2.9451
LIPIEX_A	4.6258	4.6276	4.7251	4.5038	0.0442	-0.3880	3.5311
LIPIEX_C	4.6144	4.6110	4.7168	4.5177	0.0490	0.1512	2.4924
LRCIEA	5.3239	5.3985	6.0359	4.5085	0.5120	-0.0908	1.5664
LREER	4.4700	4.4838	4.6669	4.1189	0.1256	-0.6669	2.9912
LTRADBIAS	-0.0564	-0.0521	0.0335	-0.2074	0.0490	-0.6680	3.3075
VOL1	0.0110	0.0082	0.0909	0.0007	0.0118	4.9051	32.7239
VOL2	11.8404	8.5243	115.8594	3.7573	14.2201	5.9528	43.5348
VOL3	13.0324	8.6717	90.8860	3.8406	13.3140	3.6273	19.6327
VOL4	13.1034	7.2700	243.0900	5.3500	28.8967	7.5837	60.7933
VOL5	14.2360	7.2250	134.3700	5.2900	19.4255	4.3726	24.9485

Source: Author generated

**Table 4.A3: ARDL BOUNDS TEST FOR NON-LINEAR MODELS**

Null Hypothesis: No long-run Relationship									
	RNTE		RCOCOB EA		RNATURES		REXP		
F-Statistic	8.76		2.74		21.36		6.89		
	Critical Value		Critical Value		Critical Value		Critical Value		
	Bounds		Bounds		Bounds		Bounds		
10%	2.12	3.23	1.75	2.87	1.75	2.87	1.75	2.87	
5%	2.45	3.61	2.04	3.24	2.04	3.24	2.04	3.24	
2.5%	2.75	3.99	2.32	3.59	2.32	3.59	2.32	3.59	
1%	3.15	4.43	2.66	4.05	2.66	4.05	2.66	4.05	

Source: Author generated

**Table 4.A4: Diagnostic Test for the Various Models (Non-Linear)**

	RNTE		RCOCOBEA		RNATURES		REXP	
	Values	P-Values	Values	P-Values	Values	P-Values	Values	P-Values
Ramsey RESET	0.6528	0.5166	1.1387	0.2908	0.5717	0.4542	0.2407	0-6263
$\chi^2$ N	0.6802	0.7117	1.4871	0.4754	1.4771	0.4770	1.5712	0.4558
$\chi^2$ SC	0.5483	0.7602	0.0705	0.9653	0.5223	0.7700	2.4390	0.2954
$\chi^2$ AR	0.7300	0.3929	0.3043	0.5812	0.2824	0.5952	0.0505	0.8221
$\chi^2$ W	55.8360	0-4057	58.9804	0.3322				
$\chi^2$ H	9.5658	0.3868	16.7611	0.0800	22.8100	0.4716	0.0505	0.8221
R-Squared	0.90		0.75		0.96		0.96	

