UNIVERSITY OF KWAZULU-NATAL

A COMPARATIVE STUDY ON THE USE OF COUNTRY'S IMPORT CIF/FOB RATIOS TO MEASURE INTERNATIONAL TRANSPORT COSTS.

By

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DECLARATION

I Anieto Anthony Francis Tochukwu declare that this master dissertation titled: a comparative study on the use of country's import cif/fob ratios to measure international transport costs.

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Signed

Anieto Anthony F.T.

DEDICATION

(i) To Almighty God, for His infinite blessings and Our Blessed mother Mary,

(ii) To my brothers Mr. Frank Anieto and Family and Mr. Levi Anieto

(iii) To my parents Mrs. Josephine and Late Mr. Bartholomew Anieto

(iv) To my siblings

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ABSTRACT

This study examines the use of a country's import cif/fob ratios (import *ad valorem* shipping costs) as a measure for international transport costs. The study seeks to source, compile, calculate and compare the country cif/fob ratios for South Africa, the United States of America, Germany, Venezuela, and Australia from the year 1980 to 2012. The study seeks to establish whether there is a relationship between a country's import cif/fob ratio and a country's composition of imports, as measured by the standard international trade classification (SITC) data. Empirical evidence is provided that the cif/fob ratios, are frequently misused, incorrectly recorded and miscalculated. They are therefore not reliable and they misrepresent the actual direct shipping and international transport costs of countries. The import cif/fob ratios of each country studied were correlated with each country's composition of imports. The results for the United States of America, Germany and Australia show that when a country's trade data are correct and reliable, a country's imports composition of trade has a substantial and statistically significant effect on the level and variation of that country's imports cif/fob ratios. Hence, the ratio cannot be relied on or be used as a measure of a country's direct shipping costs (*ad valorem* shipping costs) without the context of the country's imports composition. Furthermore, the results for South Africa and Venezuela show that import cif/fob ratios are inaccurate and unreliable indicators of shipping costs and should not be used as a direct measure of international transport costs.

TABLE OF CONTENTS

DECLARATION ii
DEDICATION iii
ACKNOWLEDGEMENTS iv
ABSTRACT v
TABLE OF CONTENTS vi
LISTS OF TABLES ix
LISTS OF FIGURES x
CHAPTER 1 1
INTRODUCTION AND BACKGROUND 1
1.1. INTRODUCTION 1
1.2. BACKGROUND AND CONTEXT 3
1.3. PROBLEM 6
1.4. RESEARCH AIMS AND OBJECTIVES 6
1.5. RESEARCH METHODOLOGY 7
1.6. OVERVIEW OF THE RESEARCH 8
CHAPTER 2 9
LITERATURE REVIEW 9
2.1. INTRODUCTION 10
2.2. THEORETICAL CONTEXT 10
2.3. INTERNATIONAL TRADE 12
2.3.1. INTERNATIONAL TRADE AND ITS ROLE IN THE ECONOMY 14
2.4. INTERNATIONAL TRANSPORTATION 20
2.4.1. THE INTERNATIONAL TRANSPORT INDUSTRY 22
2.4.1.1. MARITIME TRANSPORT 25
2.4.2. INTERNATIONAL TRANSPORT AND TRADE 30
2.4.3. INTERNATIONAL TRANSPORT COSTS 32
2.4.3.1. INTERNATIONAL TRANSPORT COSTS RELEVANCE TO TRADE 34
2.5. INTERNATIONAL TRANSPORT COST MEASUREMENT. 35
2.5.1. DIRECT AND INDIRECT MEASURES OF TRANSPORT COSTS. 37
2.5.2. EMPIRICAL DETERMINANTS OF INTERNATIONAL TRANSPORT COSTS .. 38

2.5.3. THE IMPORT CIF/FOB RATIOS AS A MEASURE OF INTERNATIONAL TRANSPORT COST 42
2.5.3.1. DEFINITION 42
2.5.3.2. NATURE AND COMPOSITION 47
2.5.3.3. ERRORS, PERSPECTIVES AND PERCEPTIONS. 49
2.6. THE PERCEPTION OF TRANSFER PRICING IN OVERVALUATION OF IMPORTS. 51
2.7. CONCLUSION 53
CHAPTER 3 54
RESEARCH DESIGN AND METHODOLOGY 54
3.1. INTRODUCTION 54
3.2. THEORETICAL FRAMEWORK 55
3.3. THE NATURE OF STUDY AND RESEARCH DESIGN 55
3.4. VARIABLES 57
3.4.1 TYPES OF VARIABLES 58
3.4.1.1. INDEPENDENT VARIABLES 58
3.4.1.2. DEPENDENT VARIABLE 58
3.4.1.3. EXTRANEOUS VARIABLES 59
3.5. DATA COLLECTION 59
3.6. SAMPLING THEORY AND CHOICE OF SAMPLE 61
3.6.1. REASONS FOR SAMPLING 63
3.6.2. CHOICE OF SAMPLE 63
3.7. LIMITATIONS 63
3.8. THE RESEARCH MEASURES AND PROCEDURE 64
3.8.1. THE MEASURE 64
3.8.2. PROCEDURES 65
3.9. DATA ANALYSIS PROCESS 65
3.9.1. PREPARING DATA FOR ANALYSIS 66
3.9.2. FEEL FOR THE DATA 67
3.9.3. TESTING THE GOODNESS OF THE DATA 67
3.9.3.2. VALIDITY 68
3.9.4. DATA INTERPRETATION 68
3.9.4.1. PEARSON CORRELATION 68
3.9.4.2 t- TEST 70

3.10. SUMMARY 70
CHAPTER 4 71
DATA PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS 71
4.1. INTRODUCTION 71
4.2. PRESENTATION OF DATA 72
4.3. DESCRIPTIVE ANALYSIS OF CIF/FOB DATA 74
4.4. COUNTRY ANALYSIS 78
4.4.1. UNITED STATES OF AMERICA 78
4.4.1.1. Overview 78
4.4.1.2. Data Presentation for United States 79
4.4.2. GERMANY 83
4.4.2.1. Overview 83
4.4.2.2. Germany's SITC Imports 83
4.4.3. SOUTH AFRICA 88
4.4.3.1. Overview 88
4.4.3.2. South Africa SITC data Application 89
4.4.4. AUSTRALIA 94
4.4.4.1. Overview 94
4.4.4.2. Australia's SITC Data 95
4.4.5. VENEZUELA 99
4.4.5.1. Overview 99
4.4.5.2. SITC data for Venezuela 100
4.5. CORRELATION ANALYSIS AND STATISTICAL SIGNIFICANCE 104
4.6. CONCLUSION 110
CHAPTER 5 110
CONCLUSIONS AND RECOMMENDATIONS 110
5.1. CONCLUSION 111
5.2. RECOMMENDATIONS AND FUTURE RESEARCH 115
References 116
Appendix A 144
Appendix B Ethical Clearance Certificate 155

LISTS OF TABLES

Table 2. 1. International Transport Zones and Available Transport Modes 25
Table 2. 2. . World Fleet by principal Vessel Type, 2013–2014 (Beginning of year figures, thousands of dwt, percentage share in Italics) 29
Table 2. 3. Conditions Affecting Transport Costs 41

Table 3. 1. South Africa's Annual Import Cif and Import Fob from 1980-1985 61
Table 3. 2. United States SITC data from 1980-1990..... 61

Table 4. 1. SITC Classification Structure after Revision..... 73
Table 4. 2. Selected Countries cif/fob Ratios as a Proportion of Total Imports, 1980-2012..... 74
Table 4. 3 Mean and Standard Deviation of Country's cif/fob Ratios 1980 -2012 77
Table 4. 4. Cross Correlation Analysis Results of Countries Imports cif/fob Ratios and their SITC Imports as a Proportion of Total Imports. 106

LISTS OF FIGURES

Figure 2. 1. Economic Rationale of Trade 16
Figure 2. 2. 10 Year Moving Average of World Trade, GDP and Their Ratios, 1990-2015 17
Figure 2. 3. The main maritime shipping route 20
Figure 2. 4. The Liner Shipping Connectivity Index (LSCI) 24
Figure 2. 5. The OECD Industrial Production Index and indices for the world: Gross domestic product, merchandise trade and seaborne shipments, 1975–2013 (1990 = 100) 27
Figure 2. 6. International seaborne Trade and Export of goods, 1955 - 2013 28
Figure 2. 7. World Merchant Fleet (2007–2011) and Percentage Capacity 29

Figure 3. 1. Flow Diagram of Data Analysis process 66
Figure 3. 2. Testing Goodness of Measures: Form of Reliability and Validity 68
Figure 3. 3. The Strength, Weakness and Direction of Coefficient of Correlation 69

Figure 4. 1. Countries cif/fob ratios as percentage of total imports 1980- 2012 76
Figure 4. 2. . United States, Imports cif/fob Ratio (1980- 2012) and Manufactured Import (1980 – 2014). 80
Figure 4. 3. Germany's SITC 7 and SITC 3 category as a Percentage of Total Imports, 1980-2014 85
Figure 4. 4. Germany's SITC Imports as a Percentage of Total Imports, 1980-2014 86
Figure 4. 5. Germany's cif/fob Ratio (1980- 1998) and Manufactured Import from 1980 – 2014 87
Figure 4. 6. South Africa's cif/fob Ratio (1980-2012) and Manufactured Imports (SITC7) from (1980 -2013) 90
Figure 4. 7. South Africa's SITC Imports as a Percentage of Total Imports, 1980 to 2013 92
Figure 4. 8. Australia's SITC Imports as a Percentage of Total Imports, 1980-2014. 96
Figure 4. 9. Australia's cif/fob Ratio (1980-2012) and Manufactured Imports (SITC 7) from (1980 -2014) 98
Figure 4. 10. Venezuela's cif/fob Ratio (1980-2012) and Manufactured Imports (SITC 7) from (1982 -2013) 102
Figure 4. 11. Venezuela's SITC Imports as a Percentage of Total Imports, 1982-2013. 103

CHAPTER 1

INTRODUCTION AND BACKGROUND

1.1. INTRODUCTION

Globalization refers to the increasing interdependence of world economies resulting from the growth of cross-border trade in commodities and services, the flow of international capital, and the wide and rapid spread of technologies. Globalization reflects the continuing expansion, and mutual integration, of market frontiers and is an irreversible trend for the economic development of the whole world, at the turn of the millennium (Shangquan, 2000). Invariably, no nation is self-sufficient. Each is involved in levels of trade: to sell what it produces, in order to acquire what it lacks; and to produce more efficiently, in some economic sectors, than its trade partners (Rodrigue, Comtois and Slack, 2013d). Rodrigue et al. (2013d) further emphasised that the globalization of production is linked to the globalization of trade, as one cannot effectively function without the other. “In 2008, the world produced goods and services worth about $50 trillion, at current prices. Of this total, more than 30 percent was sold across national borders” (Krugman, Obstfeld and Melitz, 2013:12). The volume of world trade has increased over the half century since the establishment of the General Agreement on Tariffs and Trade (GATT). Trade has been rising faster than the value of world gross domestic product (GDP), for the past fifty years, thereby confirming the increasing internationalisation of business (Woods, 2000). Pugel (2007) explains that international trade is very important and its effects on the economic life of people in a country are significant.

The World Trade Organisation (WTO) is not the only forum through which trade and investment restrictions have been reduced. Many countries chose to liberalize their barriers unilaterally, recognizing that by doing so they could achieve significant gains in economic efficiency, improve the welfare of consumers, and the prospects for growth. Krugman et al. (2013) stressed there have been two great waves of globalization, with the first wave relying not only on jets and the internet, but also on railroads, steamships, and the telegraph. Globalization has become such a phenomena that it is perceived as a means of ensuring not only efficiency of growth, but also of equity, and

development for countries that join the global system, while bringing economic deprivation to countries that do not (Shaw, 2003).

Transportation costs are a vital factor in the economy of a nation, a region, or a city. Low costs give a competitive advantage to a business. Therefore, it is necessary to calculate the total transportation costs accurately and try to minimize them (Sahin, Yilmaz, Ust, Guneri, and Gulsum, 2009). Manufactured goods are the largest and most rapidly growing portion of world trade, compared to bulk cargoes, which constitute the majority of international trade when measured in terms of weight, but are a much smaller and shrinking share of trade when measured in value terms (Hummels, 2007).

As the global economy is growing fast, and many borders are now open for trade, transportation costs remain a factor for competitiveness and for the survival of many businesses in different countries. The accuracy and interpretation of international transportation costs and direct shipping costs, by measurement in particular, has become vital, as it is now a tool for the anticipation of trade and economic development. Jacks, Meissner and Novy (2008) argued that many companies use imported inputs when producing goods that are exported and that bulky and heavy inputs, that are difficult to transport, will decrease in demand. Jacks et al. (2008) stated that transportation costs play an important role in economic development, and Kurmanalieva (2006) agrees that transport costs act as a major determinant in location choice and clustering of economic activity, he went on to say that transport costs depend on many factors such as modes of transportation, infrastructure and geographical location. Hummels (2007) was of the view that transportation costs drive a wedge between the price at the place of origin and the price at the destination. Jacks, Meissner and Novy, (2006) agree that trade costs are a key obstacle to international economic integration.

Transportation, and its value for countries, has become an indispensable means for nations to reach out to one another in the international market, and as a way of strengthening their economy to attract foreign direct investment. Ultimately, the measurement (presentation and interpretation) of international transportation costs, relating to nations and their trading partners, are a major concern in the global market. Venables and Behar (2010) found that econometric studies suggest that freight costs have a statistically significant and a quantitatively important impact on trade flows.

Kleinert and Spies (2011) suggest that trade and transport costs are mutually interdependent. Transportation costs directly affect trade costs and are significant in determining what goods should be shipped in order to be competitive. Hummels (2007) suggests that transport costs are sensitive to distance. Kurmanalieva (2006) stated that the cost of transportation, in international trade, can be defined as all shipping expenses of internationally traded goods from origin point to destination point. Direct shipping costs, over many decades, are cited as the primary source for most international transport costings. Transportation of the most high-value cargoes, however, is airborne as it is faster and more costly (Hummels and Schaur, 2012). Hummels and Schaur (2012) were of the view that moving goods by ocean borne freight takes a longer time; ocean borne cargo leaving European ports takes at least an average of 20 days to reach a port in the United States of America, and about 30 days to reach Japan.

In the absence of accurate direct measures (primary sources) for transportation costs, a country's import cif/fob ratios have been used, over the years, in the depiction and measurement of international transport costs.

This paper investigates the measurement of international transport costs, using the import cif/fob ratios as a measure (direct proxy) for a country's *ad valorem* shipping, or international transport costs, and its impact on trade.

1.2. BACKGROUND AND CONTEXT

International transport costs, by its very nature, is linked and motivated by the need for effective and efficient trade. Transport costs are one of the major components of trade costs along with tariffs, non-tariff measures and distribution costs. Before the advent of modern trade, trade anticipation and motivation might have emerged, necessitating the need for freight forwarders in local and international movement of goods. However, it was the needs, specialization and competiveness among countries within the international market, that brought importance to the representation of international transport costs.

Ad valorem shipping costs and trade tariffs directly and indirectly impact on productivity and competitiveness of nations within international markets, which also affects the nation's cost of

delivered goods and investments, and subsequently, its economic growth. As a result, analysing transport costs, and its impact on international trade, has increasingly become a major concern. It is of interest to many researchers, forming a body of literature explaining the development of these costs, their impact on economic development, and the measuring of trade patterns and transportation costs correctly (Oguledo and Macphee 1994, Radelet and Sachs 1998, Baier and Bergstrand 2001, Hummels 2001, and Limao and Venables 2001).

Direct shipping costs is defined as the way of determining the cost of moving goods between nations, which is used in part in pre-determining the market price of those goods. In the same manner, the cif/fob ratios are articulated as the unconventional way of determining the cost of moving goods. Unfortunately, very few countries report detailed information on direct shipping costs. Ma, Miao, Lim and Rodrigues (2011), while trying to understand the transportation problem in cross-docking distribution networks, suggest that transportation costs incurred by shippers are typically dependent on variable costs per unit product shipped per unit distance travelled. Transportation costs are costs incurred while moving goods from one destination to another, suggesting distance means that the gravity trade model could play an important role in transport costs. Rahman (2003) in his panel data analysis of Bangladesh's trade, using a gravity model approach, noticed that transportation costs have a negative impact on Bangladesh's economy. He suggests that the country will do well if they trade more with their neighbouring countries. An empirical principal of trade economics shows that exporting nations report trade transactions exclusive of freight and insurance (fob), while on the other hand, importing nations report trade transactions inclusive of freight and insurance (cif) (Hummels and Lugovskyy, 2006). Import cif/fob ratios, as a measure for international transport costs, is being questioned by many researchers, but the focus of the controversy is on its exactness when being used to reveal international transport costs of nations. These ratios are an indirect measure of international transport costs, which capture transportation costs, but fail to take the variability in transportation modes, and efficiency in the transportation services of imports, into account.

Chasomeris (2009a), stated that the import cif/fob ratio has been used by many researchers as a measure (direct shipping cost) for international transport costs; and used by the African Development Bank, International Monetary Funds (IMF), World Bank and United Nations in several publications on international trade and transport. Most users and analysts assume that a

country's composition of imports is constant and does not vary when using these ratios, and that these ratios reflect a country's actual cost of transport without taking into account the inconsistencies that could be present in data used while computing the ratios. Hummels and Lugovskyy (2006) agree that data collection relies on independent reports of the same trade flow gathered for reasons other than shipping costs. Notwithstanding the shortfalls, the ratio is still an accepted measure for international transport costs and is widely used.

Chasomeris (2010) warned that those who use cif/fob ratios must be careful and aware of what they are using, in particular, an aggregated and weighted average ratio, where the weightings are in large part, determined by the composition of imports that are not the same across countries and regions. Chasomeris (2010) noticed that *ad valorem* transportation costs applied by the IMF cif/fob ratios are notably different from the explicitly collected data on South Africa's direct shipping costs. In principle, exports from country A to country B should be identical to imports from country B to country A, for any given product in a particular year, except for the CIF additional cost. Firstly, identifying the actual trading partners might be difficult. Mostly the attention of the customs officials is drawn to the actual origin of an imported product because this determines the level of tariff to be levied. Secondly, details of reported values of commodities do not necessarily sum up to the total trade value of a given country. However, direct transport costs at the product-level are rarely available. In the absence of direct measures, indirect measures of freight cost, drawing on ratios of mirror trade reports (cif/fob ratio), turns out to be the alternative estimates for trade costs. In principle, the valuation and comparing of the same flow reported by both importer (in cif) and exporter (in fob) would yield a difference equal to freight cost. However, in reality, there are important measurement problems. Hence, the huge discrepancies observed between mirror flows cannot be substituted directly as measures of transport costs (Gaulier and Zignago, 2010). Nevertheless, Hummels and Lugovskyy (2006) still believe that IMF cif/fob ratios reveal meaningful cross-exporter variation that could be useful to researchers.