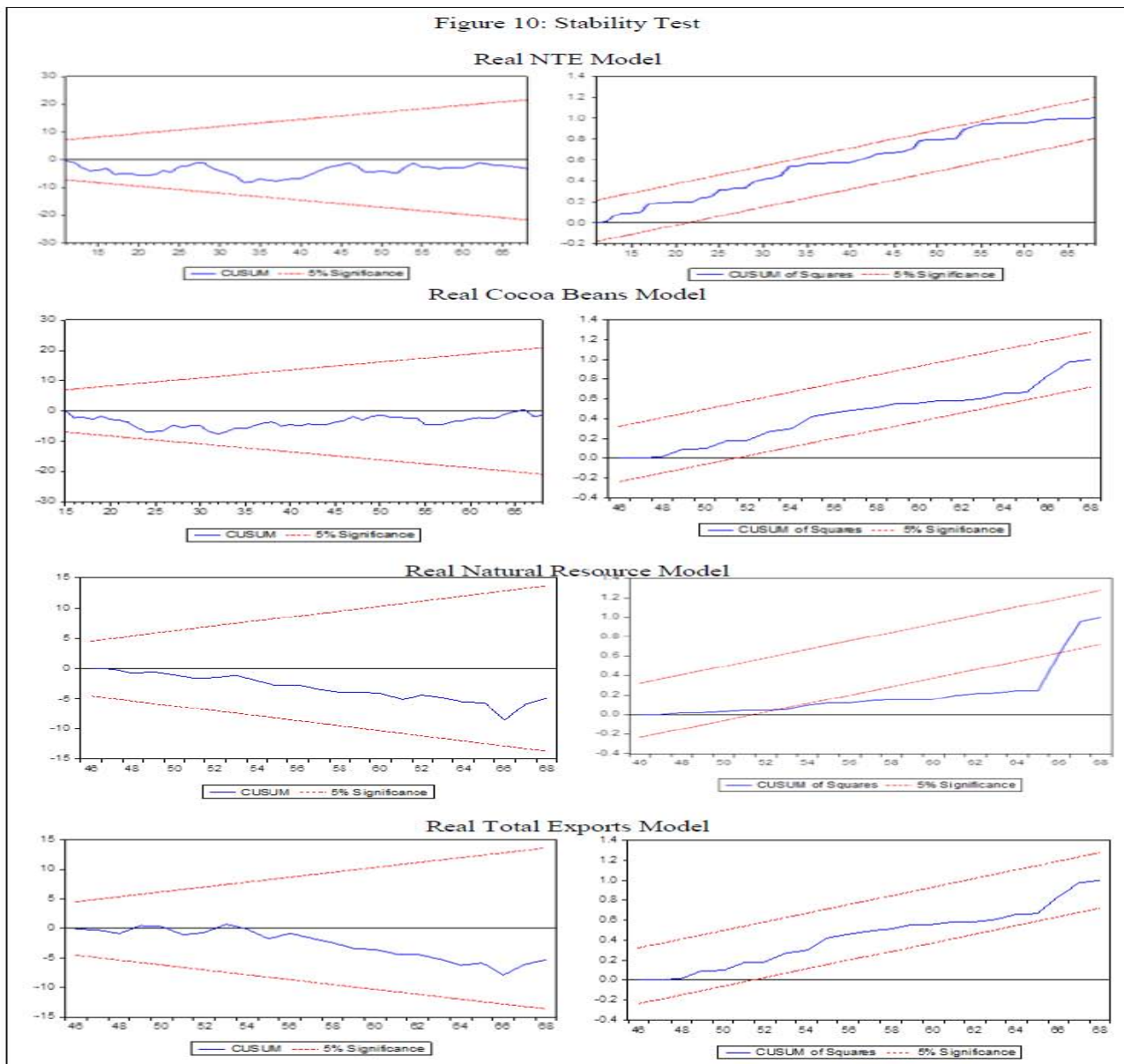
Source: Author generated

**Table 4.A5: Results on Wald's Test for Short run and Long run Asymmetric Analysis**

	Short Run		Long Run	
	$\chi^2$	P. Value	$\chi^2$	P. Value
Total Exports	5.12	0.02**	0.614	0.43
NTE	1.69	0.19	0.008	0.93
Cocoa Beans Export	0.41	0.52	0.356	0.55
Natural Resources	2.64	0.10	1.553	0.21

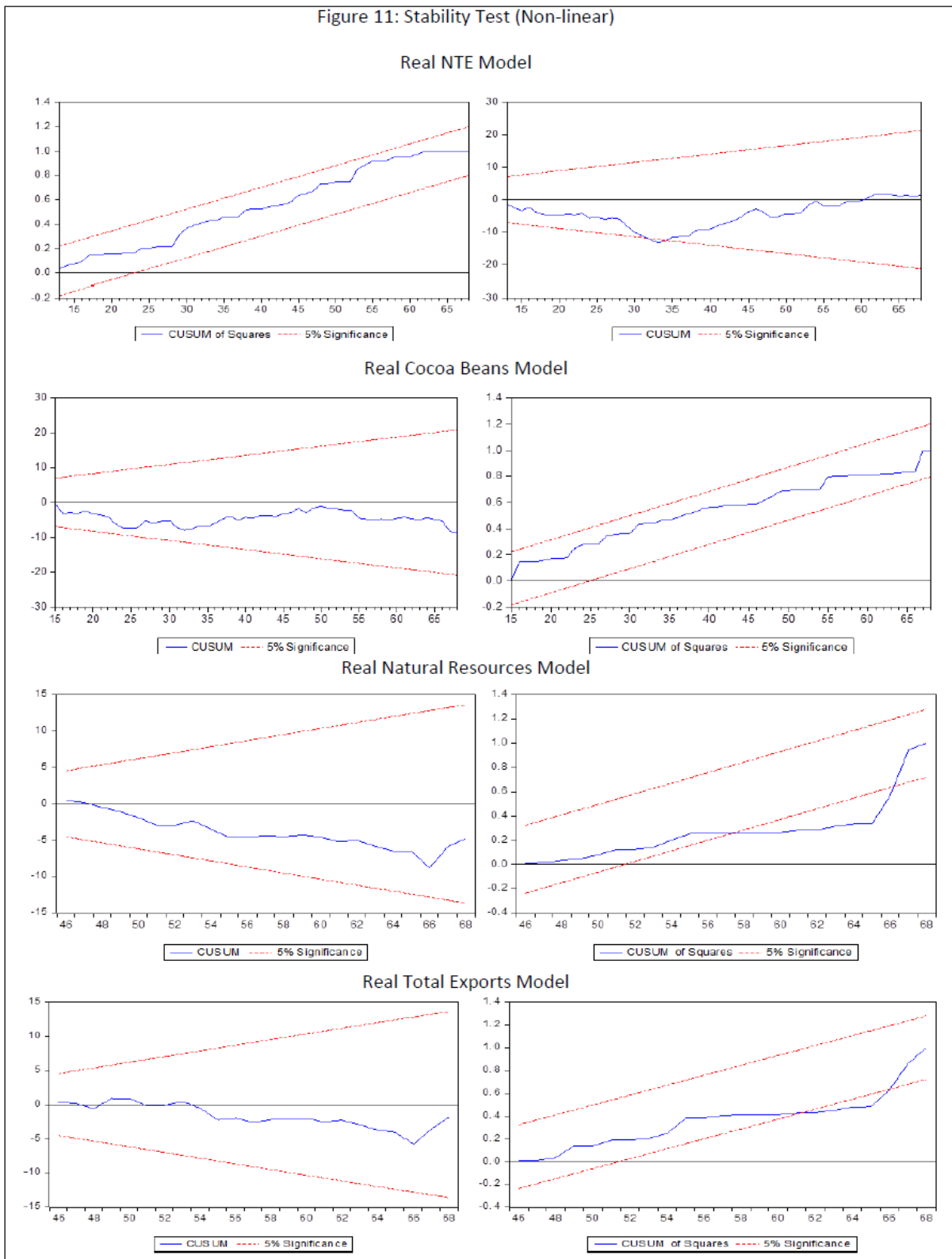
\*\*5% level of Significance

**Figure 4.A1 Stability Test for linear ARDL Model**



Source: Author generated

**Figure 4.A2 Stability Test for Non-linear ARDL Model**



Source: Author generated

## Appendix B

Tables 5B.1 Ghana: Ease of Doing Business Report, 2018

<b>GHANA</b>		<b>Sub-Saharan Africa</b>		<b>GNI per capita (US\$)</b>	
<b>Ease of doing business rank (1–190)</b>	<b>120</b>	<b>Overall distance to frontier (DTF) score (0–100)</b>	<b>57.24</b>	<b>Population</b>	<b>28,206,728</b>
<b>Starting a business (rank)</b>	<b>110</b>	<b>Getting credit (rank)</b>	<b>55</b>	<b>Trading across borders (rank)</b>	<b>158</b>
DTF score for starting a business (0–100)	84.02	DTF score for getting credit (0–100)	65.00	DTF score for trading across borders (0–100)	52.32
Procedures (number)	8	Strength of legal rights index (0–12)	7	<i>Time to export</i>	
Time (days)	14	Depth of credit information index (0–8)	6	Documentary compliance (hours)	89
Cost (% of income per capita)	17.5	Credit bureau coverage (% of adults)	16.5	Border compliance (hours)	108
Minimum capital (% of income per capita)	1.7	Credit registry coverage (% of adults)	0.0	<i>Cost to export</i>	
				Documentary compliance (US\$)	155
<b>Dealing with construction permits (rank)</b>	<b>131</b>	<b>Protecting minority investors (rank)</b>	<b>96</b>	Border compliance (US\$)	490
DTF score for dealing with construction permits (0–100)	61.90	DTF score for protecting minority investors (0–100)	51.67	<i>Time to import</i>	
Procedures (number)	16	Extent of disclosure index (0–10)	7	Documentary compliance (hours)	76
Time (days)	170	Extent of director liability index (0–10)	5	Border compliance (hours)	89
Cost (% of warehouse value)	5.4	Ease of shareholder suits index (0–10)	7	<i>Cost to import</i>	
Building quality control index (0–15)	9.0	Extent of shareholder rights index (0–10)	6	Documentary compliance (US\$)	474
		Extent of ownership and control index (0–10)	3	Border compliance (US\$)	553
		Extent of corporate transparency index (0–10)	3		
<b>Getting electricity (rank)</b>	<b>136</b>	<b>Paying taxes (rank)</b>	<b>116</b>	<b>Enforcing contracts (rank)</b>	<b>116</b>
DTF score for getting electricity (0–100)	56.81	DTF score for paying taxes (0–100)	66.47	DTF score for enforcing contracts (0–100)	54.00
Procedures (number)	5	Payments (number per year)	31	Time (days)	710
Time (days)	78	Time (hours per year)	224	Cost (% of claim)	23.0
Cost (% of income per capita)	1,080.5	Total tax and contribution rate (% of profit)	33.2	Quality of judicial processes index (0–18)	6.5
Reliability of supply and transparency of tariffs index (0–8)	0	Postfiling index (0–100)	49.54		
<b>Registering property (rank)</b>	<b>119</b>			<b>Resolving insolvency (rank)</b>	<b>158</b>
DTF score for registering property (0–100)	55.50			DTF score for resolving insolvency (0–100)	24.77
Procedures (number)	6			Time (years)	1.9
Time (days)	47			Cost (% of estate)	22.0
Cost (% of property value)	6.2			Recovery rate (cents on the dollar)	22.8
Quality of land administration index (0–30)	8.0			Strength of insolvency framework index (0–16)	4.0