1.3. PROBLEM

This study investigates the complexity and inaccuracy associated with the use of cif/fob ratios as a measure of direct transportation costs, and its impact on trade flows in countries. As trade costs are increasingly becoming an area of interest, it is surprising to note that decreasing cross border transaction costs have undoubtedly increased volumes of trade between countries, which is instrumental to investment in infrastructure, and a further reduction in transport cost. Kleinert and Spies (2011), state that transport costs differ in accordance with the market structure of the transport sector, with bilateral trade imbalances, and with port efficiencies. The growing interest in international transport costs has led many researchers to seek more accurate data that reflects the difference in transportation costs of bilateral trade between countries. The widely used and most recognised measures of the import cif/fob ratios for international transport costs have sparked controversies regarding their use among different researchers. It is perceived as an impairment to true and accurate measuring of international transport costs. Cif/fob ratios, which make use of data extracted from the IMF database, have not portrayed accurately the true composition of trade and transport costs (Chasomeris, 2010). Therefore, one should ask whether this measure is a misrepresentation of international transport costs.

1.4. RESEARCH AIMS AND OBJECTIVES

This dissertation is a comparative study on the use of a country's import cif/fob ratios to measure international transport costs in terms of definition, use, presentation and interpretation as a measure for direct international transportation costs. The main aim is to examine the measurement of international transport costs as measured by the country's import cif/fob ratios. The following specific objectives have been identified for the study:

- To source, compile, calculate and compare the country cif/fob ratios for South Africa, the United States of America, Germany, Venezuela and Australia from the year 1980 to 2012.

- To establish, using correlation analysis, the relationship between a country's cif/fob ratio and a country's standard international trade classification (SITC) data at HS (Harmonized System) revision 2-digit code 1

- To examine the use of import cif/fob ratios as a measurement for international transport costs. This will involve extensive data collection and information on the characteristics, patterns and perceptions of the use of import cif/fob ratios as a measure of international transport costs.

1.5. RESEARCH METHODOLOGY

This study follows a quantitative based method of research, using the inductive approach, to draw an observation on the flaws and irregularities in the use of import cif/fob ratios as a measurement of transportation costs. Secondary data is the data that has already been collected by researchers and are readily available as sources. The secondary data that will be used in this study will be collected from the World Integrated Trade Solution (WITS) database of the World Bank, Easy data by Quantec, the IMF databases, International Financial Statistics (IFS), Direction of Trade Statistics (DOTS), and the United Nations' Comtrade. Specifically, this study will first calculate the sample cif and fob data for South Africa, the United States of America, Germany, Venezuela and Australia from the year 1980 to 2012; and second, the SITC data of all five countries mentioned above.

Third, the study will use correlation analysis to analyse the relationship between a country's standard international trade classification (SITC) data and that country's import cif/fob ratios. This analysis will be for South Africa, the United States of America, Germany, Venezuela and Australia from the year 1980 to 2012. The findings in the correlation analysis will be used to draw conclusions and recommendations from the information gathered through critical evaluation against the findings of the studies in the literature review. The study will also make use of descriptive statistics, which will include distribution (histograms), measures of central tendencies (mean), and dispersion (standard deviation) where applicable.

This study deepens the understanding of, and makes additional contribution to, the growing body of knowledge on international transport cost measurement, and arguably its impact on trade between countries. It is hoped that this study will contribute to greater understanding when using import cif/fob ratios in the measurement of transport costs.

1.6. OVERVIEW OF THE RESEARCH

The structure of this dissertation is as follows.

Chapter One (Introduction): This section will consist of an epigrammatic prologue about what will be discussed in the dissertation. It will analyse the different areas mentioned above and illustrate why they are imperative for this research. It will finally outline the structure of this dissertation.

Chapter Two (Literature Review): This section provides an overview of international transport costs. It examines perspectives and perceptions of import cif/fob ratios as a measure of international transport costs, from a theoretical viewpoint, by different researchers who have contributed to this research field and what concepts and theories have been applied to the field. This chapter will also try to understand what research methods have been applied to the topic and what controversies there are regarding the topic. The review will examine the international trade and transport costs concepts, the assessment and the use of import cif/fob ratios, and the use of the ratios as a measurement of transportation costs for trade.

Chapter Three (Research Methodology and Design): This chapter will start with an introduction of the methodology used. Correlation analysis will be run with the cif/fob ratios of the selected countries using secondary data collected from the World Integrated Trade Solution (WITS) database of the World Bank, Easy data by Quantec, the IMF databases, International Financial Statistics (IFS), Direction of Trade Statistics (DOTS), and the United Nations' Comtrade. It will continue with a discussion of the data collection and analysis techniques used for this research.

Chapter Four (Data Presentation, Analysis and Discussion of Results): This chapter presents an extensive analysis and discussion of the empirical data. Firstly, the section introduces and deduces the viability and reliability of the sourced data. It then provides the descriptive analysis of the data used in the examples of this study. The chapter concludes with application and discussion of information derived from extracted data, providing comparisons between the freight rates

measured using IMF and national source data, taking into consideration the measurement of transportation costs for Germany, South Africa, Venezuela, the United States of America, and Australia of trade composition of imports. Correlation and comparative analysis will then be used to clarify the relationship that exists from the data analysed.

Chapter Five (Conclusion and Recommendations): The significance of this research will be portrayed in this chapter, which sums up the findings by presenting the main conclusion and recommendations for improvement in the measurement of international transport costs. The chapter will conclude with the implications and limitations of the study and identify future research area.

CHAPTER 2

LITERATURE REVIEW

2.1. INTRODUCTION

The purpose of this chapter is to provide a compendium of the literature that was reviewed in order to have a better understanding, and to provide a concise base for analysing the measurement of international transport costs. The chapter will explore the theoretical context surrounding the study before providing a review that briefly explores international trade, transport, transport costs, transfer pricing, incoterms and cost measurement, and other relevant and related concepts. The chapter then examines empirical evidence on transportation and international transport costs. This is followed by an exploration of the role, perceptions and determinants of transport costs. The measurement of international transport costs will then be reviewed in view of the perspectives and perception of the use of cif/fob ratios as a measure for direct shipping costs, followed by a review of the definition, source, nature and composition of the ratios as a measurement for international transportation costs. The chapter concludes with a review of the impact of the use of these ratios as a measure for international transport costs and provides some concluding remarks.

2.2. THEORETICAL CONTEXT

In this study, international transport costs or transportation costs could be defined as costs incurred in moving mass or freight across national borders. These costs comprise of direct and indirect elements. Freight charges and insurance of those goods, mass or freight makes up the direct element of the cost, while the indirect elements include those incurred by the transport operator. For the purpose of this chapter, we will focus on the direct elements rather than the indirect elements, as the former are more constant in transport costs.

Over the past decades, many researchers have conducted various studies on the subject of international trade and international transportation costs with the import cif/fob ratios at the forefront of studies on transport costs. Nevertheless, some studies justify the use of import cif/fob ratios as a measure for international transport costs, while others have discredited the use of the ratios as direct measures, due to observed inconsistencies and complexities surrounding cost interpretation of freight rates measured using IMF and national source trade data (Chasomeris, 2009a).

Myers (2014) explained that individuals of the same country buy and sell from each other far more than they do with individuals of a different country. A cost is associated with exchanging goods and services across national boundaries. The amount which two countries trade with each other is an amalgamation of the actual cost of trade and the elasticity of trade with respect to trade costs (Myer, 2014). In a study by Hummels (2007), transport costs were analysed relative to the value of the goods being moved and relative to other known barriers to trade, such as tariffs. Geographic separation creates price differentials across regions because of transport costs, even in the absence of institutional differences such as tariffs, taxes, and national borders. Accordingly, if the locations of production and markets are geographically distant, transport costs will be high, and hence there will be large price differentials across regions (Kazuko, Takashi and Kazutaka, 2015). Hummels (2007) believes that transport costs can alter relative prices. Anderson and Van Wincoop (2004) try to measure transport costs using price differential data, which calculates the difference between market prices and the price at the point of production. Kazuko, Takashi and Kazutaka (2015) see price data as a correct way to measure transport costs. Clark, Dollar and Alejandro (2004) argued that transport costs may be an important barrier to trade and could have an important effect on income. They went on to show that if distance between the United States and an export country increases by 100%, maritime transport costs increase by about 20%. An important determinant of transport costs is geography, distances in particular. Lugovskky and Skiba (2014) believed that distance significantly lowers volumes of trade between countries. While the exact reasons for this effect are not completely understood, it is commonly believed that distance lowers trade through the cost of transportation. Martin (2012) finds that firms charge higher fob unit values on exports to more remote countries. Chasomeris (2009a) argues in his paper on the (mis)measurement of international transport costs, that there is a degree of misunderstanding and misuse of import cif/fob ratios as a direct measure of shipping cost. His studies highlighted the erroneous assumptions made on the composition of trade when using cif/fob ratios (Chasomeris 2009a, 2009b).

Trade liberalization has been seen as a reason for increased border trade. Novy (2013); and Sánchez, Hoffmann, Micco, Pizzolitto, Sgut, and Wilmsmeier (2003) argue that trade liberalization over the past decade has seen a reduction in customs tariffs and ultimately has increased trans-border trade. Conconi, Legros, and Newman (2012) argue that not only has trade liberalization caused reduction in barriers of commodities traded, and falling transport costs, but

also has contributed significantly to organisational restructuring. Many countries have opened their borders to trade and this has benefits for firms, for mass productivity, and for increasing firms' efficiency and competitiveness. De (2007) argued that infrastructure and related services plays an important role in the flow of international trade and can have a significant effect on costs of transportation. Rothenberg (2012) agrees with De (2007) in that in many developing countries, investments in transport infrastructure are growing at an astonishing pace. China's total spending on transport projects increased from $9.2 billion in 2000-2004 to $26.4 billion in 2005-2009, while India's spending increased from $2.9 billion to $29.4 billion between the same periods. The goal of these projects was to lower transport costs between different regions. Faber (2014) was aware of the impact that development of transport infrastructure has on transport costs.

However, it seems that trade liberalization and global integration has eluded some countries, who fail to embrace it, causing them to miss beneficial gains from such trade opportunities. Offshoring, which is a product of trade liberalization, enables firms to allocate resources to developing countries, to benefit from low wages and labour productivity, thereby increasing economic growth and employment (Zhou and Zeng, 2015). Winters (2004) was of the view that trade liberalization has been a prominent component of policy advice to developing countries for the last two decades, and among the benefits claimed to arise from it - economic growth is the most important.

2.3. INTERNATIONAL TRADE

International trade is usually defined as the exchange of goods and services across international borders or territories. Goods and services that are bought outside the national borders are called imports; the import industry offers the residents of a country a large variety of goods. It also increases the number and quality of options available in the domestic market (Economy Watch, 2010a). Dollar and Kraay (2004) believed in the well-known literature that openness to international trade accelerates development. The link between nations and trade between nations

and economic growth are neither recent nor novel developments. The Amber route and the Silk route crossing, boundaries and continents, is enough evidence that international trade is not a novel phenomenon (Carr and Stone, 2013). Since the latter years of the twentieth century, developing countries have become increasingly integrated in international trade (Manger and Shadlen, 2015). Since World War II, international trade has grown almost twice as fast as world income (Dollar and Kraay, 2001; and Behar and Venables 2011). Furthermore, there was an increase in trade to GDP ratio from 24% in 1960 to 48% in 2003 (Lavallée and Vicard, 2013). Thirlwall (2000) highlighted that exports have tended to grow fastest in countries with more liberal trade regimes, and these countries have experienced the fastest growth of GDP. What could have been the driving force for this tremendous increase of international trade? Hummel (2007) attributes much of this great increase in global trade to decreasing transport costs. Kaukiainen (2014), among other things, identifies a reduction in ocean transport costs as having an effect on rapid growth of international trade. Econometric studies suggest that freight costs have a statistical and quantitatively significant impact on the flow of trade (Behar and Venables, 2011). Manger and Shadlen (2015) were of the view that there is near consensus that international trade is a necessary condition for economic development, for reduction in poverty, and for improved living standards. The globalization of markets is evident in several related trends. Firstly is the unprecedented growth of international trade, a trend which accounts for a substantial proportion of the world economy, amounting to US $14 trillion annually (Cavusgil, Knight, Riesenberger, Rammal and Rose, 2014).

Economy Watch (2010a) acknowledges a mixed debate on who gains as far as the impact of international trade on economic growth is concerned, the economists and policy makers of the developed and developing economies are divided into two nonconforming groups.

“One group of economists is of the view that international trade has brought about unfavourable changes in the economic and financial scenarios of the developing countries. According to them, the gains from trade have gone mostly to the developed nations of the world. Liberalization of trade policies, reduction of tariffs and globalization have adversely affected the industrial setups of the less developed and developing economies. The other group, which speaks in favour of globalization and international trade, come with a brighter view of the international trade and its impact on economic growth of the developing nations. According to them developing countries, which have followed trade liberalization policies, have experienced all favourable effects of

globalization and international trade. China and India are regarded as the trend setters in this case" (Economy Watch, 2010a).

If properly practised, there is no denying that international trade is beneficial for the countries involved in trade. International trade policy opens up opportunities in global markets to the entrepreneurs of developing nations. Technology and knowledge capital, that is readily available, is shared with the businesses operating in these countries, ensuring competitiveness of domestic firms in global fronts.

Although there is no single theory that can substantially and completely explain international trade or its pattern: Dettmer (2014); Simonovska and Waugh (2014); Baltagi, Egger and Pfaffermayr (2014); and Kahouli and Maktouf (2015) all used Gravity Models of trade to study international trade and its patterns. According to Krisztin and Fischer (2015), Gravity Models have become a popular way to model international trade flow. The Gravity Model provides a crucial explanation on international trade. The models assume that these bilateral relationships can be modelled as a multiplicative function of the economic size of two economies (incomes, expenditures, or endowments = GDP), the inverse of economic distance and some constant, similar to Isaac Newton's law of gravity. However, the model fails to explain the changing nature of today's trade pattern and model, as distance seems not to deter countries from trading further afield, significantly more than with their neighbouring countries.

2.3.1. INTERNATIONAL TRADE AND ITS ROLE IN THE ECONOMY

International trade has long been hailed as an engine for growth and economic development because it enhances domestic firm competitiveness, and increases profits and sales of a country by increasing its share in the global market, while providing expansion opportunities for its local business and reducing the country's dependence on existing markets. In short, international trade has gone beyond what we can imagine as firms seek international market opportunities more today than ever before, impacting and touching billions of people's lives around the globe.

Some of the logical questions being asked today of international trade and its role in the economy are:

- Why do countries trade?
- What determines with whom and where to trade in this modern world?
- Why do countries close to each other trade more with each other?
- Shouldn't developed nations such as the likes of Germany and Australia produce all their nation's needs and demands rather than resort to the importation of certain goods and services that their residents need from countries like China, Singapore and other trading partners?
- Why do these trading partners equally depend on other nations to facilitate their own needs?

(Krugman, Obstfeld and Melitz, 2011)

It is hoped that the literature review will help answer some of these questions so as to gain a better understanding of international trade and transport costs.

Krugman et al. (2011: 10) explains that: "Countries engage in international trade for two reasons, each which contributes to their gains from trade. First, countries trade because they are different from each other. Nations, like individuals, can benefit from their difference by reaching an arrangement in which each does the things it does relatively well. Second, countries trade to achieve economies of scale in production. That is, if each country produces only a limited range of goods, it can produce each of these goods at a larger scale and hence more efficiently than if it tried to produce everything".

David Ricardo's principle of comparative advantage helps to understand how international trade works: a country will export the goods and services that it can produce at a low opportunity cost and will import the goods and services that it would produce at a high opportunity cost (Economy Watch, 2010a). Ingham (2004) agrees with what Adam Smith said, that a country should specialise in and export goods and services in which they have an absolute advantage. When a country can produce a commodity with less labour per unit than could its trading partner, they are said to have an absolute advantage in production of that commodity. Assuming that the United States has an absolute advantage in producing cotton, and South Africa has an absolute advantage in producing wine, both will be better off if they specialize and trade with each other: with the United States

exporting cotton to South Africa and importing wine, and with South Africa exporting wine to the United States and importing cotton from them. Helpman (2014) believed that both, Ricardo, Ohlin and Heckscher comparative advantage model emphasized cross-country differences as drivers of international trade flows.

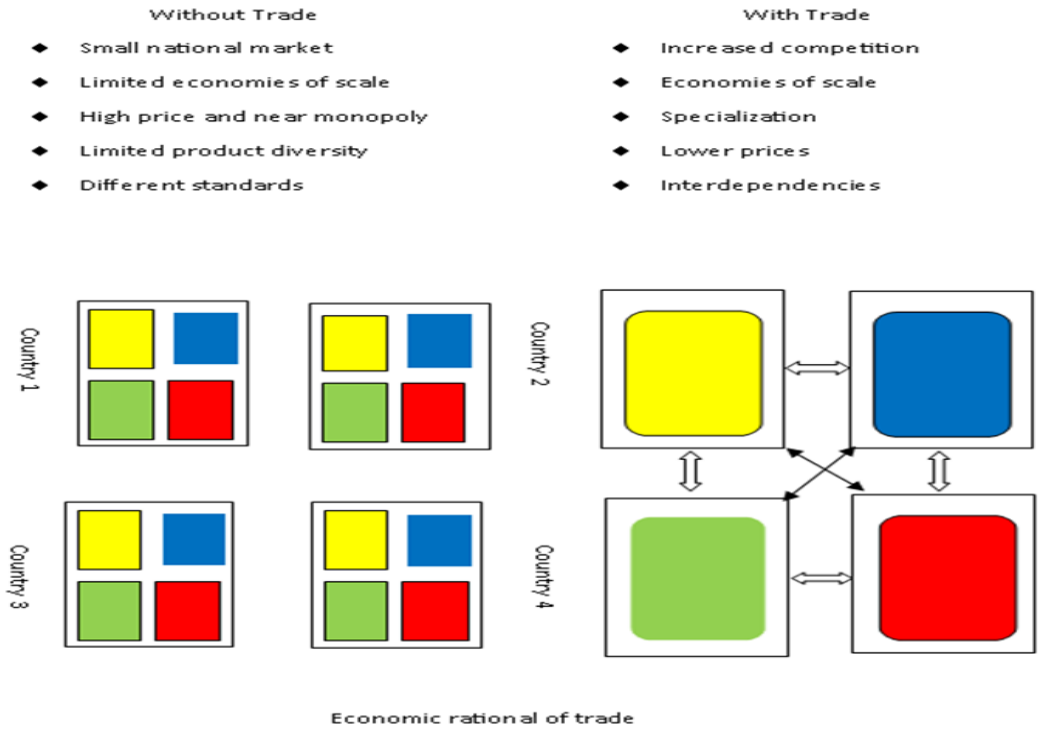


Figure 2. 1. Economic Rationale of Trade

Source: Rodrigue, Comtois and Slack (2006:145)

Figure 2.1 shows four countries. Without trade, each country produces all four mixtures of goods given limited resources. Rodrigue, Comtois and Slack (2013d) argue that without international trade, only a few nations can maintain a moderate standard of living. With only domestic resources, each country could only produce limited amounts of goods and shortcomings would be prevalent. With trade, competition increases and redistribution of production normally takes place as comparative advantages are exploited. In figure 2.1, the outcome of trade liberalization involves specialization of production of one good in each country and trade of other goods between them.

As a result, the greater economies of scale that is achieved through specialization, results in lower prices (Rodrigue et al., 2013d).

As international trade is expressed as an exchange of goods and services and capital across international territories, then international trade can been seen as an economy where prices, and supply and demand affect global events. In most countries, trade represents a share of its gross domestic product (GDP), especially in developing and underdeveloped countries.

Figure 2. 2. 10 Year Moving Average of World Trade, GDP and Their Ratios, 1990-2015

Source: WTO (2014b)

Figure 2.2 shows that world trade growth has been on the increase, with the highest peak of a 6.7% growth rate recorded in year 2000, and through to about 4% in 2009 due to a recession. Most developing countries support trade expansion in anticipation of improving their market status and GDP, both of which indicate economic development and growth in that nation. Although international trade was in existence for centuries, its social, economic and political importance has just begun emanating in the past century, and this could explain why economic sanctions are implemented as a punitive measure to try to correct political errors of nations.

The results of a regenerated trading system and trade expansion, such as globalization, industrialization, multinational corporations, advanced transportation and outsourcing have all been judged to play a significant role in impacting on modern day international trade. However, without the adequate infrastructural support and enabling macroeconomic policy to operate upon, international trade expectations are neither attainable nor sustainable by mere trade expansion alone, they could be rather disruptive and abrasive on economic growth.

In principle, international trade does not differ from domestic trade because the motivation of the parties involved do not change regardless of whether trade is across a border or not (Nawaz, Aziz and Zaman, 2014). However, the main discrepancy is that international trade involves the movement of goods and services, and capital over a long distance with imposed costs arising from tariffs, distance (transport) and costs associated with time, cultural differences, language and legal systems (Mundra, 2010). However, without international trade, residents of nations will be limited to the goods and services produced within their own borders. Arguing thus, transport costs are an impeding factor to be considered when embarking on global trade.

According to the United Nations Conference on Trade and Development (UNCTAD) (2013), liner shipping services form a global maritime transport network which moves most of the international trade in manufactured goods. Several empirical studies have found that there is a strong correlation between liner shipping connectivity and trade costs, transport costs in particular. OECD/EUROSTAT (2014), believe that containerization has made globalization possible, container trade and major dry bulks are the main drivers in the development of seaborne trade. As economists unanimously forecast increases in international trade, international transportation is now becoming an integral part of international trade as rising demand puts pressure on all transportation nodes and links, like ports, ships, trucks, trains, airports and roadway systems (Ioannou, 2008).

Development and economic growth is being piloted by international trade, providing the policy measures and economic infrastructure are accommodative and accurate to cope with the changes in the social and financial scenario that result from it. Transport costs are justified as a major element of overall trade costs, while international trade might be motivated, influenced and predetermined by specialization needs and costs. They are more of an important component of trade than tariff barriers (Hummels, 1999).

Helpman and Razin (2014) argue that in the absence of international trade in equities, a tariff may provide protection to an exporting firm of a small country, but this paradoxically does not arise in the presence of equities in international trade. Transport cost drivers differ between foreign and domestic goods prices and therefore play a significant role in economic growth and development (Chasomeris, 2010).

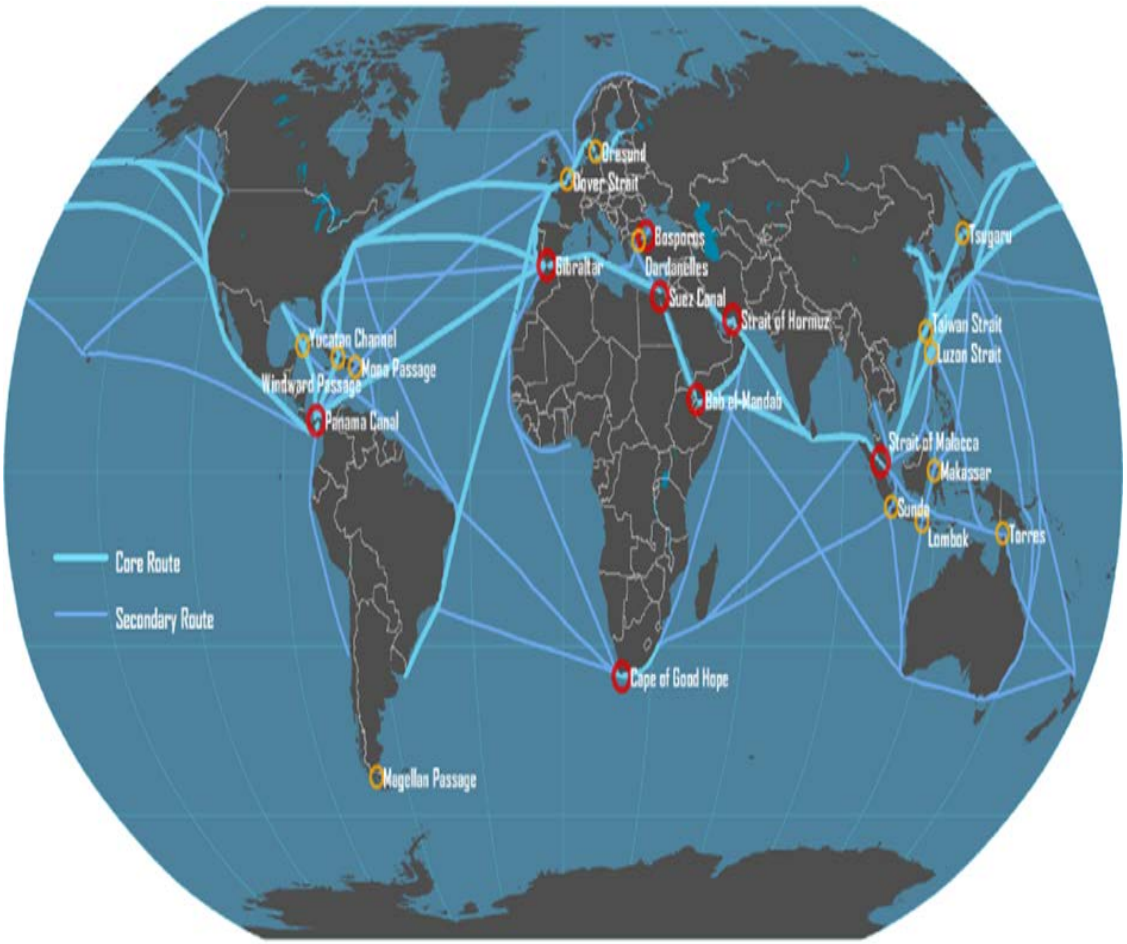


Figure 2. 3. The main maritime shipping route

Source: Rodrigue, Comtois and Slack (2013:21c)

2.4. INTERNATIONAL TRANSPORTATION

Freight Transportation is a key supply chain component to ensure the efficient movement of goods and timely availability of raw materials needed (Steadie, Seifi, Delleart, Nuijten, van Woensel and Raoufi, 2014). It has an important macroeconomic and microeconomic role to play in any nation and society alike. Steadie et al. (2014) believe that in many parts of the world, freight transportation has witnessed several trends as new markets are rising and growing based on the customers' demands. As consumer tastes and preferences grow, accessing goods and services that lie outside

of the immediate vicinity of the society is dominant and, for this to be achieved, transportation is required. From a macroeconomic point of view, transportation has been noted in India to be a critical infrastructure requirement for economic growth (Pradhan and Bagchi, 2013). Sinha and Labi (2011) are of the view that economic vitality and global competitiveness of a country influence the quality and quantity of its transportation infrastructure. Understandably, despite the major changes that have been experienced in society, transportation issues continue to be an epicentre of importance in our day-to-day lives.

Transportation is still being appraised primarily in terms of mobility, but the growing importance of transportation in our day-to-day existence lies in the fact that it creates valuable links between regions and economic activities, between people and rest of the world. As the world evolves, transportation still remains critical and has undergone large scale changes over time (Redding and Turner, 2014).

The A380 Airbus Project represents one of the highest challenges, leading to a new quay and lifting platform being built in Hamburg terminal (Morales, 2006). A failed project it would have been, if not for transportation, bringing different component parts of the A380 airbus from different European countries. Rodrigue et.al. (2013d), and Redding and Turner (2014) stated that transportation involves the physical movement of goods and service. Rodrigue et.al. (2013:12d) refer to "transportation as the dominant outcome of derived demand, which its purpose is to fulfil demand for mobility, since transportation can only exist if it moves people, freight and information around, otherwise it has no purpose".

According to Novianti, Panjaitan and Nugraheni (2015), transportation costs are one aspect of logistics costs, other than administrative and handling costs. They believe that a good state of logistics costs is a very crucial prerequisite for a country to be able to compete strongly in the international market, as well as to maintain a good supply of goods in its domestic market. Balsas (2015) believes that transport and transportation costs are an integral part of any society's development, functioning and communal integration. Limao and Venables (2001) found that increased transport costs would reduce the volume of imports to the United States. While a study by Baier and Bergstrand (2001) showed that a rise in transport costs will reduce the volume of imports and exports in most countries.

Olsen and Granzin (2015) define international transportation as subsumes of those objects and activities necessary to move the consumer to the point of acquisition, or the consumption of goods (locally or internationally), as well as those elements required to move the goods from the point of acquisition to the place of consumption or other disposition. Granzin and Valentin (2015); and Timotheou, Panayiotou and Polycarpou (2015) all acknowledge that transportation involves an element of movement of not only goods, but people as well. The demand for transportation is an indirect or derived demand resulting from demand for international trade itself (Hummels, 2009). Therefore, a growth in demand of international trade will concurrently result in a growth in demand for international transport (Ola, 2011). Rodrigue (2010), in his paper "Maritime Transportation: Drivers for Shipping and Port Industries", stated that economic growth and international trade (global trade) have been significant vectors for the growth of transportation (mobility).

The liner connectivity of countries within the market is through the global transport system measured by the liner shipping connectivity index (LSCI) which is considered a proxy of the accessibility to global trade. The higher the connectivity index of a country, the easier it is to access a high capacity and frequency global maritime freight transport system and thus participate effectively in international trade (Rodrigue et al., 2013d). The lack of this connectivity in landlocked countries has made them the least connected countries in the world due to the complexity of achieving connectivity to the liner shipping network. This lack of connectivity in a landlocked country often affects average development levels and GDP more than their maritime neighbours (Faye, McArthur, Sachs and Snow, 2004). Arvis, Raballand and Marteau (2007) indicated that a large proportion of the least developed countries are landlocked. Due to this, their access to the world market depends largely on the availability of trade corridors and transit systems.

In order to reach a definitive conclusion about the level and measurement of international transport cost, the factors which determine their level, and their effects on national economies, greater knowledge of the state of global transport industry and of international transportation cost is needed.

2.4.1. THE INTERNATIONAL TRANSPORT INDUSTRY

The global transportation industry is a complex, challenging and rapidly changing sector in the global market. The global economy is competitive and practitioners are faced with diverse market challenges. The transport industry has become an increasingly important contributor worldwide to countries' trade exports and gross domestic product as countries integrate ways to use the transportation system to contribute more to their national economic development. Although efficiency in transport may have increased appreciably because of innovations and improvements in infrastructure and modes of transport, organisations in the global transportation sector still face challenges to achieve a competitive advantage.

The modern global transport system consists of five major transportation modes (Air; Maritime - coastal-sea and deep-sea shipping; Rail; River and Canal; and Road) which it uses to foster effective and efficient trade through the cohesion (intermodal) of these modes. Transport connectivity recently has been considered in gravity studies of trade. Limao and Venables (2001); Micco and Serebrisky (2004); and Alamá-Sabater, Márquez-Ramos, Suárez-Burguet and Navarro-Azorín (2013) were of the view that transport connectivity increases trade flows between trading partners. Jacks and Pendakur (2010:746) stated that a "most commonly-held perception is that the growth of world trade is strongly associated with technological improvement in the communication and transport sectors."

Of the modes of transport mentioned above, the maritime, with deep sea (sea ports) in particular, has become of major significance to global transportation, trade flows and trade efficiency. Branch and Stopford (2013) believe that the idea of shipping as a catalyst to economic development is not new. These five main modes of transportation have advantages and disadvantages, and when selecting a particular mode all the advantages and disadvantages related to the concerned mode of transportation have to be considered. Tuzkaya and Önüt (2008) acknowledge the main criteria for transportation mode selection depends on the type and volume of freight and the distance to be covered, other criteria might include speed, availability, capacity, reliability, security and frequency of delivery.

The maritime shipping networks are assessed through the LSCI which can be considered as a measure of connectivity to maritime shipping and also a measure of trade facilitation (see figure 2.4) (Rodrigue 2010). This is acknowledged to have altered the world movement of goods from what it was known.

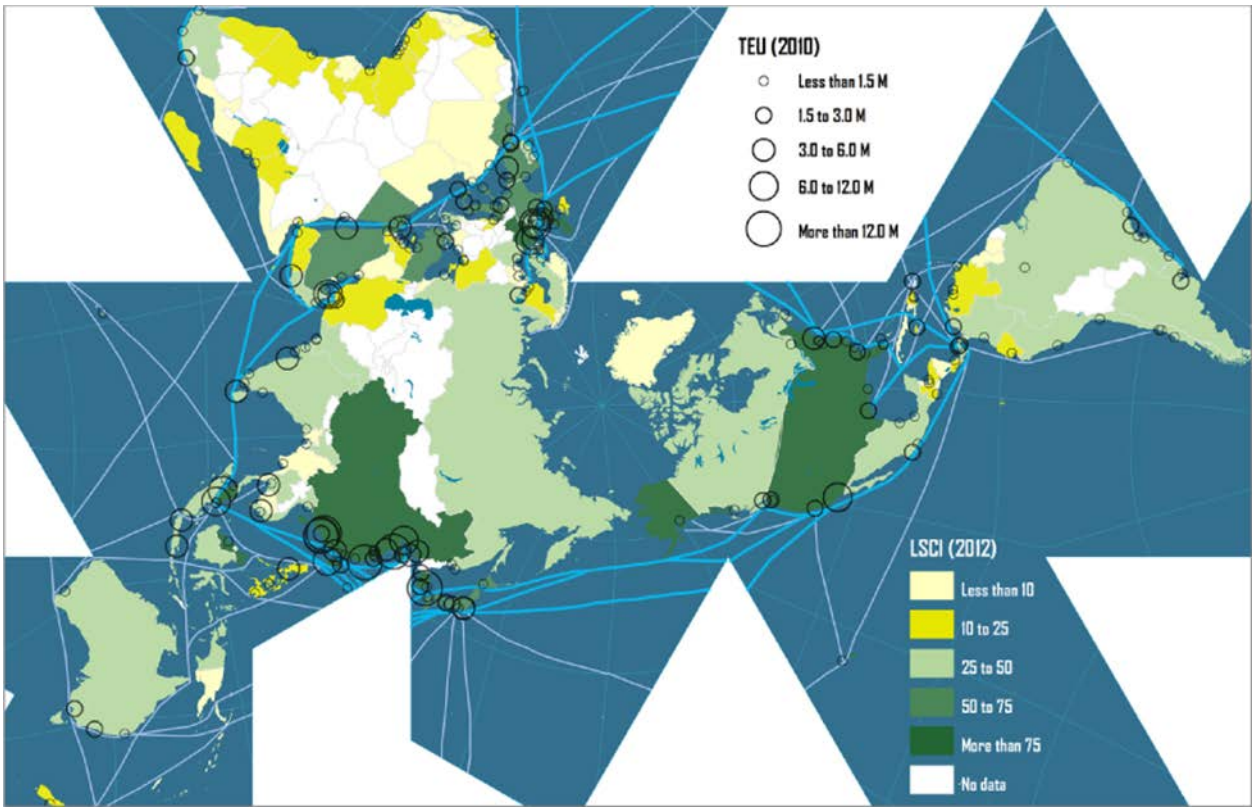


Figure 2. 4. The Liner Shipping Connectivity Index (LSCI)

Source: Rodrigue, Comtois, and Slacks (2013:33b)

According to Branch and Stopford (2013), Adam Smith saw shipping as a primary source of cheap transport which can open up markets wider to greater specialization by offering transport at low prices for the most everyday products, those that cannot be achieved by other modes. Turnbull (2014) hailed multimodal freight transportation systems as a key to the global competitiveness of the United States. No doubt, freight transportation systems are necessary for an efficient international transport industry, integrating different modes of transport with the ultimate aim of creating a seamless service that facilitates greater flows of cargo to strategic points. These different modes of transport used in modern international transport system in affecting trading, both at a domestic level and international level. The modes of transport are: roads, inland waterways, shipping lines, railways and air freight (Branch and Stopford, 2013). Branch and Stopford (2013) believe that trade competition still exists between different modes, as rail competes with road; short sea shipping competes with rail and road; and deep sea shipping with air freight transportation for higher value cargo.

The transport system can be categorised into three zones based on operations. Table 2.1 presents this with inter-regional transport, short-sea shipping and land.

Table 2. 1. International Transport Zones and Available Transport Modes

Zone	Area	Transport Sector	Vehicle
1	Inter-regional	Air freight	Plane
		Deep sea Shipping	Ship
2	Short sea	Coastal seas	Ship/ferry boat
3	Inland (Land)	Rivers and canal	Barge
		Road	Truck
		Rail	Train

Source: Adopted from Branch and Stopford (2013: 08)

Inter-regional comprising of: deep-sea shipping and air freight catering for long distance trade and transportation, short sea shipping catering for cargo transport over short distances, usually on a national scale or redistributing cargoes brought in by deep-sea shipping or transporting to landlocked countries without access to deep-sea shipping and land which comprises road, rail, river and canal (in land-waterways) (Branch and Stopford, 2013). For the purpose of this study, the deep sea inter-regional transportation (maritime) will be the only transportation mode to be analysed.

2.4.1.1. MARITIME TRANSPORT

Talley and Ng (2013) define maritime transport as a network over which carriers, ports and shippers are involved in the movement of cargo. It is an essential means of transportation for the

prosperity of a nation. It plays an important role in meeting a nation's needs and essentially affects the rate of development of the nation. Undoubtedly, maritime transport is often seen as the most cost efficient means of transportation as it is able to transport a bulk (heavy) and large number of goods over a longer distance, at a lesser or moderate cost, compared to other means of transport. It is therefore regarded as being crucially important to the modern society and also the backbone and lifeblood of global trade flows (Griffiths and Jenks, 2012). According to Martinez-Zarzoso and Nowak-Lehmann (2007), maritime and road transportation costs are important determinants of trade flows.

According to IMO (2013), maritime transportation is the backbone of world trade and globalization. Historically hailed as main freight transportation, Meng, Wang and Lee (2015) believed that it is one of the most effective ways of transporting large volumes of cargos across continents. UNCTAD (2013) reported that approximately eight billion tons of cargoes are carried each year by sea or maritime transportation. Alizadeh and Muradoglu (2014) in a paper titled "Stock Market Efficiency and International Shipping-Market Information" try to find out whether maritime freight transport rates are able to predict movements in the US stock market. They believed that maritime transport freight rate carries information about economic activity worldwide. The development and growth of modern international trade can be credited to the significant contribution of maritime transport. Though maritime transport has not singlehandedly catered for the demands of internationally traded goods movement without the concomitant interface of one or two of the other modes of transport. As the world economy strives amidst peaks and troughs, containerization and bulk cargo is still the most carried commodities, maritime transport, along with the rail and road transport sector are jointly credited with the effective movement of goods to accommodate the growing demands of international transport in international trade.

The growing demand for world seaborne shipping is evidenced in the increase of the world traded merchandise as well as the world's GDP (see figure 2.5 and 2.6).