Source: World Bank Doing Business 2018 Report

Tables 5B.2 Nigeria: Ease of Doing Business Report, 2018

<b>NIGERIA</b>		<b>Sub-Saharan Africa</b>		<b>GNI per capita (US\$)</b>	
<b>Ease of doing business rank (1–190)</b>	<b>145</b>	<b>Overall distance to frontier (DTF) score (0–100)</b>	<b>52.03</b>	<b>Population</b>	<b>185,989,640</b>
<b>Starting a business (rank)</b>	<b>130</b>	<b>Getting credit (rank)</b>	<b>6</b>	<b>Trading across borders (rank)</b>	<b>183</b>
DTF score for starting a business (0–100)	80.80	DTF score for getting credit (0–100)	90.00	DTF score for trading across borders (0–100)	19.93
Procedures (number)	8.5	Strength of legal rights index (0–12)	10	<i>Time to export</i>	
Time (days)	18.9	Depth of credit information index (0–8)	8	Documentary compliance (hours)	131.4
Cost (% of income per capita)	28.8	Credit bureau coverage (% of adults)	7.8	Border compliance (hours)	135.4
Minimum capital (% of income per capita)	0.0	Credit registry coverage (% of adults)	0.1	<i>Cost to export</i>	
				Documentary compliance (US\$)	250
<b>Dealing with construction permits (rank)</b>	<b>147</b>	<b>Protecting minority investors (rank)</b>	<b>33</b>	Border compliance (US\$)	785.7
DTF score for dealing with construction permits (0–100)	58.81	DTF score for protecting minority investors (0–100)	66.67	<i>Time to import</i>	
Procedures (number)	15.1	Extent of disclosure index (0–10)	7	Documentary compliance (hours)	172.7
Time (days)	110.3	Extent of director liability index (0–10)	7	Border compliance (hours)	283.7
Cost (% of warehouse value)	18.5	Ease of shareholder suits index (0–10)	7	<i>Cost to import</i>	
Building quality control index (0–15)	11.8	Extent of shareholder rights index (0–10)	5	Documentary compliance (US\$)	564.3
		Extent of ownership and control index (0–10)	5	Border compliance (US\$)	1,076.8
		Extent of corporate transparency index (0–10)	9		
<b>Getting electricity (rank)</b>	<b>172</b>	<b>Paying taxes (rank)</b>	<b>171</b>	<b>Enforcing contracts (rank)</b>	<b>96</b>
DTF score for getting electricity (0–100)	34.68	DTF score for paying taxes (0–100)	48.44	DTF score for enforcing contracts (0–100)	56.32
Procedures (number)	9.8	Payments (number per year)	59	Time (days)	454
Time (days)	149.4	Time (hours per year)	360.4	Cost (% of claim)	42.3
Cost (% of income per capita)	334.8	Total tax and contribution rate (% of profit)	34.8	Quality of judicial processes index (0–18)	7.9
Reliability of supply and transparency of tariffs index (0–8)	0	Postfiling index (0–100)	47.48		
<b>Registering property (rank)</b>	<b>179</b>			<b>Resolving insolvency (rank)</b>	<b>145</b>
DTF score for registering property (0–100)	34.08			DTF score for resolving insolvency (0–100)	30.60
Procedures (number)	11.3			Time (years)	2.0
Time (days)	68.9			Cost (% of estate)	22.0
Cost (% of property value)	10.5			Recovery rate (cents on the dollar)	27.8
Quality of land administration index (0–30)	7.4			Strength of insolvency framework index (0–16)	5.0