Figure 2. 5. The OECD Industrial Production Index and indices for the world: Gross domestic product, merchandise trade and seaborne shipments, 1975–2013 (1990 = 100)

Source: Adopted from UNCTAD (2014: 3)

(Billions tons loaded)

Figure 2. 6. International seaborne Trade and Export of goods, 1955 - 2013

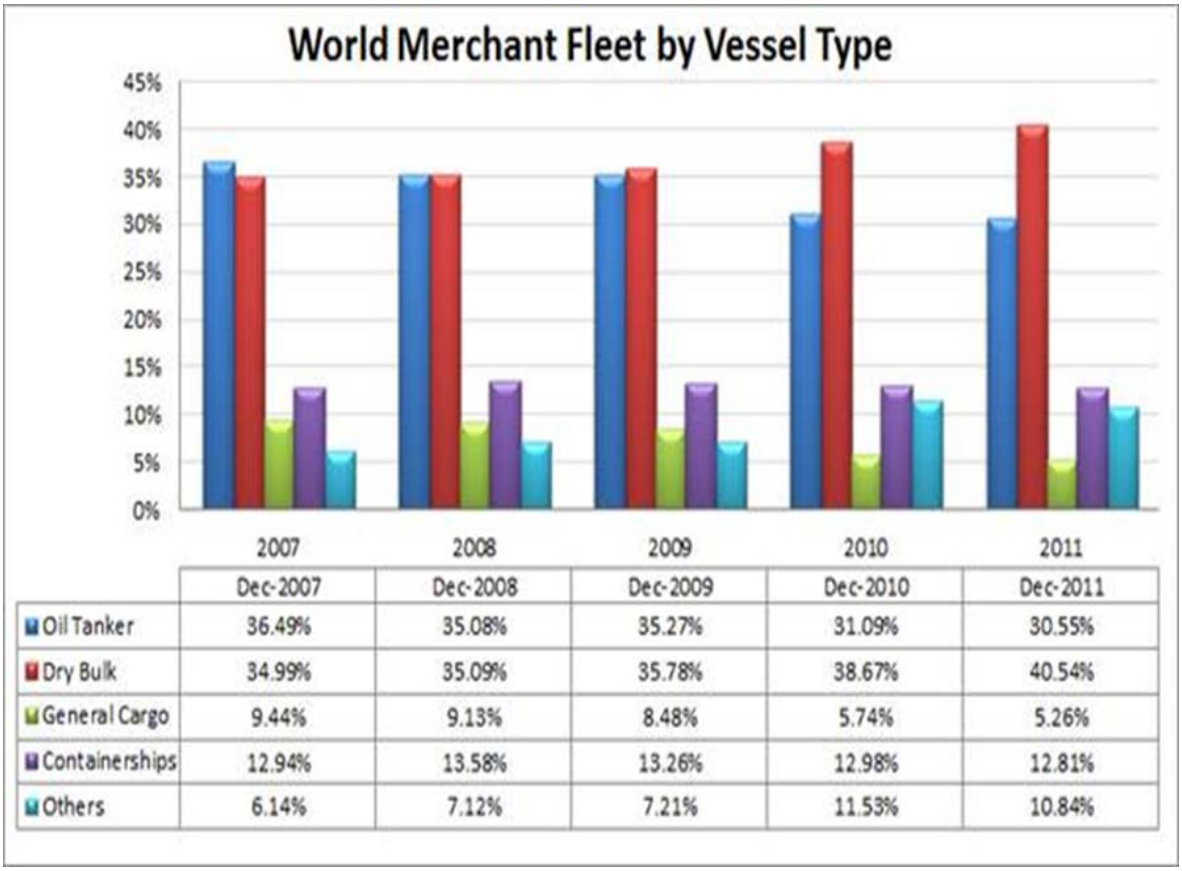
Source: Rodrigue et al. (2013a)

According to UNCTAD (2014), the world sea-borne trade performance in 2013 was shaped by various trends, including a more balanced growth in demand (trade), a continued persistent oversupply in the world fleet across the various market segments (see figure 2.7 and table 2.2. below).

UNCTAD (2012:15) asserted that "after the economic and financial crisis in 2008 the world fleet continued to expand during 2011 with an annual growth of almost 10%. In December 2001, a total tonnage of 1.534 million dwt was recorded for the world fleet. Dry bulk carriers, having the largest growth in tonnage of 13.9% in 2011, accounted for 40.5% of the world total capacity. Containerships increased by 7.2%, and comprised 12.8% of the world fleet".

Singh, Asmath, Chee and Darsan (2015) believed that throughout history, maritime activities have been instrumental in bridging civilization, promoting development and affording humanity a form of mobility whether for trade, transport or fishing among others. IMO (2013) and Singh et al. (2015) believe that maritime activities in the twenty first century have evolved into a vibrant economic sector substantially linking economies worldwide and by way of maritime transport, which accounts for about 90% (sea-borne) of the global trade. Of all different modes of transportation, deep-sea shipping is the highest volume. Stevens (2014) stated that world sea-borne

trade grew by 4.0% in 2011, bringing in total the volume of goods loaded worldwide to 8.7 billion tonnes.



	Dec-2007	Dec-2008	Dec-2009	Dec-2010	Dec-2011
Oil Tanker	36.49%	35.08%	35.27%	31.09%	30.55%
Dry Bulk	34.99%	35.09%	35.78%	38.67%	40.54%
General Cargo	9.44%	9.13%	8.48%	5.74%	5.26%
Containerships	12.94%	13.58%	13.26%	12.98%	12.81%
Others	6.14%	7.12%	7.21%	11.53%	10.84%

Figure 2. 7. World Merchant Fleet (2007–2011) and Percentage Capacity

Source: Adopted from CEIC, 2013

Table 2. 2. . World Fleet by principal Vessel Type, 2013–2014 (Beginning of year figures, thousands of dwt, percentage share in Italics)

Principal Type	**2013**	**2014**	**Percentage change 2014/2013**

Oil tanker	472 890	482 017	1.9%
	29.1%	*28.5%*	
Bulk carrier	686 635	726 319	5.8%
	42.2%	*42.9%*	
General cargo ships	77 589	77 552	0.0%
	4.8%	*4.6%*	
Container ship	206 547	216 345	4.7%
	12.7%	*12.8%*	
Other types	182 092	189 395	4.0%
	11.2%	*11.2%*	
Gas carriers	44 346	46 247	4.7%
	2.7%	*2.7%*	
Chemical tankers	41 359	42 009	1.6%
	2.5%	*2.5%*	
Offshore	68 413	71 924	5.1%
	4.2%	*4.3%*	
Ferries and passengers	5 353	5 601	4.6%
	0.3%	*0.3%*	
Other/n.a.	22 621	23 434	3.6%
	1.4%	*1.4%*	
World total	1 625 750	1 691 628	4.1
	100.0%	*100.0%*	

Source: UNCTAD Review of Maritime Transport (2014)

2.4.2. INTERNATIONAL TRANSPORT AND TRADE

From the 19th century Industrial Revolution, to globalization and the economic integration process of the late 20th and early 21st centuries, regions of the world have been affected in different ways by economic development. Jack, Meissner and Novy (2008:529) stated that "international trade costs are the costs of transactions and transport associated exchange of goods across national borders and thus, impede international economic integration". Trade and transportation have become vital components of economic growth and development with a growing share of the world's wealth being linked to world trade and its distribution protocols (Rodrigue et al., 2013d). Fujita and Thisse (2013) believed that transport by its very nature, is linked to trade, which as an act, may be characterised as being one of the oldest human activities, the transport of commodities

is, therefore a fundamental ingredient of any society. Therefore, people often get involved in trade because they want to consume goods and services that are not produced within reach.

International trade represents a viable option for increasing market share and profit, but also may present risk that may not be evident to a company, which might act as a limit to its domestic market (Lee, 2013). According to Behar and Venables (2011) transportation and transport cost is among one of the many factors that has shaped the pattern of trade. Improvements in transportation services and infrastructure will undoubtedly lead to improvements in export performance of tradable goods (Francois and Manchin, 2013). Nevertheless, international trade depends on a sound transport infrastructure with a sound logistic planning for support, a successful market analysis with effective entry strategies.

Martincus and Blyde (2013), trying to find problems affecting the relationship between internal infrastructure and trade, believed that assessing the impact of domestic transport infrastructure on trade is demanding in data. Their study suggested that "internal transport infrastructure and hence internal transport cost can be important determinants of trade. However, available evidence regarding what extent this infrastructure actually matters for exporting is at most very limited. Kellenberg (2015) shows that a better transport infrastructure leads to a fall in transaction costs associated with international trade.

However, transport systems, as lucrative as they might be to economic growth and development, have their negative externalities. Su and Rogers (2012) pointed out that transportation systems are being greatly criticised for their effect on the natural environment. Wu, Li, Liang, Zhang, Wang, Chen and Yu (2014) acknowledged the disaster of the oil spillage in the Gulf of Mexico in 2010.

Cristea, Hummels, Puzzello and Avetisyan (2013) believe that international trade generates greenhouse gas (GHG) emissions from two obvious sources; the production of traded merchandise, and their transportation between partners involved in the trade.

To some researchers, whether improved transport infrastructure affects economic growth and development is still arguable, Sahoo and Dash (2012) believe that strong emphasis needed to be laid on the importance of transport infrastructure for overall economic development in South Asia. Sahoo and Dash (2012) argue that for South Asia to maintain its present growth momentum, it's

essential for the region to strengthen different kinds of infrastructure facilities, transportation being at the core.

2.4.3. INTERNATIONAL TRANSPORT COSTS

International transport costs might be considered as the costs in monetary equivalent that must be paid for the provision of transportation services to deliver goods and services from a country of origin to a country where such goods are designated for use or consumption. Transport costs vary based on the transportation mode of choice, the composition and the nature of the goods (light goods or heavy goods), the infrastructure availability at both sides of the border, origins and destination and the distance over which goods will travel.

De Oliveira (2014) viewed transport cost as a component of import price, which translates (implies) that variation in cost has an impact on trade development. Transport costs might be seen as an important part of trade costs (Anderson and van Wincoop, 2004). For the sake of this study, transport costs may be defined as the direct shipping costs incurred in the movement of freight (goods) from point of origin to point of named destination. This definition in the case of international shipping trade covers freight and insurance from the port of exportation to the port of importation. Hummels (2007) noted that most international economists typically express transportation cost in terms of *ad valorem* costs, that is shipping costs relative to the value of the goods. Anderson and van Wincoop (2004) for instance, estimate trade costs to be about 170% equivalent of *ad valorem* tariffs.

However, neither international transportation costs, nor its measurement, were considered as a significant role player in determination of trade, but recent economists have acknowledged that infrastructure, distance, geographical characteristics and most importantly transportation costs, are major and important determinants of international trade and trade cost in particular. Recent literature by many researchers all argues that gravity effect on distance as proxy to transport cost. Hummels (2007) stated that *ad valorem* transportation costs for a particular commodity depends on the distance the goods is being shipped, the quality of the transport services offered and the weight/value ratio of the commodity. Martínez-Zarzoso, García-Menéndez and Suárez-Burguet (2003); Berthelon and Freund (2008); and Lafourcade and Thisse (2011) were of the view that

distance matters for trade because transport costs increase with distance. A recent survey by Naudé and Matthee (2007) concluded that transport costs are in fact the most important component of trade cost.

Transport costs may affect a firm's decision of industrial location (Behrens, Gaigne and Thisse, 2009). However, according to Kuwamori's (2006) interpretation of the term "transport cost" varies depending on the particular literature being reviewed. Often it means not only freight costs but other costs incurred in the transaction. Kuwamori (2006) citing Limao and Venables (2001); Micco and Perez (2002); and Martinéz-Zarzoso and Suarez-Burget (2005) emphasised the key role of the quality of transport infrastructure. It is believed that transport costs still have an important impact on economic development, they affect countries' productivity as well as their competiveness with global markets and the cost of delivered goods. Wilmsmeier and Sanchez (2009) stated in their journal "The relevance of international transport costs on the food prices: endogenous and exogenous effects" the finding that consumers bore the impact of the transport costs of food imports.

Rudaheranwa (2006) found out that high transport costs for a land locked country like Uganda, which is served by Mombasa and Dar-es-Salaam sea ports, have a negative effect on trade and economic growth. Interestingly, it was revealed that high shipping costs reduces the profit from exports and thus reduces a country's income level. It also inflates the price of imported inputs. Novianti, Panjaitan and Nugraheni (2015) citing Baier and Bergstrand (2001); and Krugman (2002) were of the view that the factor that encourages growth in world trade is a decrease in transport costs.

UNCTAD (2014) stated that smaller vessels are less fuel efficient per unit carried; therefore lower volumes of trade will lead to high freight costs. In the same sense it can be said that an increase in the volume of tradable commodities will cause a decrease in transport costs. Curtis (2009) believed that increased costs of transportation will decrease trade volume and alter a firm's geographical location. De (2007) agreed that trade costs are often cited as an important determinant of the volume of trade. Limao and Venable (2001) contended that trade costs vary across trading partners and the variance does not primarily depend on the distance. However, it seems that there is no agreed definition of what transport costs are. According to recent literature, Sourdin and Pomfret

(2012) believed that there is no perfect measure of trade costs because there is no agreed definition of trade costs (transport costs).

2.4.3.1. INTERNATIONAL TRANSPORT COSTS RELEVANCE TO TRADE

To comprise all costs, trade costs are adjudged, comprising costs incurred in the movement of products to their final destination or consumers, except the marginal costs of producing the commodity itself (Anderson and van Wincoop, 2004). De (2007) citing Anderson and van Wincoop (2004) stated that trade costs are huge, about 170% total trade represents a rich country *ad valorem* tax equivalent estimate.

It could be asked of what important significance are transportation and transport costs to the nature, volume and composition of global trade and trade costs in general. To what extent has the change in global trade been driven by changes in transport costs? Several authors and academic researchers have asked these questions over the years in order to establish the relevance of transportation and their costs in global trade and the trade costs. Studies were done by Hummels (1999); Limao and Venables (2001); Radelet and Sachs (1998); Micco and Perez (2001); and Sánchez, Hoffmann,Micco, Pizzolitto, Sgut and Wilmsmeier (2003), identifying the trading costs' determinants, especially the costs of transportation.

The connection between trade in general and transportation costs goes beyond just transportation costs. Transportation costs indirectly influence a country's productivity as well as its competitiveness within the international markets. Hummels (2007) indicated that transport cost plays a large role in altering and determining the relative prices across exporters. The weight/ value ratio of goods determines intensity of impact that transportation costs will have on its delivered price (Hummels, 2007). Transport costs also affect the shelf price of goods that the consumer pays for. Hummels (2007) believes that high valued goods require a special and extensive transportation care that might include insurance of such goods. Transport costs and care varies according to the nature of the goods being transported, fragile, perishable and down to goods low in value.

Goods traded in international markets incur bilateral transport costs. Which includes the domestic transport costs of getting the mass (goods) to the named port of export and the transportation cost

of getting the mass (goods) to its final foreign destination. The lack of efficient and effective transportation hinders a country's trade competitiveness.

To advance countries competitive advantages when it comes to global trade, transportation and transportation cost plays a significant role. This implies that transportation, and transport costs in particular, influence the cost competitiveness of a country in international trade. There are large differences in transportation systems and transportation costs across countries, which systematically correlated with a country's level of development. Adamopoulos (2011) indicated that rich countries have lower transportation costs and more transportation infrastructure than poor countries, for example, "the purchasing power parity (PPP) freight rail rates in Uganda and Mali are 10 times higher than those in the United States and Canada". So to say, the inefficiency of a country's transportation system works against them as a supressing tool of the country's comparative advantage.

The physical nature and value of goods determines the mode of transportation in which the goods could be transported for trade (De, 2007). This ultimately determines the costs of transportation of such goods and determines equally the volume of the particular goods to be transported. Storeygard (2013) found out that in periphery cities is Sub-Saharan Africa, increasing the transport cost decreases the trade there between manufactured goods and agricultural goods.

The cost of transport is essentially the price of providing services in trade (Sánchez et al., 2003). This service cost is argued to be the most upsetting or controversial aspect of trade cost. It is considered to have a significant impact in the final price of a product at the purchasing shelf in the market, as consumer's bear the impact of the transport cost. Sánchez et al. (2003) argues that lower transport costs reduces the final shelf price of goods, thereby increasing trade.

2.5. INTERNATIONAL TRANSPORT COST MEASUREMENT.

Over the years, the empirical and theoretical role of transportation costs and its role in international trade have received a wide view of attention, so also has the measurement of transport cost in global trade as a whole and the movement of traded merchandise in particular. According to Chen

and Novy (2011:206) empirical researchers faces a major challenge to measure overall trade cost since “direct measures are remarkably sparse and inaccurate”. Clark, Dollar and Micco (2004) explained that composition of trade additionally helps to explain transport cost differences across regions, due to the insurance component of transport costs; higher value products have higher charges per unit of weight. Clark, Dollar and Micco (2002) indicated that transport costs and its measurement are important to trade and the economy as a whole, more so than other trade or global tariff barriers. International policy barriers (both tariff and non-tariff), distribution costs and transportation costs (freight and time) are the main components of trade costs (Martinez-Zarzoso and Nowak-Lehmann, 2007). Micco and Pérez (2002) believed that transport cost is an important barrier to trade and could have an adverse effect on income. Hummels’ (2007) empirical study provided evidence from examining customs data. It consistently finds that transportation costs are large, and frequently larger than tariffs, and this poses a barrier to trade integration.

Transport costs, for many countries, provides more protection to trade today compared to the past. Martinez-Zarzoso and Suárez-Burguet (2005) consequently stated that obtaining reliable data is one of the difficulties faced in analysing transport cost. Both tariffs and non-tariff barriers have significantly decreased as a result of international trade negotiations which have reduced steadily tariff rates and non-tariff barriers (Hummels, 2007). The protection offered by transport cost should not be misconceived, because a misrepresentation of international transport cost either through measurement or interpretation could be terrible to the regions involved in both the short run and in the long run.

There have been several attempts in recent economic literature to measure transport costs directly and indirectly. Kleinert and Spies (2011) argued that transport costs are difficult to measure. Hummels (2009:135) in an explanation stated that, “international trade economists typically express transportation costs in *ad valorem* terms, which is, the cost of shipping relative to the value of the goods. Which is useful because it describes the size of the wedge that transportation costs drive between origin and destination prices, and because it facilitates comparison with tariff barriers”. Golub and Tomasik (2008) citing Hummels (2007) found that Hummels presents various direct measures of air and maritime transport shipping costs at an international level and only for a few particular countries

2.5.1. DIRECT AND INDIRECT MEASURES OF TRANSPORT COSTS.

International transport costs can be measured indirectly (as a proxy for direct shipping costs) and directly (country's direct port to port or door to door shipping costs). Trade statistics data shows that only a few countries report detailed information on shipping costs as part of their trade statistics, direct measures of transport costs have become difficult to source, so therefore many researchers have turned to indirect measures of international transportation costs in particular the country's imports cif/fob ratios. Micco and Pérez (2002); Chasomeris (2009b); Hummels and Lugovskyy (2006); and Kleinert and Spies (2011) show that direct measures are still difficult to obtain and this has without doubt motivated for indirect measures, the import cif/fob ratio as a proxy for direct shipping costs.

There are various data and information sources used for the indirect measure of international transportation costs:

- the use of data on international trade and transport costs from various primary sources including national data and shipping price indices obtained from shipping trade journals;
- the use of shipping company quotes obtained from service providers for the costing of transporting goods; and
- the use of trade flow data obtained from databases to draw on ratios of mirror trade reports as a proxy for shipping costs; etc.

Trade flow data from various databases of all these sources, is commonly used in drawing on ratio mirror trade reports as a proxy for shipping costs used to indirectly measure international transport costs.