Source: World Bank Doing Business 2018 Report

**Tables 5B.3 Singapore: Ease of Doing Business Report, 2018**

<b>SINGAPORE</b>		<b>East Asia &amp; Pacific</b>		<b>GNI per capita (US\$)</b>	
Ease of doing business rank (1–190)	2	Overall distance to frontier (DTF) score (0–100)	84.57	Population	5,607,283
<b>Starting a business</b> (rank)	6	<b>Getting credit</b> (rank)	29	<b>Trading across borders</b> (rank)	42
DTF score for starting a business (0–100)	96.49	DTF score for getting credit (0–100)	75.00	DTF score for trading across borders (0–100)	89.57
Procedures (number)	3	Strength of legal rights index (0–12)	8	Time to export	
Time (days)	2.5	Depth of credit information index (0–8)	7	Documentary compliance (hours)	2
Cost (% of income per capita)	0.5	Credit bureau coverage (% of adults)	67.8	Border compliance (hours)	10
Minimum capital (% of income per capita)	0.0	Credit registry coverage (% of adults)	0.0	Cost to export	
				Documentary compliance (US\$)	37
<b>Dealing with construction permits</b> (rank)	16	<b>Protecting minority investors</b> (rank)	4	Border compliance (US\$)	335
DTF score for dealing with construction permits (0–100)	80.26	DTF score for protecting minority investors (0–100)	80.00	Time to import	
Procedures (number)	10	Extent of disclosure index (0–10)	10	Documentary compliance (hours)	3
Time (days)	54	Extent of director liability index (0–10)	9	Border compliance (hours)	33
Cost (% of warehouse value)	6.2	Ease of shareholder suits index (0–10)	9	Cost to import	
Building quality control index (0–15)	12.0	Extent of shareholder rights index (0–10)	7	Documentary compliance (US\$)	40
		Extent of ownership and control index (0–10)	5	Border compliance (US\$)	220
		Extent of corporate transparency index (0–10)	8	<b>Enforcing contracts</b> (rank)	2
<b>Getting electricity</b> (rank)	12	<b>Paying taxes</b> (rank)	7	DTF score for enforcing contracts (0–100)	83.61
DTF score for getting electricity (0–100)	91.33	DTF score for paying taxes (0–100)	91.58	Time (days)	164
Procedures (number)	4	Payments (number per year)	5	Cost (% of claim)	25.8
Time (days)	30	Time (hours per year)	64	Quality of judicial processes index (0–18)	15.0
Cost (% of income per capita)	25.3	Total tax and contribution rate (% of profit)	20.3		
Reliability of supply and transparency of tariffs index (0–8)	7	Postfiling index (0–100)	71.97	<b>Resolving insolvency</b> (rank)	27
<b>Registering property</b> (rank)	19			DTF score for resolving insolvency (0–100)	74.31
DTF score for registering property (0–100)	83.57			Time (years)	0.8
Procedures (number)	6			Cost (% of estate)	4.0
Time (days)	4.5			Recovery rate (cents on the dollar)	88.7
Cost (% of property value)	2.9			Strength of insolvency framework index (0–16)	8.5
Quality of land administration index (0–30)	29.0				

Source: World Bank Doing Business 2018 Report

**Tables 5B.4 Malaysia: Ease of Doing Business Report, 2018**

<b>MALAYSIA</b>		<b>East Asia &amp; Pacific</b>		<b>GNI per capita (US\$)</b>	
Ease of doing business rank (1–190)	24	Overall distance to frontier (DTF) score (0–100)	78.43	Population	31,187,265
<b>Starting a business</b> (rank)	111	<b>Getting credit</b> (rank)	20	<b>Trading across borders</b> (rank)	61
DTF score for starting a business (0–100)	83.78	DTF score for getting credit (0–100)	80.00	DTF score for trading across borders (0–100)	82.75
Procedures (number)	8.5	Strength of legal rights index (0–12)	8	Time to export	
Time (days)	18.5	Depth of credit information index (0–8)	8	Documentary compliance (hours)	10
Cost (% of income per capita)	5.4	Credit bureau coverage (% of adults)	82.6	Border compliance (hours)	45
Minimum capital (% of income per capita)	0.0	Credit registry coverage (% of adults)	63.6	Cost to export	
				Documentary compliance (US\$)	45
<b>Dealing with construction permits</b> (rank)	11	<b>Protecting minority investors</b> (rank)	4	Border compliance (US\$)	321
DTF score for dealing with construction permits (0–100)	82.19	DTF score for protecting minority investors (0–100)	80.00	Time to import	
Procedures (number)	14	Extent of disclosure index (0–10)	10	Documentary compliance (hours)	10
Time (days)	78	Extent of director liability index (0–10)	9	Border compliance (hours)	69
Cost (% of warehouse value)	1.4	Ease of shareholder suits index (0–10)	7	Cost to import	
Building quality control index (0–15)	13.0	Extent of shareholder rights index (0–10)	8	Documentary compliance (US\$)	60
		Extent of ownership and control index (0–10)	6	Border compliance (US\$)	321
		Extent of corporate transparency index (0–10)	8	<b>Enforcing contracts</b> (rank)	44
<b>Getting electricity</b> (rank)	8	<b>Paying taxes</b> (rank)	73	DTF score for enforcing contracts (0–100)	66.61
DTF score for getting electricity (0–100)	94.33	DTF score for paying taxes (0–100)	76.07	Time (days)	425
Procedures (number)	4	Payments (number per year)	8	Cost (% of claim)	37.3
Time (days)	31	Time (hours per year)	188	Quality of judicial processes index (0–18)	12.0
Cost (% of income per capita)	28.0	Total tax and contribution rate (% of profit)	39.2		
Reliability of supply and transparency of tariffs index (0–8)	8	Postfiling index (0–100)	52.65	<b>Resolving insolvency</b> (rank)	46
<b>Registering property</b> (rank)	42			DTF score for resolving insolvency (0–100)	62.51
DTF score for registering property (0–100)	76.06			Time (years)	1.0
Procedures (number)	8			Cost (% of estate)	10.0
Time (days)	13			Recovery rate (cents on the dollar)	81.3
Cost (% of property value)	3.5			Strength of insolvency framework index (0–16)	6.0
Quality of land administration index (0–30)	27.5				