According to Gaulier and Zignago (2010) in the absence of direct measures, many researchers turn to other techniques to derive trade costs estimates, indirect measures of freight cost by drawing on ratios of mirror trade reports in a country's import cif/fob ratio. In essence, this measure compares the cost, insurance and freight (cif) value with the free on board (fob) values of imports. Hummels and Lugovskyy (2006) indicated in their literature that exporting countries report trade flows exclusive of freight and insurance (fob.), and importing countries report trade flows inclusive of freight and insurance (cif.). Therefore, so to say, it is the valuation of the same trade flow reported

by the importer and exporter should yield a difference equal to transport costs Hummels and Lugovskyy (2006).

Chasomeris (2009a:149) made it clear that "the country's import cif/fob ratio, is given by [(cif/fob)-1], provides a measure of *ad valorem* shipping costs. In other words, it is a measure of shipping costs as a proportion of the value of the imported goods". The import cif/fob ratio has been used to measure transport cost, but recently some features of these import cif/fob ratios are still being questioned by some researchers, motivated by how accurate are these data, Chasomeris (2009a) (and this is discussed in sections 2.5.2 and 2.5.3). The obvious discrepancy of barriers to trade which range from countries to products and time has raised a questionable eyebrow and debate about the use of uniform/constant measurement (import cif/fob ratios) as a direct replacement or indirect measure for shipping costs.

Transport costs are sometimes regarded as the cost of shipping goods. Rudolph (2009) argued that these costs can be separated into direct costs, sometimes called costs of insurance and freight (cif.), and indirect transport costs, which includes cost of holding goods in transit, inventory costs due to buffering variability of delivering costs, preparation costs associated with size of the shipment and other costs. Many researchers have tried in several ways to capture trade costs with empirical data (Hummels, 1999; Limao and Venables, 2001; Redding and Venables, 2002; and Hummels, 2007). The determinants of transports costs vary from nation to nation, although there are some that are constant. These determinants are discussed in section 2.5.2 as empirical evidence are presented to show these determinants of transportation costs.

2.5.2. EMPIRICAL DETERMINANTS OF INTERNATIONAL TRANSPORT COSTS

International transport costs structure of a nation directly and indirectly plays an important role in configuring its economic stability and development. International transport costs, not only impact on a nations' cost of trade, but has potential to foster or thwart the sustainability of that nation's trade flow. This in turn impacts on GDP and income flow of that nation. It could be interesting to

ask why do some countries have higher transport costs than others? And what actually determines these costs?

Martinez-Zarzoso and Nowak-Lehmann (2007:46) stated that "a number of authors have recently investigated the determinants of transport costs from an empirical point of view (Radelet and Sachs, 1998; Limao and Venables, 2001; Micco and Pe´rez, 2002; Clark, Dollar and Micco, 2004; Egger, 2004; Combes and Lafourcade, 2005; Martinez-Zarzoso and Suarez-Burguet, 2005; and Kleinert and Spies, (2011)". These studies try to analyse undoubtedly all hosts of factors responsible for international transport costs determination. They state determinant factors ranging from geographical location and distance (explained by gravity models), the category of products being transported, economies of scale, energy prices, transport infrastructures, trade imbalances, modes of transport and tariff and non-tariff barriers as being important in explaining the variation in transport costs across countries.

Blyde and Molina (2015) showed that distance is obviously an important component of the costs of transportation between partner countries involved in international trade. Many conventional studies have interpreted distance effects as merely reflecting transport cost. Choi and Choi (2014) in their regression analysis conducted on 42 products from 48 cities, found significant effect of distance on transport costs in a broad product category, including services which are considered traditionally as non-tradable. In addendum to distance, Venables and Behar, (2010); and Wilson, Mann and Otsuki (2005) analysed four measures of trade facilitation: port facilities, custom handling, the availability of service sector infrastructure and the regulatory environment. Improvements in all these four measures would impact on both exports and imports costs of transportation as they concluded. Radelet and Sachs (1998) pointed out that maritime shipping cost will not only depend on the standardize size of the freight (e.g. a forty-foot equivalent container) but also on the composition of the freight, they went on to say that shipping costs will have greater impact on value added and labour intensive commodity. Although they based their study merely on explanatory variables related to geographical characteristic and distance, land locked countries and existing international borders, they used a country's import cif/fob ratios as the measurement of international transportation costs.

Chasomeris (2006) in adding to transport cost determinants stated that:

> "First, and most obviously, countries that are located further from major markets are likely to face higher shipping cost than proximate countries. Second, overland transport costs tend to be considerably higher than sea freight costs. Thus, for a given distance from the main markets, countries with a higher proportion of transit by land will tend to have higher overall shipping cost. Third, there are extra costs to inter-modal transport (e.g. in which freight must be shipped both by land and sea), because of the extra costs of transferring between transport modes. Fourth, shipping costs differ because of differences in the quality of ports' administration and/or ports' infrastructure. Countries with better functioning ports authorities, less red tapes for traders to work through, and more transparent and less corrupt customs clearance, are likely to have lower overall shipping costs. Variations in basic port and handling fees can differ widely across countries. Similarly, countries with adequate port capacity, stronger port infrastructure, and more sophisticated packaging and loading technologies are likely to have lower shipping and probably overall transport costs".

Geographical factors necessary or related to the movement of goods, whether the goods requires special transport condition (e.g. refrigerated transport), the number of efficient maritime service providers in the region, the development of containerized transport, trade imbalances, and practical restrictions, all determine maritime transport cost (Wilmsmeier and Martinez-Zarzoso, 2010). Clark et al. (2004) argues that trade composition is also one of the determinants of transport cost. On the other hand, Jonkeren, Demirel, van Ommeren and Rietveld (2011) stated that "imbalances in trade flows affect transport prices, because (some) carriers have to return without cargo from the low-demand region to the high-demand region. Therefore, transport prices in the high-demand direction have to exceed those in the low-demand direction. This implies that transport costs, and therefore trade costs, are fundamentally endogenous with respect to trade imbalances".

Another interesting factor argued by Sanchez et al. (2003) is that well efficient infrastructure affects or determines transport costs. Wilson, Mann and Otsuki (2005, cited in Wilmsmeier, Hoffmann and Sanchez, 2006) believed that port efficiency has a powerful and significant effect in determining international transport cost differences between countries. Martinez-Zarzoso et al. (2003) pointed out that large distance accompanied with poor infrastructures in trade partner countries as a notable factor that raises maritime transport costs. To make it clear, they attested

that further inclusion of infrastructure measurement will give not only a true cost of trade between countries, but would also improve the fit of regression.

Some researchers might argue that distance is dead in international trade, as innovations in transportation and information technology have led the way (Cairncross 1997; and Kandilov and Grennes, 2012). But other empirical studies, using gravitational models still believe that distance remains an important determinant of international transport costs and trade and a proxy for more than just transport cost (Anderson and van Wincoop, 2004; Hummels, 2007; Berthelon and Freund, 2008; Disdier and Head, 2008 and Martin, 2012). Korinek and Sourdin (2010) contended that "if distance is a proxy for transport and other trade costs, then the true effect of transport costs is impossible to determine".

Arguably, administrating factors in trade partners' point of entries and departure, most especially in developing countries, has not received much attention as influencing international transport costs. Because this factor is a human factor, it is regarded as less of a barrier to trade, as it could be addressed through interventions and policies.

Hoffmann (2001); Wilmsmeier (2003); and Wilmsmeier and Martinez-Zarzoso (2010) showed the effect of institutional factors on transport costs. Through their examination of the impact of port operator model on transport costs in the case of South America, they showed that the analysis of explanatory variables of port efficiency and proves that this does not only depend on infrastructures, but also on a series of variables related to administrative and political issues (Wilmsmeier and Martinez-Zarzoso, 2010).

There are difficulties experienced when it comes to effectively analysing maritime transport costs, these can be traced back to inconclusive and the complex nature of various factors that influence trade between different trade partners. Table 2.3 showcases the conditions affecting transport costs.

Wilmsmeier and Martinez-Zarzoso (2010) explained that obtaining reliable data is one of the main difficulties in analysing maritime transport costs. Sourdin and Pomfret (2009:8) stated that "trade costs depend on exogenous factors such as distance or landlockedness and on commodity characteristics that are only indirectly policy related (such as bulk/value ratios or perishability)".

Table 2. 3. Conditions Affecting Transport Costs

Conditions	Factor	Examples
Geography	Distance, physiography, accessibility	Shipping between France and England vs. shipping between France and Netherlands
Type of product	Packaging, weight, perishable	Shipping coal, shipping flowers or wine
Economies of scale	Shipment size	A 747 compared to 737 (passengers), a ULCC compared to a VLCC (freight)
Trade imbalance	Empty travel	Trade between China and United States
Infrastructure	Capacity, limitations, operational conditions	The interstate
Mode	Capacity, limitations, operational conditions	A bus compared to a car
Competition and regulation	Tariffs, restrictions, safety, ownership	The European Union, The Jones Act.

Source: Adopted from Wilmsmeier (2014:30)

2.5.3. THE IMPORT CIF/FOB RATIOS AS A MEASURE OF INTERNATIONAL TRANSPORT COST

2.5.3.1. DEFINITION

Sourdin and Pomfret (2012:751) stated that "the current best measure of aggregate trade cost is the cif/fob gap proposed by Hummels (2007)". Bergstrand and Egger (2011) acknowledged the cif/fob ratio as common factor for estimating trade cost between two countries as the measures is

not without flaws. De (2007:10) said that “the most straightforward measure in international trade for measuring international transport costs is the difference between the cif (cost, insurance and freight) and fob (free on board) quotations of trade”, emphasizing “the difference between these two values as a measure of the cost of getting an item from the exporting country to the importing country”.

Several researchers use an indirect measure in the estimation of transport costs between countries. Ideally, statistics on traded goods between two nations (countries) should be captured by the respective customs office in each nation. Country Y’s recorded export cost to Country Z should be identical to Country Z’s recorded imports cost from Country Y (mirror statistic). Though there could be discrepancy and errors caused by statistical methodology differences used by the two authorities, but we should expect a more or less similar mirror statistic.

Multiple factors can be prone to lead to discrepancies in “mirror statistics” (see Yeats 1995; Makhoul and Otterstrom, 1998; and Ferrantino and Zhi, 2008). The differences in reporting could be the cause of discrepancies as noted by Hamanaka (2012) because exports are reported on the basis as a free on board (fob), while imports based on a cost, insurance and freight (cif). The measure of a country’s international transport cost using cif/fob ratios was of difficulties in obtaining information for direct measure. Hummels and Lugovskyy (2006) inferred that many researchers uses import cif/fob ratios as measures for international transport cost in instances where information for direct measures are not available (also see Yeats 1978; Rose 1991; Baier and Bergstrand 2001; Limao and Venables 2001; Hummels 2001; and Bergstrand and Egger 2006).

According to Carrère and Grigoriou (2015:7) “the matched partner" CIF/FOB ratio technique consists in comparing the valuation of the same flow reported by both the importer and the exporter. This technique has notably been used in the literature to overcome the lack of data on the transportation cost. As the imports are reported including the cost insurance and freight (CIF) while the exports are net of these charges, the difference between the two trade flows should yield a difference proxying the transport costs”. Radelet and Sachs (1998) and Hummels (1999 and 2009) inferred that cif (cost, insurance and freight) measures all the value of imports at the point of entering for a country, which includes the costs of transport, insurance and freight, as opposed to fob (free on board) which measures the value of exports from the point at which the goods is loaded

on board a carrier vessel. Radelet and Sachs (1998) referred to cif/fob ratio as a shipping cost (sc) which arithmetically is defined as SC= (import CIF/Export FOB)-1.

Chasomeris (2009b: 451) explained that "a country's import cif/fob ratios have various names in different studies, for instance: shipping costs (Radelet and Sachs, 1998), *ad valorem* transport costs, *ad valorem* shipping costs and *ad valorem* freight rate (Yeats, 1978), freight factor, a country's average freight rate (UNCTAD, 2003:13), CIF/FOB band on imports and transport cost rate (Naudé, 1999a; 1999b), and cif/fob transport-cost factor, average cif/fob factor (Baier and Bergstrand, 2001)", and cif/fob factor (Bergstrand and Egger, 2011)

The IMF that provides most of the statistical data used in the measuring of import cif and fob ratios of a country, defines and discuss the concept in ITS (international trade statistics) to include the maritime movement of goods, and all movements of goods across different spectrum mode of transportation, from the point of origin to the point of the final destination of the goods. Chasomeris (2006) stated that the international chamber of commerce that is responsible for the publication of the official rules governing international trade terms in their "INCOTERMS" defines it as:

> "Free on Board: this term means that the seller's obligation to deliver is fulfilled when the goods have passed over the ship's rail at the named port of shipment. This means that the buyer has to bear all costs and risks of loss or of damage to the goods from that point. The FOB term requires the seller to clear the goods for exports. This term can only be used for sea or inland waterway transport. If the parties do not intend to deliver the goods across the ship's rail, the FCA (Free Carrier) term should be used."
>
> (UNITED NATION, 2011: 97)

> "Cost, Insurance and Freight" means the seller has the same obligations as under CFR, but with the addition that he/she has to procure marine insurance against the buyer's risk of loss of or damage to the goods during the carriage. The seller contracts for insurance and pays the insurance premium. The buyer should note that, under the CIF term, the seller is required to obtain insurance only on minimum coverage. The CIF term requires the seller to clear the goods for export. This term can only be used for sea and inland waterway

> transport. If the parties do not intend to deliver the goods over the ship's rail, the CIP (Carriage and Insurance Paid To) term should be used.
>
> (UNITED NATION, 2011: 98)

> Cost and Freight (CFR) "this term means that the seller's obligation to deliver is fulfilled when the goods have passed over the ship's rail in the port of shipment. The seller must pay the costs and freight necessary to bring the goods to the named port of destination, but the risk of loss or of damage to the goods, as well as any additional costs due to events occurring after the time of delivery, are transferred from the seller to the buyer. The CFR term requires the seller to clear the goods for export. This term can only be used for sea and inland waterway transport. If the parties do not intend to deliver the goods over the ship's rail, the Carriage Paid To (CPT) should be used.
>
> (UNITED NATION, 2011: 97)

The definition of incoterm cif and fob specifically states the use and representation of its extracted data as concerned only with sea and inland waterways (maritime shipping) transport measurements while IFS (International Trade Statistics) definition and data are applicable not only on maritime measurement but also to different modes of transport costs (Chasomeris, 2006). The United Nations (2004:19) recommend that the "statistical value of imported goods be cif and exported goods fob".

Chasomeris (2006) made clear the difference in definition of and the use of international import cif and fob measures and the definition by official Incoterm shipment cif and fob, which on that basis Limao and Venable (1999; 2001; and 2002) use a country's cif and fob ratio to estimate not only the impact of infrastructure on transport costs of a country but also on the trade flow. The studies and data definition of trade statistic data can be used to measure transport cost beyond direct shipping, while incoterm definition are intended for direct measurement of shipping cost between countries. Chasomeris (2006:13) found that strong challenges to this measure lies in the

definitions and the ability “to distinguish the international trade statistic use of cif and fob from the traditional Incoterm’s-maritime trade use-of cif and fob, but not all have the same definition”.

There are a number of sources that provide cif and fob data for the analysis and measure of international transport cost using import cif/fob ratios:

- the National Bureau of Economic Research (NBER) database from the United Nations;
- the Comptes Harmonisés sur les Echanges et L’Economie Mondiale (CHELEM)and Base pour l’ Analyse du Commerce International (BACI) database for International Trade Analysis from CEPII;
- the United Nations’ Commodities Trade Statistics Database (COMTRADE);
- World Integrated Trade Solution (WITS) data from World Bank
- the Direction of Trade Statistic (DOTS) data types, yearbooks and International Financial Statistics (IFS) all from the International Monetary Fund (IMF) and
- the Global Trade Analysis Project (GTAP).

However, all of these databases take their cue from UNCOMTRADE. According to the World Bank (2013a:28) “the principal data source is the United Nations Commodity Trade Statistics Database (UNCOMTRADE), which reports detailed bilateral export and import data. The database is regularly updated and includes information for over 170 countries, some of which have been reporting these types of statistics to the United Nations since 1962”. Gaulier and Zignago (2010:7) was of the view that “countries report to the United Nations their international trade statistics detailed by commodity and partner country. The UN Statistics Division disseminates the annual data reported via COMTRADE (Commodities Trade Statistics database), which provides very detailed trade data, accounting for more than 95% of world trade. COMTRADE provides data on imports, exports, re-imports and re-exports (in values and quantities) in different international product classifications but the most disaggregated is the Harmonized System 6-digit level”.

However, as noted by Hummels and Lugovskyy (2003), the IMF database has extensive data coverage for years and countries and they are at the disposals of researchers to make use in drawing an ideal mirror trade report ratio. They also infer that Dots data set covers bilateral trade flows

between over 200 countries of the IMF between 1948 and 2013. Like many empirical researchers, Ferguson and Gars (2014); Baldwin and Taglioni (2011); and Feenstra and Romalis (2012) made use of data from UNCOMTRADE to estimate cif/fob measures of transport cost. Glick and Rose (2015) use DOTS data set provided by IMF (International Monetary Fund) to estimate the effect of currency unions on trade. Rose (1991) used IMF's International Financial Statistic data and also updated Mitchell (1980) data from IMF's Government Finance Statistics data to measure trade ratios of nominal merchandise export plus nominal imports to nominal GDP.

Hummels and Lugovskyy (2003) attested that IMF DOT data set as allowing for a comprehensive import cif/fob ratio analysis. Hummels and Lugovskyy (2003) went on to establish that the three IMF data sources that reports cif/fob factors, which are in line with Chasomeris (2009a) are thus: DOTS (Direction of Trade Statistics) contain aggregated bilateral data of overall commodities, while DOTS year books and the IFS (International Financial Statistics) contain aggregated trade data of overall commodities. However, when compared one finds consistence on the level of trade reports for a given country, but cif/fob ratios are not consistently reported alongside of the three sources. However, many analysts and researchers consistently use one of the sources in their analyses (Hummels and Lugovskyy, 2003). There is still a lingering concern and fear as noted by Hummels (2007) cited by Bergstrand and Egger (2011) that this cif/fob ratios measures may incorrectly estimate the true transport costs.

2.5.3.2. NATURE AND COMPOSITION

The cif/fob ratio, as a measure of a country's international transport costs, has been used by several researchers and institutions. Chasomeris (2009a:148) citing Radelet and Sachs (1998:3) stated that "to use the ratios as a measure of (direct) shipping costs, many authors have essentially assumed that a country's import composition is reasonably stable so that the ratio reveals true differences in shipping costs rather than commodity mix effects". Chasomeris (2009a:148) proceeds to say that "a rise in a country's cif/fob ratios is supposed to indicate a rise in that country's (direct) international transport costs". Chasomeris (2009b) indicated that the cif/fob ratio is used as a measure of international transport costs and is not limited to authors, and organisations (World

Bank). Recent studies by Globerman and Storer (2015) used the same method of cif/fob ratio used by Frankel (1997) to estimate their measure of transportation costs.