Source: World Bank Doing Business 2018 Report

## Appendix C

### AC1: Firm Level Questionnaire

August, 2019

Dear Sir/Madam

My name is Emmanuel Owusu-Afriyie. I am currently pursuing a PhD in Development at the University of Ghana, Legon. I am by this letter requesting your assistance in gathering information by completing the following questions in the survey attached. The data will be used in a research that seeks to investigate the determinants of export performance of NTEs with particular emphasis on the role of exchange rate uncertainty.

I have no doubt that your experience and opinions are important in finding ways of improving our understanding of how exchange rate uncertainty and other key factors influence export performance at the firm level (NTEs) in Ghana. To this end, your firm has been selected to participate in this survey. I would be grateful if you could take some few minutes of your time to complete the attached questionnaire. This questionnaire is intended to be answered by a manager or Chief Executive Officer in your firm who is actively involved in decision making in regard to exporting and international business.

It is expected that your response to this questionnaire is treated as voluntary and as such all information collected will be accorded the highest confidentiality and solely used for this study. You are assured that aggregate report rather than individual firm reports will be analyzed and reported.

Since we value the time of business executives like you, we have endeavored to simplify the questions to ensure that they are answered easily and quite promptly.

We would be delighted to send you a copy of the summary of the findings if you send a request to me or my supervisors. You stand to get the general sentiments about the issues raised from colleague exporters.

For further information or clarification please feel free to contact me on this number +233 208163780.

Your participation in this survey will greatly contribute to the successful completion of this research. Thank you very much for your assistance and time in this regard to improve export practices and firm growth in Sub-Saharan Africa.

Yours sincerely,

Researcher: Emmanuel Owusu-Afriyie (eowusuafriyie69@gmail.com)

Supervisor: Dr. Ebo Turkson, Department of Economics, University of Ghana

Supervisor: Dr Bernadine Senadza, Department of Economics, University of Ghana

Supervisor: Prof. Alexander Darku, Department of Economics ,Lethbridge University, Canada

Thank you for participating in this survey. The survey includes questions on export practices in the home and foreign environment of your firm to gain understanding about the key drivers of performance. Please note your answers are confidential and cannot be linked back to you or your firm. There are no right or wrong answers, therefore please answer each question as completely and accurately as you can. Please indicate your response by choosing the appropriate answer that shows the likelihood that you agree or disagree with the following statements below: Please tick or circle.

**A. General Information**

1. Please indicate below the number of years your company has been in the export business?

2. Please indicate the number of persons employed in your firm? (Please tick ONLY ONE box)

Permanent Staff:  1-5       6-29       30-99       Over 100

Casual Staff:     None       1-5       6-29       30-99       Over 100

3. (a) Under which of the following sectors will you classify your activity? (Please tick ONLY ONE box)

- Agriculture               Manufacturing: Process/semi process
- Handicraft               Other, please specify.....

3 .(b) Please can you list the **Three main** export products you undertake?

.....

.....

.....

.....

.....

4. Please indicate the ownership structure of your firm? (Please tick ONLY ONE box)

Wholly Ghanaian owned       Wholly Foreign owned       Joint Venture (Foreign and Ghanaian)

Foreign subsidiary               other.....

5. Kindly indicate your position in the company (Please tick ONLY ONE box)

Owner/ Manager               Export Manager               Chief Executive Officer

Marketing Manager               Operations Manager       Other please specify.....

6. Please can you indicate the highest level of education you have attained? (Please tick ONLY ONE box)

No Education                       Basic Education (JHS/MSLC)    Secondary education (SHS, O & A levels)

Vocational training               Diploma /University degree    Professional Certificate

7. Is your firm registered with the Ghana Export Promotion Authority?

Yes    No

8. Is your firm aware of the incentive packages available to exporters under the Ghana Export Promotion regime?

Yes    No

9. Is your firm aware of the Ghana National Export Strategy document launched in 2012?

Yes    No

10. If yes, can you recall some of the expectations or benefits that accrued to exporters under the Ghana National Export Strategy document?

.....  
.....  
.....  
.....  
.....

11. Was your firm able to take advantage of the support packages made available under the Ghana National Export Strategy document?