Hummels (1999:3) found out that the IMF data are subjected to two errors or problems, "first the IMF data are of extremely low quality and rely on extensive imputation. Second, as aggregate data they are subject to compositional effects that mask the true time series in transport costs". Radelet and Sachs (1998) emphasised that IMF's published cif/fob ratios used in various studies, "of course, are not a perfectly accurate measure of actual cif/fob ratios, since they are in many cases estimated by IMF staff based on incomplete information. However, in that they show little variance over time, indicating that IMF staff retain a constant cif/fob conversion factor once it is established for a country, and revise it only infrequently". However, some authors still regard these ratios as a complete and true measure of international transport cost. Radelet and Sachs (1998) were doubtful about these measures supported the above statement by saying that "nevertheless, these data are relatively consistent and complete, and provide a good starting point for examining the general cost of international shipping for almost all countries in the world".

Nevertheless, the use of cif/fob factor as a measure of international transport cost is always criticised and questioned. Hummels and Lugovskyy (2003) believed that there are distortions evidenced in using these measures and useful information is not provided most of the time. There is a misunderstanding of the definitions, nature and composition of commodities traded and consequently the misuse of cif/fob ratios as a measure of international cost. Nevertheless, Kuwamori and 桑森啓 (2006) states that most empirical studies still employ the difference between cif and fob import values as a measure of transport costs, mostly use the IMF's Direction of Trade Statistics (DOTS) data.

Chasomeris (2005; 2007; 2009b) provided evidence that a country's composition of imports may drastically affect changes in that country's cif/fob ratios significantly. The assumption that a country's import composition is constant over time, has misled many analysts and researchers who use the ratio as a measure of international transport costs (Chasomeris, 2009a). The other aspect and nature of cif/fob factor as a measure of international transport costs as argued are the continuous changes in the composition of goods being traded by a country (Chasomeris, 2009a). Radelet and Sachs (1998:3) believes that countries will ultimately differ in their average cif/fob

ratios not simply because of true differences in costs of shipping for a given composition of goods, but also because of commodity mix differences.

Trade composition has a way of shaping transportation costs that are difficult to recognise under cif/fob factors as a measure of international transport costs. Chasomeris (2009b) authentically argued that trade composition influence on cif/fob factors and modal choices can invariably have the ability to influence transport costs measurements.

2.5.3.3. ERRORS, PERSPECTIVES AND PERCEPTIONS.

The measure of *ad valorem* shipping cost and the analysis as well as global trade and international transportation over the years have relied heavily on data from IMF's International Financial Statistics database and United Nation's COMTRADE database, through measures relating to cif/fob ratios among many others. But excessive reliance on these databases have been deemed by empirical studies as disastrous to the measuring and reflective movements of transactions on international trade and services and economic growth consequently (Ola, 2011)

This section seeks to outline the perception and perspective of analysis as well as the problems of lacking quality that emanate from the data sourced from IMF and UNCOMTRADE to measure the cif/fob factor. Inadequacy pertaining to the using of the cif/fob ratios as a measure of international transport costs, should be the errors mentioned and noted.

Henry, Kneller, Milner and Girma (2012:8) simply put that "the c.i.f./f.o.b. measure is not without its drawbacks. The principal one is that it is prone to measurement error. For one thing, the ratio is a crude estimate undertaken by the IMF for countries that report the total value of imports at c.i.f. and f.o.b. values, which themselves contain some measurement error". There are several reasons for differences in partner reports as construed by the IMF, these include: "differences in classification schemes, recording times, valuations, coverage, and processing errors as causes of inconsistent reports" (IMF, 2007:29).

Radelet and Sachs (1998), Hummels and Lugovskyy (2006), and Chasomeris (2006; 2009a), gave their respective views on the perception and perspectives on the acceptability and general usage of the ratio as a measure. According to Limao and Venables (2001); Chasomeris (2009a) and Feenstra

and Romalis (2012:21), the first of these errors is measurement errors. Gaulier, Mirza, Turban and Zignago (2008:4) proposed using the econometrics method that will condition out the measurement errors. Hummels and Lugovskyy (2003:1) commented that "IMF cif/fob factor are error ridden in levels, as such contain no useful information for cross–commodity variation or time series, but, however, the data still reveals some meaningful cross –exporter variation that can still be exploited by researchers".

Hamanaka (2012:36) citing Federico and Tena (1991) pointed out three elements that might lead to (in)accuracy of cif/fob data, which are regarded as unavoidable factors of structural differences (i.e. government), human errors (i.e. by customs) and deliberate misreporting (i.e. by traders). For manipulated trade activates like over invoicing and under invoicing (see Nitsch, 2012). See Fisman and Wei (2007) for the level of smuggling activities and corruption. That's why Javorcik and Narciso (2012:4) were unsure and questioned the role of customs officials in the CIF/FOB ratio discrepancy: "as most of the tariffs are *ad valorem*, customs officials could have incentives to overvalue the imports to increase the perceived tariffs". Without hesitation Barbieri, Keshk and Pollins (2009:472) suggested that erroneous trade reports may result from deliberate or non-deliberate actions by governments who record information; publish trade records and as such submit those to international organisations.

Several empirical studies directly addressed this error and inaccuracy problem with the cif-/fob factor as a measure of transportation costs (see Geraci and Prewo, 1977; Harrigan, 1993; Limao and Venables, 2001; Micco and Pérez, 2002; Chasomeris, 2009b; and Carrère and Grigoriou, 2015).

Chasomeris (2009a) justified that some measurement errors are as a result of incomplete information estimates by IMF staff, in that Gaulier et. al; (2008:4) believed that "errors of cif/fob calculation arise in the data not simply because of mis-measurement but because of differences in registration methods across countries". On that point Radelet and Sachs (1998:3) believed that "countries differs in their average cif/fob ratios not only because of true differences in shipping costs for a given good, but also because of differences in the commodity mix" and structural differences and policies which are assumed to influence the ways of import documentation.

Nitcsh (2012) attested that roughly almost half of IMF's DOTS database observations fall outside (1-2) range (which would be consistent with *ad valorem* transportation costs between 0 to 100

percent) the remaining observations substantially contain errors in levels (also see Gaulier et. al; (2008:5); and Hummels and Lugovskyy (2006)).

Kar and Cartwright-Smith (2009) classify that after a flat 1.1 correction, any cif/fob factor or ratio larger than 1, is seen as evidence of possible trade mispricing, while ratios below the threshold are treated or regarded as noise. However, data may contain error and can still be used, it is believed that this does have an adverse effect on the measure of transport costs (Hummels and Lugovskyy, 2006). Micco and Pérez (2002) did not support the usability of erroneous data based on the fact that cif/fob factor is an aggregate measure of all commodities.

Ferguson and Gars (2014:13) systematically put that "the lack of a quality-sorting result in the FOB data may suggest that quality sorting hypothesis is not valid, but it may also be driven due to higher reporting errors in the exporter-reported data". Hamanaka (2012:34) and Carrère and Grigoriou (2015:8) however, believed that import data is more accurate and reliable compared to export data, as a policy governments are more serious about recording imported goods as it's a source of revenue to the government in the form of tax and tariffs levied on the imported commodities.

However, no matter how hard customs try to provide accurate imports data, Carrère and Grigoriou (2015:10) cited that one of the evident reasons for misreporting of trade flows is undervaluation of imports to evade high tariffs. This can be evidenced in different empirical studies, Fisman and Wei (2004) on flow of trade between China and Hong-Kong. Mishra, Subramarian and Topalova (2008) noticed the misreporting in India. Rotunno, Vézina and Wang (2013) in all Chinese imports from its multiple trading partners (exporters) and Javorcik and Narciso (2008) in ten transition economies.

2.6. THE PERCEPTION OF TRANSFER PRICING IN OVERVALUATION OF IMPORTS.

Transfer pricing can be understood as the price charged for products and services sold between controlled or related multinational firms in the same organisation or simply put, a price at which a firm sells goods to its intra firm or even independent industry.

In Shunko, Debo and Gavirneni (2014: 2045) “transfer pricing is an intra-organisation price used for transactions between subsidiary or affiliated companies within the same enterprise”. Ponduri (2015:1) defines transfer pricing as “the price at which goods and services are being transferred between two or more divisions of the same company”. However, there are different definitions on what transfer pricing is, but all are similar to the above (Gilbert, McMillian and Walters, 2013; Hammami and Frein, 2014: 243; Jost, Pfaffermayr and Winner, 2014: 261; Chen, 2015:2; and Chan, Lo and Mo, 2015).

Transfer pricing has been a practice for many countries since 1930. The Organization for Economic Co-operation and Development (OECD) and the United States developed some guidelines in 1979. In 1988 the United States led the development of comprehensive guidelines and proposals in 1990-1992, which in 1994 became the regulation of transfer pricing. However, OECD in 1995 issued its current transfer pricing guideline first draft, which substantially was emended in 1996 and 2010 (Ponduri, 2015:2)

However, to curb profit shifting through manipulation of transfer pricing, tax authorities substantially apply the arm’s length principle (Keuschnigg and Devereux, 2013). The arm’s length principal is set out in detail in article 9 of the OECD Model Tax Convention. Keuschnigg and Devereux (2013:432) defines arm’s length as that price at which transaction would take place, buyer and seller acting independently as if they were unrelated parties.

Accordingly, transfer pricing can be viewed as an astute mechanism adopted by multinational firms for valuing the services and goods traded with their associate companies, with the aim to minimise tax (*ad valorem* tariff) for a greater profit. In that Shunko et al. (2015) was of a view that transfer pricing is used to determine profits and as such used to shift income from high tax jurisdiction to lower tax jurisdiction. As a common practice there is a trade gap with high tariff. Fisman and Wei (2004) indicated that import duty evasion rises with *ad valorem* tariff. Javorcik and Narciso (2008) argued about the possibility of faking invoices in differentiated products. It could be seen as a move that creates, trade gaps and distorted trade data.

Ferrantino and Wang (2008) and Hamanaka (2011) accordingly believed that the shifting of profit through transfer pricing could lead to overvalue of price of imported goods, in an attempt to evade local taxes, thereby shifting profits away from the importing country, Carrère and Grigoriou (2015:11) agreed to the above literature.

How much the firms involved in transfer pricing benefit from the practice is in their intents to evade tax and to maximise after tax profit. A survey done by Ernst and Young (2007) showed that over 90% of the companies surveyed indicate that transfer pricing is crucial for international taxation issues and with about 31% of the companies indicating that it will be beneficial to them over the next few years.

Transfer pricing has been used as a way to move taxable income from the country where it was earned to another country in other to minimise income tax, de Boyrie, Pak and Zdanowicz (2005:218) argued that one of the ways to achieve this is by over invoicing imports and under invoicing exports. Evidence of bad trade practises that questions the accuracy of trade statistical data. Pak and Zdanowicz (1999) estimated that between 1998 and 1999 USA treasury lost about US$35.6 billion and US$46.2 billion of tax revenue due to transfer pricing issues in international trade. “Within the South African context, the commissioner of South African Revenue Service (SARS) told parliament’s finance committee on 8 May 2012 that SARS has detected an increase in the use of cross border structuring and transfer pricing manipulations by business to unfairly and illegally reduce local tax liabilities” (Mberi, 2012:1).

2.7. CONCLUSION

The literature review revealed that an effective transport costs mechanism is critical to the liberation of trade and economic growth, as it enhances an inroad into the world market thereby making the way for a most favourable distribution of resources and productivity which encourages economic growth.

Going through other similar literature on the measure of international transportation cost and the use of import cif/fob as a proxy to measure direct international transport cost, can be said to have made clear to the evidence of misrepresentation and misuse of import cif/fob ratios as a measure

of determining and consequently reporting international transport costs. Several shortcomings were encountered in the literature of this chapter that makes the use of import cif/fob factor measures questionable. The most debatable aspect on the use of these ratios as a measure of international transport costs observed in the review are the presumed definitions under which the import cif/fob ratios are being used, the source and data nature used to show the ratios, and the assumption that trade composition are constant in applying the ratios.

However, the measurement errors, a common perspective and perception of the users and providers of the cif/fob ratios, were reviewed. The ratios are often prone to measurement errors in the values of import cif and import fob; data documentation error by reporting or source countries; IMF staff imputations; the commodity classification error and the aggregate assumption error. Many opinions and reviews were collected on these errors to assess the conditions under which the cif/fob ratios were applied with the corresponding errors.

The chapter then delved into the perception of transfer pricing in overvaluation of imports. While not the main core objective of this study, the researched literature elaborated and looks into the corrupt practices of trade that distort trade data, (that is deliberate misreporting), individuals and firms seeking a way to evade import tariff.

CHAPTER 3

RESEARCH DESIGN AND METHODOLOGY

3.1. INTRODUCTION

This very chapter explains the research methodology, data collection and the exact analysis techniques that were used for this study. The research approach and the strategy employed in form of design and nature of the study, variables, sampling and sample choices used in the study are discussed in this chapter. In chapters 1 and 2 the view and platform for this research and the need was well reviewed, as well as the empirical literature that surrounds the measurement of

international transportation costs, precisely the use of cif/fob factor as a general measure for international transport costs. This chapter will discuss the measures, in terms of procedures and research instrument used in the analysis of this study. Throughout this chapter, theories behind the research methodology adopted will be reviewed and their application as it pertains to this research will be broadly elaborated. The data collection and how data is derived from secondary sources will be dealt with in this chapter, detailing the condition under which the various stages investigated were carried out and the approach used.

3.2. THEORETICAL FRAMEWORK

Darko-Ampem (2004:134) brilliantly put that “every type of empirical research has implicit, if not explicit, research design. In the most elementary sense, the design is a logical sequence that connects empirical data to a study's initial research questions and ultimately, to its conclusions”. Yin (2013) listed four problems when it comes to research in the sense of design research blue print: what question to study, what data to collect, what data are relevant and how to consciously analyse the result. It is in every sense much more than a work plan because the principal or prime purpose is to help avoid situations where evidence does not support or address the initial research questions.

However, Darko-Ampem (2004:134) pointed out that “research design deals with a complex logical problem and obviously not a logistical problem, as it elucidates how researchers will address the two critical issues of representation and legitimisation”. In addition, Yin (2013) believed that “a research design describes a flexible set of guidelines that connects theoretical paradigms to strategies of inquiry and methods for collecting empirical material. It situates researchers in the empirical world and connects them to specific sites, persons, groups, institutions, and bodies of relevant interpretive material, including documents and archives”.

3.3. THE NATURE OF STUDY AND RESEARCH DESIGN

It is very important to establish a research design from which to approach research blue print problems, with the aim of describing and understanding the problems from the vast different points of view, so as to provide tolerable answers to the research problems and questions thereof.

Research methodology can be approached either from a qualitative or a quantitative perspective, or ultimately a mixed approach. In a case where both quantitative and qualitative methods were employed, Silverman (1995:2) states that, depending on theories, hypothesis and research questions, and methods from both approaches can be used in the same research project. Blumberg, Cooper, and Schindler (2008: 191) inferred that the difference "between a qualitative and quantitative study is based mainly on the kind of information used to study a phenomenon. Creswell (2013:4) stressed that the difference between qualitative research and quantitative research is framed in terms of word usage (qualitative) rather than numbers (quantitative). As their names suggest qualitative studies based their accounts on quantitative information (i.e. words, sentences, description, exploratory and narratives). The mixed research is a third legitimate paradigm of research. This involves the mixing of both quantitative and qualitative methods and paradigm characteristics.

Darko-Ampem (2004:135) (cited in Leedy, 1997:104) defined a quantitative study as "an inquiry into social or human problems, based on testing a theory composed of variables, measured with numbers and analysed with statistical procedures in order to determine whether the predictive generalizations of the theory hold true". In comparison, he defined a qualitative study as "inquiry process of understanding a social or human problem, based on building a complex, holistic picture, formed with words, reporting detailed views of informants, and conducted in a natural setting". Darko–Ampen (2004), cited Denzin & Smith, 1998:3) added that: "Qualitative research is multi-method in focus, involving an interpretive, naturalistic approach to its subject matter". This means that qualitative researchers attempting to make sense of, or interpret phenomena in terms of the meanings people bring to them, studying things in their natural settings. Qualitative research is difficult to define as it has no paradigm or theory that is distinctively its own (Ritchie, Lewis, Nicholls and Ormston, 2013:2). Based on these analogies a quantitative method is ideally suited for this study.

The inductive method of research was used to draw observation and irregularities in the use of cif/fob factor as a measure of the international transportation cost and the role of the composition of imports in its bilateral trade flow, using secondary data.

Secondary data analysis positively impacted on the characteristic of research studies. Clark (2013:57) defined secondary data as "information that has already been collected by someone else and which is available for you, the researcher, to use". Brakewood and Poldrack (2013: 675) argued that denying the use of secondary data or existing data may invariably reduce the ability to expand or spread the benefit of knowledge by reducing access for a larger population sample to which it may be generalized. Trzesniewski, Donnellan and Lucas (2011) referred to secondary data as being rich and having a long tradition in the social sciences. Although the data of this research is quantitatively analysed, the whole design did wholly qualify as such to be referred as quantitative in nature.

The research was designed to source, compile, calculate and compare the country cif/fob ratios for South Africa, the United States of America, Germany, Venezuela and Australia from the year 1980 to 2012.

Brockwell and Davis (2013:1); and Chatfield (2013) stated that time series is set of observations, of which each one is being recorded at a specified time. Granger and Newbold (2014:2) added that such record could be hourly, daily, monthly and quarterly or at any predetermined equal-interval time points, in which data are gathered in describing changes over time, with the aim of answering certain research questions.

3.4. VARIABLES

Many empirical researchers in social science are most interested in relationships among variables. Babbie (2015:15) believed that variables are logical sets of attributes, in which attributes are characteristics or qualities that describes an object. Bless, Higson-Smith and Kagee (2006:30) defined variables as "an empirical property that is capable of taking two or more values".

There is nothing more surprising about the notion of dependence and independence variables (Blumberg et al., 2008). Dependent variables are what are of important to researchers, since independent variables are manipulated to determine its value, in that Bless et al. (2006:31) agreed

that variation in dependent variable is as a result of change in independent variable. Researchers hypothesize the relationships of these two variables: they invent them, and they by reality try testing them to see if the relationship actually worked out (Blumberg et al., 2008). This study goes along the same way, to see the relationship between transport cost measurement (cif/fob ratio) and the composition of imports.

3.4.1 TYPES OF VARIABLES

Sekaran (2003), Bless et al. (2006:31), Blumberg et al. (2008), and Wimmer and Dominick (2013) all stated that, independent and dependent variables are the two most important types of variables. As suggested by their name, both are tied to each other in a relationship. The term independent and dependent variable are commonly used in econometric models (Wooldridge, 2012). According to Wooldridge (2012), any other factor causing variation in dependent variable (y) other than that caused by change in independent variable (x) is regarded as being unobserved.

3.4.1.1. INDEPENDENT VARIABLES

As emphasised by Schwab (2013:12), independent variables are variables that seeks or thought to effect or at least predict dependent variables. Bless et al. (2006:30) sees it as variable influencing other variables. On the other hand, Whitley, Kite and Adams (2012:16) explained that the independent variable is the variable that a theory or study proposes as a cause of another variable. Gadenne (2013:2) and Gray (2013:29), see independent variables as variables that are manipulated. In this study the composition of imported goods are manipulated value which effects, rather than completely determine the measurement of international transport cost (as measured by the cif/fob ratio).

3.4.1.2. DEPENDENT VARIABLE

According to Schwab (2013:12) “dependent variables are outcomes or consequences; they are variables that researchers seek to understand, explain and/or predict”. In addition, Whitley et al. (2012:16) cited that it is a variable caused by another variable, that is its outcome or value is influenced by an independent variable. In this study, the cif/fob factor is analysed as a dependent variable, because its outcome or values are a measure of international transport costs is affected by the imports composition.

3.4.1.3. EXTRANEOUS VARIABLES

Extraneous variables can also be called confounding variables, which are not independent variables, but could affect the outcome or result of an experiment. Gadenne (2013:2) defines extraneous variable as that other variables or factors which could also affect the dependent variable (y). Gadenne (2013) believed that these variables could be controlled by eliminating them or keeping them constant in a study. These factors are usually not measured or considered in the measurement of international transport costs using import the cif/fob factor.

“In the COMTRADE database, countries report only strictly positive trade flows. Hence, there is no distinction between zero trade flows and missing values in raw data. Moreover, we exclude the "999'999" classification at the HS6 digit, as this code corresponds to "unspecified" goods” Carrère and Grigoriou (2015:12).

3.5. DATA COLLECTION

Data collection is critical to every research study; it’s often a prominent factor in determining the success of a research project (Wilcox, Gallagher, Boden-Albala and Bakken, 2012:68). According to Bryman and Bell (2015:12) data collection is “the key point of any research project”. Darko-Ampem (2004) named several data collection methods, including interviewing, participant observation, past research and document study, physical artefact, field research and historical-comparative research. However, a good research study will want to use as many sources as possible, because no single source has complete advantage or more favoured over any of the others.

There are two sources of data analysis that can be used in empirical study, the primary data analysis and secondary data analysis.

Sekaran and Bougie (2010:184) defined secondary data as "material information gathered by someone else other than the researcher conducting the study". Secondary data sourcing is one common source used by researchers. It involves the gathering of information made available for purposes other than for the completion of a research project. Furthermore, there are pitfalls and potential shortcomings in using secondary data (Clark, 2013), there are useful books containing extensive discussion of the issues raised by using secondary data are included in those by Healey (1991); Dorling and Simpson (1999); Fielding (2000); and Walford (2002).

Sekaran and Bougie (2010:180) defined primary data as first-hand information obtained by the researcher conducting the study on variables of interest for the specific purpose of the study. According to Bryman (2012:13) and Bryman and Bell (2015) in primary data, the researcher or the researchers who collected the data do the analysis, compared to secondary whereby someone else analyses the already available data.

Scheaffer, Mendenhall and Gerow (2011:2) believed that we depend on data to make intelligent decisions. According to Rani (2004) and Sekaran (2000), the researcher must specifically set up respondents for the research – individuals, groups, and a group of respondents whose opinions may be sought on particular issues.

For the sake of this study, only secondary data were sourced. According to Emory and Cooper (1991), secondary data were often used for three research purposes: 1) as an integral part of the larger study: 2) to fill a need for a specific reference on some points; and 3) as the sole basis for research study.

The data for imports cif/fob factor measurements were sourced from Quantec Easy Data for all five countries from 1980 to 2012. The imports cif/fob data for 2013 to 2015 were not available when these data were downloaded in 2013 from Quantec Easy Data and the data is no longer accessible now in the Quantec database. Germany's cif/fob data were not available in the database from 1999 onwards.

The SITC data on the five nations used as a case study were sourced from WITS (World Integrated Trade Solution) of World Bank from 1980 to 2014. The standard international trade classification

data was not available in 1980, 1981 and 2014 for Venezuela from the WITS database at the time these data were downloaded for this study. South Africa SITC data for 2014 were also not available from the WITS database.

3.6. SAMPLING THEORY AND CHOICE OF SAMPLE

Guetterman (2015:2) cited Creswell (2015) state that "Sampling in quantitative research typically follows random sampling procedures". Purposive sampling also known as judgemental sampling is selecting a sample on the basis of your own knowledge of the population, its elements, and the nature of your research aims (Latham, 2007). Based on this, the choice of the five countries selected for this study was purposefully or judgementally selected.

Table 3. 1. South Africa's Annual Import Cif and Import Fob from 1980-1985

South Africa	cif anually	fob anually		South Africa ratio(CIF/FOB ratio)	1-CIF/FOB ratio	100%
1980/12/31	15263700000	14362700000		1.062731938	0.062731938	6.273194
1981/12/31	20118300000	18438700000		1.091091021	0.091091021	9.109102
1982/12/31	19986500000	18373700000		1.087777639	0.087777639	8.777764
1983/12/31	17617000000	16204000000		1.087200691	0.087200691	8.720069
1984/12/31	23537900000	21635800000		1.087914475	0.087914475	8.791448
1985/12/31	25226300000	22690600000		1.111751122	0.111751122	11.17511

Adapted from: Quantec Easy Data, TIPS 2013

The table 3.1 shows a snap shot from an excel spread sheet of annual import cif and annual import fob of all international trade in South Africa from 1980 to 1985. The table also shows cif/fob ratio (South Africa ratio), calculated by dividing import cif with import fob. Cif/fob ratios were calculated for the five countries (South Africa, Germany, United States, Australia and Venezuela) chosen for the purpose of this study from 1980 to 2012. Table 3.2 shows a snap shot from an excel spread sheet of United States SITC data from 1980 to 1990.

Table 3. 2. United States SITC data from 1980-1990

SITC	0	1	2	3	4	5	6	7	8	9
1980	6,68314	1,196392	4,497402	32,51082	0,22754	3,539999	13,55563	25,23226	9,822833	2,733989
1981	6,04261	1,250478	4,465912	30,84547	0,192656	3,563343	14,46318	26,51149	10,03501	2,629846
1982	6,166301	1,438291	3,70275	26,48479	0,175484	3,878606	13,80554	29,86077	11,55435	2,933112
1983	6,180529	1,37468	3,854231	22,26092	0,200513	4,176007	13,7046	32,99325	12,39839	2,856886
1984	5,689871	1,174305	3,541488	18,50633	0,218369	4,186886	14,46677	36,11602	13,20856	2,891401
1985	5,607427	1,141211	3,139673	15,42569	0,203094	4,176721	13,77282	39,24689	14,19506	3,091415
1986	5,78027	1,091966	2,930288	10,28444	0,152076	4,014931	13,4914	42,998	15,39745	3,859184
1987	5,238873	1,051985	2,942723	11,02815	0,150452	3,943678	13,406	43,17285	16,13513	2,930158
1988	4,728837	0,973575	3,131162	9,587452	0,201176	4,438138	14,2217	43,99262	15,95771	2,767626
1989	4,553296	0,951283	3,350726	11,3816	0,159095	4,318782	13,33181	42,72961	16,22209	3,001715
1990	4,629339	0,960966	3,061515	13,28627	0,168071	4,46926	12,34092	41,33056	16,40017	3,352914

Source: Authors calculations from data adopted from World Bank (WITS Database), TIPS 2015

The Standard International Trade Classification (SITC) is a numeric standard code developed by the United Nations to classify, based on a hierarchy, commodities used in international trade, with Products Codes: (0-9 represents product code)

0- Food and live animals;

1- Beverages and tobacco;

2- Crude materials, inedible, except fuels;

3- Mineral fuels, lubricants and related materials;

4- Animal and vegetable oils, fats and waxes;

5- Chemicals and related products;

6- Manufactured goods classified chiefly by material;

7- Machinery and transport equipment;

8- Miscellaneous manufactured articles;

9- Commodities and transactions not elsewhere classified.

Mbokane (2009:85) cited Hungler and Polit (1999:37) refers to population as a totality or aggregate of all groups of people, items, subject or object that conform to a set of specifications. Levy and Lemeshow (2013) indicated that population are sets of entire individuals to which finding of the survey are to be extrapolated. Sekaran (2003) believed that population is critical to researchers as it contains those units they are keen on investigating.

3.6.1. REASONS FOR SAMPLING

Mugo Fridah (2011) outlined six reasons for sampling instead of doing census, which are economy, timeliness, the huge size of population, destructiveness of the observation, accuracy and inaccessibility of some of the population. The countries chosen for this study were done based on completeness and accessibility of data necessary for the analysis. The author believed that sampling is economical because fewer resources are needed compared to population. Information is quick to obtain and it may always be more accurate than census (population). Sekaran (2003) was of the view that working with sample (smaller number) ensures less fatigue and less error prone to that of using a large number (population). See Singh and Mangat (2013) for more reasons for sampling.

3.6.2. CHOICE OF SAMPLE

The researcher wanted to get trade (imports) information from developed and developing countries. Two developing and three developed countries were identified by the researcher, each with very different significant trends, data and information. In terms of their trade accessibility and trade report, the developing countries were crossed examined with trends from developed countries against the cif/fob factor as a measurement of international transportation cost and the threshold of the composition of imports. The researcher ended up with information for five different ones covering the period 1980 to 2012 for cif/fob ratio and a period from 1980 to 2014 for composition of imports (i.e. SITC)

3.7. LIMITATIONS

Accurate information and correct data is the key to success. The analysis of this study is based on secondary data (trade reports) and previous related literatures, and the way in which they were analysed (imports cif/fob ratio and the composition of import) to measure the costs of international transport. The data used or rather sourced for the purpose of this study met the required needs of the research analysis and was current to specification required.

The secondary use of large scale data sets always presents some certain challenges and drawbacks. The major drawback to data collection and validation was the basis that data on countries are at times estimated by the data providers to conform to their original needs and some data provided by member bodies were at times equally incomplete, either by design or prone to error.

3.8. THE RESEARCH MEASURES AND PROCEDURE

3.8.1. THE MEASURE

Developed by researchers, measures are at the core of doing any research. According to Pedhazur and Schmelkin (2013) measurement is the "Achilles' heel of social behavioural research". This is clear in a way that in almost all research, everything eventually has to be reduced to numbers, and this gives results and precision in measurement which is very important. Stevens (1968:850) defined measurement as "the assignment of numbers to aspects of objects or events according to one or another rule or convention". Webster and Eren (2014) coined that it is a process of assembling information from the physical world and comparing the information gathered with an agreed standard.

Measurement pervades almost every plane of our lives and day to day activities. We measure a variety of things (for example: temperature, weight, time, distance and ingredients to be used in cooking). One of the great advantages in using measurements according to Pedhazur and Schmelkin (2013) is that it allows application of powerful mathematical tools to study the phenomena. Stevens (1951) proposed four types of measurement instruments from the unrefined to the most elaborate: nominal, ordinal, interval, and ratio.

Secondary data sourcing was selected as the most suitable research instrument for exploring the study, considering the nature, phenomenon and outcome expectation of this study.

Therefore, the research measure was structured:

- ✓ To test a hypothesis of casual relationship between variables (Cited in Kothari, 2004, p2)
- ✓ To examine the theory on the data's parameter

- ✓ To provide step by step systematic procedure of analysis
- ✓ And to stay close to the data as much as possible so as not to generate another misconception of the measure.

However, to achieve this, quantitative research design was used with a descriptive and inductive measure of approach, which means that the study manner of approach measure is from a specific broad conceptual level.

3.8.2. PROCEDURES

Research in a simple term refers to a search for knowledge. In fact, research could be regarded as an art of scientific investigation. Ellis and Levy (2008:23) defined research as a systematic and scientific search for apropos information on a particular topic. Kothari (2004:1) defines research as "the systematic method consisting of enunciating the problem, formulating a hypothesis, collecting the facts or data, analysing the facts and reaching a conclusion either in a form of solution(s) towards the concerned problem or in certain generalisation for some theoretical formulation".

As indicated earlier, quantitative research method was chosen for this research study. However, this methodological approach has rapidly developed in the last few years in other research fields, mainly in health sciences and education, and has led to essential theoretical advancements (Aguinis and Molina-Azorina, 2015)

3.9. DATA ANALYSIS PROCESS

The following data analysis process, which they adopted from Sekaran (2003:301), Aalam and Aini (2013:33), which was modified by the researcher for the purpose of this study:

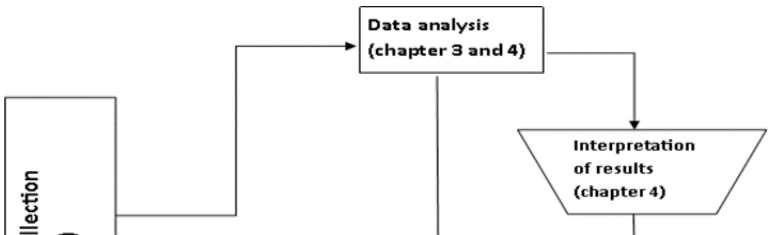


Figure 3. 1. Flow Diagram of Data Analysis process

Source: Adapted from Sekaran, (2003:301) and Aalam and Aini (2013:33)

3.9.1. PREPARING DATA FOR ANALYSIS

The initial preparation involves finding the cif/fob ratios, the ratio is gotten by dividing imports cif with export fob data collected for the five countries from 1980 to 2012. Then the next stage involves finding the country's annual compositions of imports ratios (see appendix tables A1, A2, A3, A4 and A5). At this stage data analysis involves editing, taking care of blank trade report periods, and putting the data into categories to make the next phase of interpretation easier. As said earlier secondary data was being used for the purpose of this research, most of the data has been prepared for analysis. According to Njeru, Bwisa and Kihoro, (2012:60) who cited Sekaran,

(2003), there are three major objectives in data analysis; getting a feel for the data, testing the goodness of the data and testing the hypothesis developed for the data.

3.9.2. FEEL FOR THE DATA

Getting to understand how good and consistent the data is and how well the previous stages of editing, coding and categorising has been done are paramount to the researcher. The achievement of this is done through the use of descriptive statistics such as mean, standard deviation and correlation analysis. This phase of research stands as a point of assessing how good the ranges or scales assigned to the research data are in accordance to the data preparation (Sekaran, 2003:306)

3.9.3. TESTING THE GOODNESS OF THE DATA

The test for the goodness of data is done by checking for reliability and validity of the data (Sekaran, 2003). Figure 3.2 shows the different forms of reliability and validity tests conducted when checking for goodness of data.

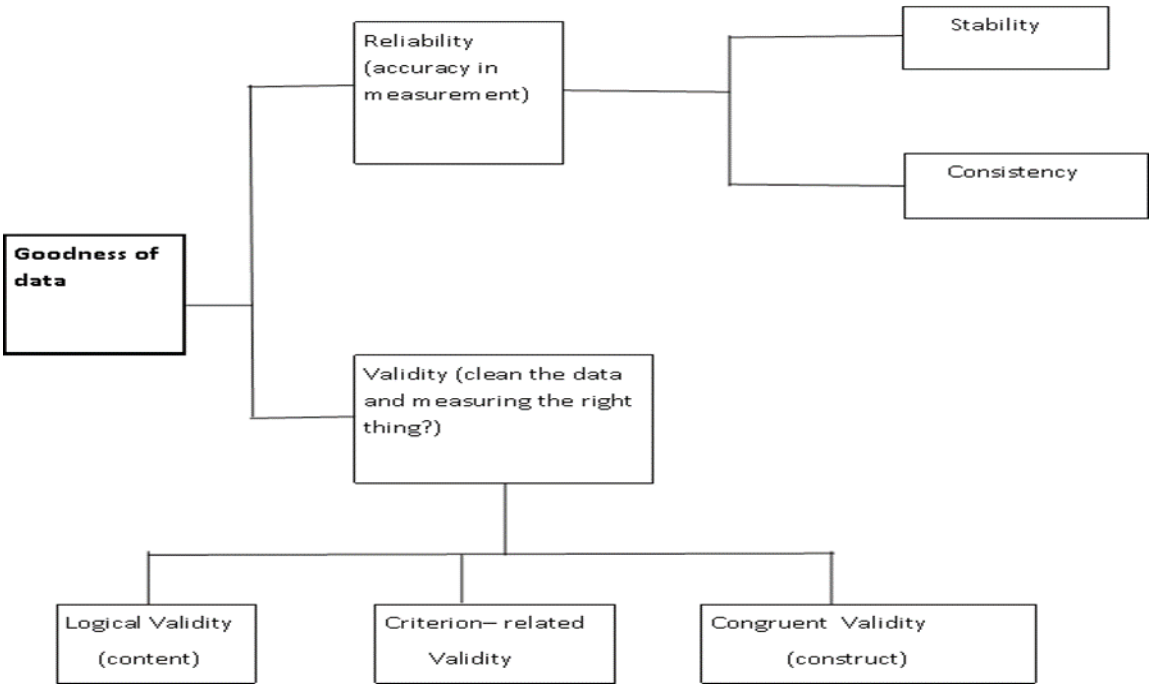


Figure 3. 2. Testing Goodness of Measures: Form of Reliability and Validity

Source: Adapted from Sekaran, 2003:204

3.9.3.2. VALIDITY

Hair, Black, Babin, Anderson and Tatham, (2006), define validity as the "extent to which a measure or set of measures correctly represents the concepts under study – the degree to which it is free from any systematic or non-random error". Malhotra (2004:269) was of the view that "the validity of a scale may be defined as the extent to which differences in observed scale scores reflect true differences among objects on the characteristics being measured". In other words, validity is a phrase used to ensure the ability of a scale to measure the purposive concept (Zailin, 2011:260).

Validity of data can be examined through the use of three methods: Logical/content validity check, criterion related validity and construct/congruent validity (Sekaran, 2003).

3.9.4. DATA INTERPRETATION

Hypothesis testing and data interpretation can be achieved by the use of inferential statistics such as regression analysis, Pearson correlations, t- Test, chi-square test, ANOVA tests (Sekaran, 2003).

3.9.4.1. PEARSON CORRELATION

Karl Pearson adopted the Pearson correlation in 1900. It is also called coefficient of correlation (Lind, Marchal and Wathen, 2008). Represented with letter "r", Pearson's correlation shows or reflects the degree of linear relationship that exists between two variables. According to Aigbogun and Sadoun Naser Yassin (2013:176), "correlation between two variables reflects the degree to which the variables are related". According to Lind, Marchal and Wathen (2008) a correlation

coefficient of surpassing 0.5 is considered strong while a correlation coefficient of below 0.5 is considered weak.

However, for this study, the Pearson's correlation analysis was conducted in order to find out if there was a significant positive relationship between the countries cif/fob ratios and a country's annual compositions of imports.

Aigbogun and Sadoun Naser Yassin (2013:176), and Lind et al. (2008), provided the following characteristics of Pearson's correlation:

- ✓ When computed in a sample, it is designated by the letter "r"
- ✓ It ranges from +1 to -1
- ✓ Pearson's can fall between 0.00 (no correlation) and 1.00 (perfect correlation)
- ✓ A "r" value near 1 show a direct or positive relationship between the variables
- ✓ A "r" value near -1 show an inverse or negative relationship between the variables
- ✓ A correlation coefficient of surpassing 0.5 is considered strong
- ✓ A correlation coefficient of below 0.5 is considered weak.

Figure 3.3 adds up the strength and direction of the coefficient of correlation.