Yes    No

12. If No, can you assign the reason(s) why?

.....  
.....  
.....  
.....  
.....

13. Has your firm benefited from the Export Development and Agricultural Investment Fund (EDAIF)?

Yes    No

14. If No, can you assign the reason(s) why?

.....  
 .....  
 .....  
 .....

15. Can you please indicated the last time you exported?

16. Please select the region(s) in which you export. Among the selected region(s), please indicate number 1 for the most important region.

Rank	Country	Region
		ECOWAS
		North Africa
		South Africa
		East Africa
		Central Africa
		Europe
		Asia
		Middle East
		America
		Australia
		Other

**B. Firm Competence**

**a. Managerial International Experience**

Select the appropriate response that best reflects the involvement of management of your firm in the export business as in the statements below.

(1 = none 2 = only slightly substantial, 3= somewhat substantial, 4 =definitely substantial, 5 = extremely substantial).

1. The level of professional exporting experience
 

1	2	3	4	5
---	---	---	---	---
  
2. Extent of work experience - live or work abroad
 

1	2	3	4	5
---	---	---	---	---

- |   |   |   |   |   |   |
|---|---|---|---|---|---|
| 3. Degree of training in international business e.g. attended formal export courses | 1 | 2 | 3 | 4 | 5 |
| 4. Ability to follow up on trade leads in the main importing market                 | 1 | 2 | 3 | 4 | 5 |
| 5. Ability to operate many foreign markets  | 1 | 2 | 3 | 4 | 5 |
- 

**b. Export Commitment**

To what extent would you agree or disagree with the following statements? Please circle the applicably response as indicated in the bracket below

(1 = strongly disagree 2 = disagree, 3= neutral, 4 = agree, 5 = strongly agree)

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 6. The firm has established an appropriate organizational structure to deal with all export activities | 1 | 2 | 3 | 4 | 5 |
| 7. The firm's executives undertake frequent travels to export markets                                  | 1 | 2 | 3 | 4 | 5 |
| 8. Adequate funds are set aside to develop overseas markets  | 1 | 2 | 3 | 4 | 5 |
| 9. Learning about export procedure and documentation is a high priority in this firm                   | 1 | 2 | 3 | 4 | 5 |
| 10. Exporting is a high priority activity in the firm  | 1 | 2 | 3 | 4 | 5 |
- 

**C. Product Development Capabilities**

To what extent would you agree or disagree with the following statements? Please circle the applicably response as indicated in the bracket below

(1 = strongly disagree 2 = disagree, 3= neutral, 4 = agree, 5 = strongly agree)

- |  |   |   |   |   |   |
|--|---|---|---|---|---|
| 11. The firm is capable of developing new products for our customers | 1 | 2 | 3 | 4 | 5 |
|--|---|---|---|---|---|

12. The firm is capable of researching into new products

1      2      3      4      5

13. The firm can speedily develop and launch new products for export

1      2      3      4      5

14. The firm is capable of improving/modifying of existing products

1      2      3      4      5

15. The firm often make adoption of new methods/ideas in production

1      2      3      4      5

---

### C. Macroeconomic Uncertainty

To what extent would you agree or disagree with the following statements? Please circle the applicable response as indicated in the bracket below

(1 = strongly disagree 2 = disagree, 3= neutral, 4 = agree, 5 = strongly agree)

1. Deterioration in external demand conditions have negative impact on your activities

1      2      3      4      5

2. Deterioration in global financial conditions have negative impact on your activities

1      2      3      4      5

3. Exchange rate volatility has adverse impact on your activities

1      2      3      4      5

4. The incentive regime in Government's fiscal policy does not enhance your activities

1      2      3      4      5

5. Monetary and financial conditions are not favourably to your activities

1      2      3      4      5

---

### D. Locational Factors

1. Is this firm located in an industrial zone or cluster?

Yes       No

2. Is this firm located in the city center?

Yes       No

3. To what extent would you agree or disagree with the following statements? Please circle the applicably response as indicated in the bracket below

(1 = strongly disagree 2 = disagree, 3= neutral, 4 = agree, 5 = strongly agree)

a. Access to source of raw material supply has positive impact on export performance.

1 2 3 4 5

b. Access to export-related services and infrastructure is likely to improve export performance.

1 2 3 4 5

c. Access to managerial labour skills and network opportunities is likely to have positive impact on export performance

1 2 3 4 5

d. Being in a geographically concentrated area is likely to have a positive impact on export performance.

1 2 3 4 5

**E. Business Environment**

**1. EXPORT PROMOTION PROGRAMMES**

To what extent does your firm adopt the following export promotion programmes from government agencies?

(1 = Not adopted, 2= somewhat adopted, 3 = Neutral, 4 = very much adopted, 5=fully adopted.)

i) Organization of export seminars/conferences

1 2 3 4  
5

ii) Training activities specializing in exporting

1 2 3 4 5

iii) Training on export documentation

1 2 3 4 5

iv) Provision of counselling advice on export business

1 2 3 4 5

v) General knowledge about doing business in a specific country

1 2 3 4 5

- vi) Linking to easy sources of financing export business
- 1      2      3      4      5

2. Please rank in order of importance in your opinion the major constraints hindering export business in Ghana, where 1 is the **most important** to 9 being the **least important**

Rank	Factors
	Limited access to finance or loan
	Limited access to Land
	Problems with electricity supply
	Problems with the water supply
	Limited access to technology
	Inadequately educated workforce
	Government's Fiscal Policy
	Exchange Rate volatility
	Monetary Conditions

3. Please select as applicable the number of **problem(s)** your firm encounters in the export trade system. **(Select all that apply)**

Select	Factors
	Complicated customs clearance procedures
	Time consuming customs procedures
	Lack of thorough publicizing of trade rules and regulations
	Method for the assessment of customs duties is unclear
	Criteria for determining classification of customs duties are obscure
	Unclear inspection system
	High non-tariff barriers
	Strict quarantine system
	Others, Specify.....

**F. Export Performance of Firms**

1. To the best of your knowledge, how would you rate your firm's export performance based on the following objectives?

(1=low, 2=slightly low, 3=average, 4 =high, 5= very high)

1. Export sales volume
- 1      2      3      4      5

2. Export market share
- 1      2      3      4      5

3. Export profitability	1	2	3	4	5
4. Return on investment	1	2	3	4	5
5. Export sales intensity	1	2	3	4	5

---

2(a). In your own establishment, what were the actual performance of 2018 in the following areas compared to your earlier expectations for the same year?

	Greatly Exceeded Expectations	Somewhat Exceeded Expectations	Close to my Expectations	Somewhat Less than Expectations	Much Less than my Expectations
a. Export Sales Volumes					
b. Export Profitability					
c. Export Market Share					
d. Export Sales intensity					
E. Employment					

2(b). What were your expectations for the year 2018 as in question (2a) above?

	A Much Higher Level	A Somewhat Higher Level	About the Same Level	A Somewhat Lower Level	A Much Lower Level
a. Export Sales Volumes					

b. Export Profitability					
c. Export Market Share					
d. Export Sales intensity					
E. Employment					

Many thanks for your cooperation. If you would like to receive a copy of the executive summary, please fill in your details below and submit it together with the completed questionnaire.

E-mail address.....

Telephone number.....

## **AC2: Institutional Level Interview**

August 2019

Dear Sir/Madam

My name is Emmanuel Owusu-Afriyie. I am currently pursuing a PhD in Development at the University of Ghana, Legon. I am by this letter requesting your assistance in gathering information by completing the following questions in the survey attached. The information will be used in a research that seeks to investigate the determinants of export performance of NTEs with particular emphasis on the role of exchange rate uncertainty. This interview will also seek to undertake a review of the Ghana National Export Strategic Plan (2013-2017) as to whether it had any significant impact on NTEs performance and whether the expected role of the relevant state institutions were effectively discharged.

I have no doubt that your experience and opinions are important in finding ways of improving our understanding of how exchange rate uncertainty and other key factors influence export performance at the firm level (NTEs) in Ghana.

To this end, your organization has been selected to participate in this survey. I would be grateful if you could take some few minutes of your time to complete the attached questionnaire.

It is expected that your response to this questionnaire is treated as voluntary and as such all information collected will be accorded the highest confidentiality and solely used for this study.

We would be delighted to send you a copy of the summary of the findings if you send a request to me or my supervisors.

For further information or clarification please feel free to contact me on this number +233 208163780.

Your participation in this survey will greatly contribute to the successful completion of this research. Thank you very much for your assistance and time in this regard to improve export practices and firm growth in Sub-Saharan Africa.

Yours sincerely,

Researcher: Emmanuel Owusu-Afriyie (eowusuafriyie69@gmail.com)

Supervisor: Dr. Ebo Turkson, Department of Economics, University of Ghana

Supervisor: Dr Bernadine Senadza, Department of Economics, University of Ghana

Supervisor: Prof. Alexander Darku, Department of Economics, Lethbridge University, Canada

Interview Questions

2. What is the name of your organization?
  
3. What were the specific roles expected of your organization under the Ghana National Export Strategic Plan (2013-2017)
  
4. How will you rate the performance of your organization as far as the Ghana National Export Strategic Plan (2013-2017) is concerned?
  
5. What were the key enablers?
  
6. What were your key constraints?

Many thanks for your cooperation. If you would like to receive a copy of the executive summary, please fill in your details below and submit it together with the completed questionnaire.

E-mail address.....

Telephone number.....

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