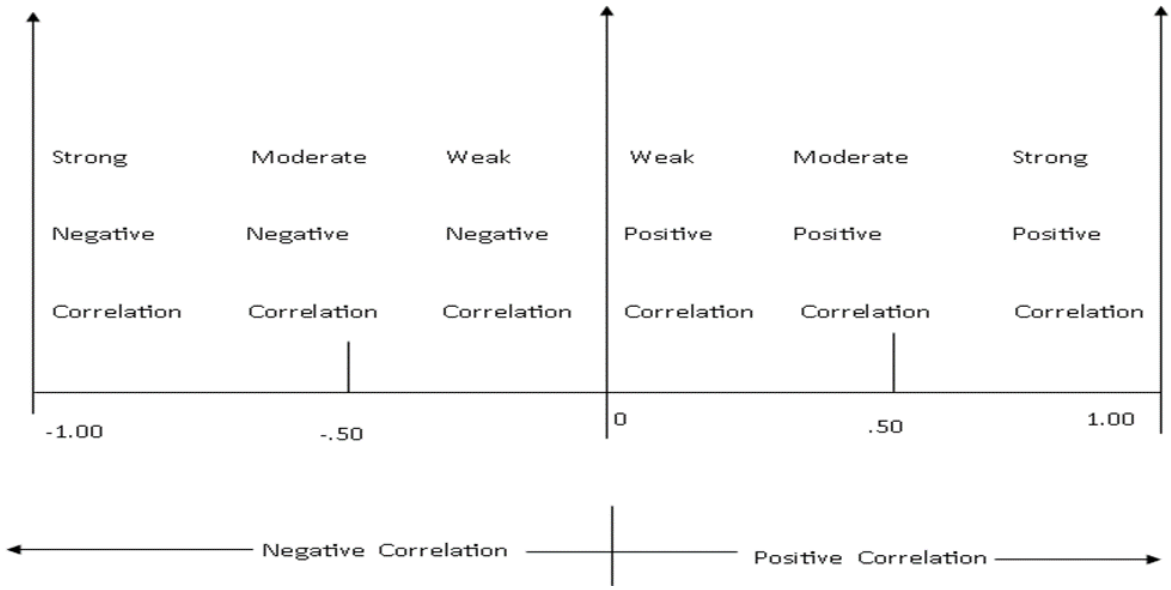


Figure 3. 3. The Strength, Weakness and Direction of Coefficient of Correlation

Source: Adapted from Lind, Marchal and Mathen, 2008:462

3.9.4.2 t- TEST

Urdan (2010:93) and Trochim (2006) defined t- test as simply comparing two means to see if they are appreciably different from each other. The t- test analysis is suitable when one wants to compare the means of two groups, and especially good as the analysis for the post-test-only two-group randomised experimental design. The secondary data generated for the purpose of this study is analysed further through the t- test to indicate the separateness of the sets of measures.

3.10. SUMMARY

This chapter contained the methods and the nature of the study and dealt with the research design, data collection and their derivation from secondary sources, sampling and population theory, the development and administration of research instrument as well as the adopted steps and processes that were used in the analysis and interpretation of the data.

The chapter also detailed and indicated how issues of validity and reliability are addressed through the use of data gathering methods.

This study adopted the use of observational, inductive and descriptive statistical approach to analyse observations on irregularities through literature comparative synthesis and analysis as well as Pearson's correlation analysis.

Chapter 4 will present, interpret, analyse and discuss the data collected as evidence of cif/fob ratio as a proxy to international transportation cost.

CHAPTER 4

DATA PRESENTATION, ANALYSIS AND DISCUSSION OF RESULTS

4.1. INTRODUCTION

This chapter tries to analyse and discuss data gathered on the five countries in the examination of a comparative study on the use of country import cif/fob ratios to measure international transport costs. A representation of World Bank and Quantec database sourced data, gathered as part of this research, was discussed here, as of course the analysis of data on the crucial subject matter discussed. One way for a successful quantitative content analysis is that data can be brought down to concepts that portrays the research phenomenon (Cavanagh, 1997; Elo and Kyngäs, 2008; Hsieh and Shannon, 2005), by creating concepts, a model, categories, conceptual map or conceptual system (Elo, Kääriäinen, Kanste, Pölkki, Utriainen and Kyngäs, 2014). As far as we can observe from this chapter, data from the WITS database and Quantec data, reports from professional bodies, literature from previous empirical research and notes taken compiled during the course of this research, were examined and evaluated to answer the research questions asked at the beginning

of the study. Data was tabulated and displayed through tables and figures, with the aim to providing the best interpretation of the results of the study. Riff, Lacy and Fico (2014:18), believed that "the emphasis on data reminds the reader that quantitative content analysis is reductionist, with sampling and operational or measurement procedures that reduce communication phenomena to manageable data (e.g., numbers) from which inferences maybe drawn about the phenomena themselves". The analytical instruments used were discussed in methodology presented in Chapter 3 of this study and in presentation of data (section 4.2) and descriptive analysis of cif/fob data (section 4.3) of this chapter. However, data are presented in Section 4.4 for each country involved in this study, while Section 4.5 showcases a complete discussion of the findings as the data are interpreted in conjunction with the insights gained from literature review.

4.2. PRESENTATION OF DATA

The description and analysis of results of qualitative research differs from quantitative data. The difference between quantitative and qualitative research could be noted by difference in the data, how it is collected and analysed, with the aim of in formativeness of each towards a research study (Tewksbury, 2009). Quantitative studies explains phenomena according to numerical data and it employs an analysis data by means of mathematically based methods, precise statistics (Yilmaz, 2013). The sample size for this study was limited to five countries with the data examined limited to a 34-year period time series. The majority of data presented here was sourced from the World Integrated Trade Solution (WITS) database of the World Bank and Easy data by Quantec. Where data are sourced elsewhere, it is clearly indicated.

Import trade data was sourced from the international merchandise trade statistics database, which was adopted by the United Nations Statistical Commission under the Standard International Trade Classification (SITC) harmonization code to generate a country's history of imports composition with the world. These data are identical to those being used by the IMF to generate imports cif/fob ratios, just that they are more disaggregated. Maintained by the United Nations the SITC code is a system of classification of goods used to systematically classify both export and imports trade of

a country, in a way to enable an even and just comparison of trades by different nations over specific years.

These codes are broadly classified according to broad economic categories for compiling all trades entering and exiting the international market, which is aimed to foster international comparability of international trade statistics. SITC was first introduced by the United Nations Economic and Social Council in 1950, since then until 2006 the SITC classification has been revised at least four times (Affendy, Yee and Satoru, 2010). Table 4.1 below shows the different years that each revision of SITC classification took place.

Table 4. 1. SITC Classification Structure after Revision

Classification		SITC (original)	SITC REV. 1	SITC REV.2	SITC REV.3	SITC REV.4
Year of revision/ Structure	Code	1950	1960	1975	1985	2006
Number of articles in sections	1-digit code	10	10	10	10	10
Number of articles in divisions	2-digit code	52	56	63	67	67
Number of articles in groups	3-digit code	150	177	233	261	263
Number of articles in subgroups	4- digit code	na	625	786	1033	1024
Number of articles in items	5-digit code	570	1312	1832	3121	2970

Source: Affendy, Yee and Satoru (2010:3)

According to Affendy, Yee and Satoru (2010) SITC Revision 2 is the only classification that is extensively used and adopted by the United Nations Conference of Trade and Development (UNCTAD) when doing their intensity commodity-factor classification. This study made use of SITC Revision 2 at 1-digit code classification in its analysis.

The Standard International Trade Classification (SITC) is a numerical standard code developed by the United Nations to classify, based on a hierarchy, commodities used in international trade, with the following codes and description of codes (United Nations, 2010):

0- Food and live animals;

1- Beverages and tobacco;

2- Crude materials, inedible, except fuels;

3- Mineral fuels, lubricants and related materials;

4- Animal and vegetable oils, fats and waxes;

5- Chemicals and related products;

6- Manufactured goods classified chiefly by material;

7- Machinery and transport equipment;

8- Miscellaneous manufactured articles;

9- Commodities and transactions not elsewhere classified.

4.3. DESCRIPTIVE ANALYSIS OF CIF/FOB DATA

Table 4.2 shows the country's imports cif/fob ratios of the analysed countries. From table 4.2, figure 4.1 was drawn to show the trends of import cif/fob of individual countries over the period analysed. It is statistically interesting to notice that all the developed countries in this study (USA, Australia and Germany) import cif/fob ratios fell over the period.

Table 4. 2. Selected Countries cif/fob Ratios as a Proportion of Total Imports, 1980-2012

	Import cif/fob ratios using data from the Quantec Easy data				
	USA	GERMANY	AUSTRALIA	VENEZUELA	SOUTH AFRICA
1980	4.780213731	3.008358227	10.13435808	10.99991267	6.273193759
1981	4.739389156	3.316271559	10.83754607	11.00007889	9.109102052
1982	4.481209418	3.091676844	13.00336294	10.99994011	8.777763869
1983	4.584013114	3.085767426	12.34213007	11.00002964	8.720069119
1984	4.742651506	3.046877781	14.23271631	11.00008409	8.791447508
1985	4.731695286	2.80616203	11.84424992	11.00005392	11.17511216
1986	4.612547135	2.680273189	9.287154217	10.99995563	10.51199392
1987	4.48059157	2.540726723	8.700512101	11.00003474	8.482662891
1988	4.216105154	2.611928976	8.272821577	11.00005634	7.805713215
1989	4.165372318	2.648987831	9.811313459	10.99993749	8.435382968
1990	4.376240382	2.425421244	7.987029936	10.99985961	7.674665304
1991	4.076134244	2.585747869	7.546600105	10.99998433	7.876521238
1992	3.990876067	2.551574287	7.600021617	11.00004616	6.622547879
1993	3.949451432	2.786998679	7.44089124	11.0002727	11.28294119
1994	3.824177612	2.800038287	7.042460382	11.00035212	9.044830212
1995	3.672959967	2.800008048	6.720280894	11.00021172	13.04276869
1996	3.361536846	2.800063134	6.557230683	11.00010888	12.11696271
1997	3.268092477	2.799984027	6.621563265	11.0000233	16.99155972
1998	3.559060334	2.799962766	6.391447743	11.00006192	12.89089209
1999	3.398333041	n/a	5.626638803	11.00010331	10.87829983
2000	3.389106911	n/a	5.666723725	10.9997469	10.85834469
2001	3.346187555	n/a	5.267687483	11.0000084	12.88716944
2002	3.151534944	n/a	5.509382636	11.00049435	13.13398024
2003	3.653589156	n/a	5.153059653	11.00045642	17.07374052
2004	3.7984417	n/a	5.525128409	9.999860968	13.44832344
2005	3.681615824	n/a	5.468880521	9.999978424	13.46951867
2006	3.459658889	n/a	5.099382203	10.00012157	15.61202667
2007	3.241762734	n/a	4.87444766	10.00002221	10.94612928
2008	3.130288452	n/a	4.813308163	10.00016506	6.776865242
2009	2.928918583	n/a	4.212222982	9.999987481	14.60137735
2010	2.890493558	n/a	4.423703619	10.00031747	17.57509311
2011	2.619505899	n/a	3.999947143	9.99985143	21.87982573
2012	2.646660689	n/a	4.124635825	10.00005882	22.61542416

Source: Author's calculation using data from the Quantec Easy data (see Appendix Tables A1, A2, A3, A4, and A5 for data used for cif/fob ratios for each country). N/A- Data not available.

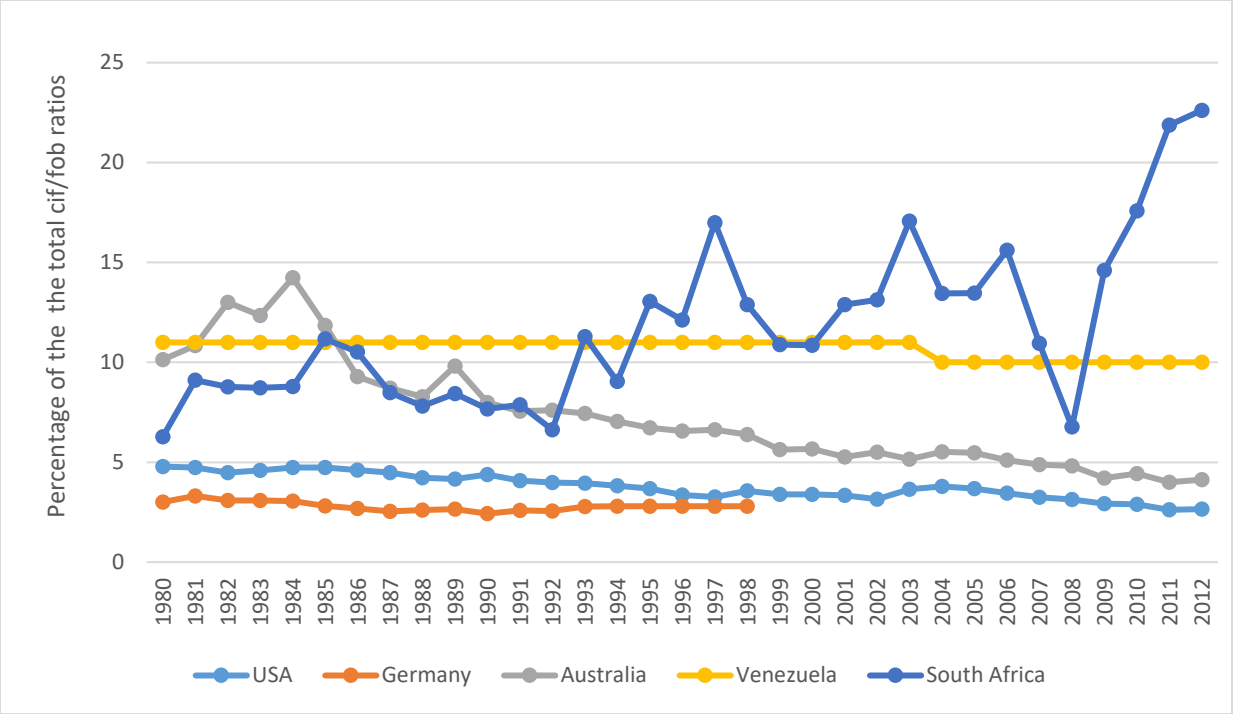


Figure 4. 1. Countries cif/fob ratios as percentage of total imports 1980- 2012

Source: Authors Calculations from Quantec Easy Data.

From figure 4.1, it shows that import cif/fob ratios for USA, Germany and Australia have fallen consistently over the period. Australia's imports cif/fob has fallen from 14.2 % in 1984 to 4.1% in 2012 and has an average of about 7.33% cif/fob ratio, and a standard deviation of 2.75%.

United States imports cif/fob ratios have fallen from 4.78% in 1980 to 2.65% in 2012 with an average cif/fob ratio of about 3.79% and a standard deviation of about 0.64%, while Germany's has decreased from 3.32% in 1981 to 2.79% in 1998 with mean of 2.79%.

South Africa's cif/fob ratio has fluctuated over the period analysed, from 6.27% in 1980 to a rise of 22.61% in 2012 with a mean of 11.73% and a huge variation from the mean shown by the 4.11% standard deviation.

Venezuela's import cif/fob ratios show little or no variation over the period analysed with the mean of 10.72% and a standard deviation of 0.45% from 1980 to 2012. Strikingly the standard deviation from 1980 to 2003 and from 2004 to 2012 is at about 0.00%, possible evidence that its import

cif/fob ratio data for those periods for Venezuela were consistent at 11% (1980-2003) and 10% (2004-2012) (see figure 4.1.).

The fact that South Africa and Venezuela's import cif/fob ratios do not follow the pattern of those developed countries where trade data are considered, accuracy raises concern and questions as to the quality of the data and their use as direct measures of shipping costs.

Table 4.3 show the mean or average and standard deviation of a country's imports cif/fob ratios as a percentage of total imports calculated from table 4.2. It shows how much import cif/fob data samples were collected for the purpose of this study deviates from the mean.

Table 4. 3 Mean and Standard Deviation of Country's cif/fob Ratios 1980 -2012

Country	USA	Germany	Australia	Venezuela	Venezuela	Venezuela	South Africa
	1980-2012	**1980-1998**	**1980-2012**	**1980-2012**	**1980-2003**	**2004-2012**	**1980-2012**
Mean/Average	3.78631563	2.79930679	7.337540589	10.7273387	11.00007557	10.00004038	11.73885603
Standard deviation	0.64462578	0.22675188	2.754647069	0.45228296	0.000175759	0.000147528	4.110998015

Source: Authors Calculation from Quantec Easy Data.

4.4. COUNTRY ANALYSIS

4.4.1. UNITED STATES OF AMERICA

4.4.1.1. Overview

The United States remain one of the wealthiest and largest economies in the world with a total population of 318.9 million and GDP growth of 2.4% in 2014 (World Bank, 2014a). The United States economy was responsible for about 20% of the world's total GDP (PPP) or $15.684 trillion in dollar terms (Economy Watch, 2013b). According to WTO (2014a), the United States is one of the world's largest manufacturers, with value added of US $2.1 trillion in 2013, of which main industries include steel, automobiles, petroleum, constructions, chemicals, telecommunications, food processing, electronics, and agricultural machinery.

United States recognises the importance that trade is to its economy and the impact that timely and efficient import processes have on its financial stability (WTO, 2014a). Therefore, enhancement of trade flows, trade security and trade facilitation measures have become of paramount importance to this great economy. The country has about five Trade Facilitation Measures, which include Single Window, Border Interagency Executive Council (BIEC), Advanced Rulings, Simplified Entry Pilot/ Ace Cargo Release, and Trusted Trader Programs (WTO, 2014a). The data accuracy and U.S.A. trade weight in the world market as one of the best economies thus qualifies it to be significant and adequate enough to be used as a case study for this work in order to exemplify, identify and compare what type of relationship or correlation exists between the import cif/fob ratios and the country's composition of imports.

According to WTO (2014a), the United States Seaborne trade amounted to 2.3 billion tonnes in 2012, a 10.8% decrease from its peak of 2.5 billion tonnes in 2006. The statistics release by the World Trade Organisation showed that the United States ranks second behind China in overall containerized port traffic. Economy Watch (2013b) has it that since 1920, US economy has ultimately grown to be the largest in the world, the country today boasts of having the largest financial market NYSE (New York Stock Exchange) and NASDAQ (National Association of Securities Dealers Automated). Foreign Investment in the US averages $2.4 trillion, compared to a total of US $3.3 trillion invested in other countries (Economy Watch, 2013b). It was believed

that countries that are close to each other trade significantly with one another, this case is evidenced in Canada being currently the largest trading partner of Unites States with $632 billion in total (two ways) goods trade during 2013 with goods exported totalling about $300 billion and goods imported totalling about $332 billion (United States Trade Representative, 2013).

4.4.1.2. Data Presentation for United States

The data series of each of the five countries identified as suitable and with distinctive characteristics that surrounds transportation measurement and trade data collected for the study. Providing a nub for examination of the first country sample is table A1 in the appendix. The table shows the United States SITC imports presented as a proportion of total imports from the periods 1980 to 2014 as collected by the World Bank (World Integrated Trade Solution). By a way of identifying international transportation measurement trends, the SITC imports data for United State were analysed as a percentage of all imports to construct the nation's trade imports composition (see appendix A, Table A1.) for the study period.

Each import SITC code (SITC 0 to 9) for each year was divided by the total imports for the same year that is the sum of SITC 0 to 9. Then the answer is multiplied by 100 (see appendix A, Table A1). Also employing the data for cif/fob ratios was derived by the formula (imports cif/ imports fob)-1 then multiplied by 100 as a percentage of total imports (see appendix A, Table A1). These cif/fob ratios were then examined as a proxy for direct shipping and international transport cost for the country.

Furthermore, the study used correlation analyses to examine the relationship between a country's SITC imports categories (from SITC 0 to SITC 9) as a percentage of total imports and that country's imports cif/fob ratios. The correlation analyses examined the significance, direction and magnitude of the relationship between the country's imports composition of trade and the country's import cif/fob ratios (see appendix A, Table A6).

Figure 4.1 gives an overview of the United States imports cif/fob ratio (1980 to 2012) and the country's manufactured imports (SITC7) as a percentage of total imports (1980 to 2014)

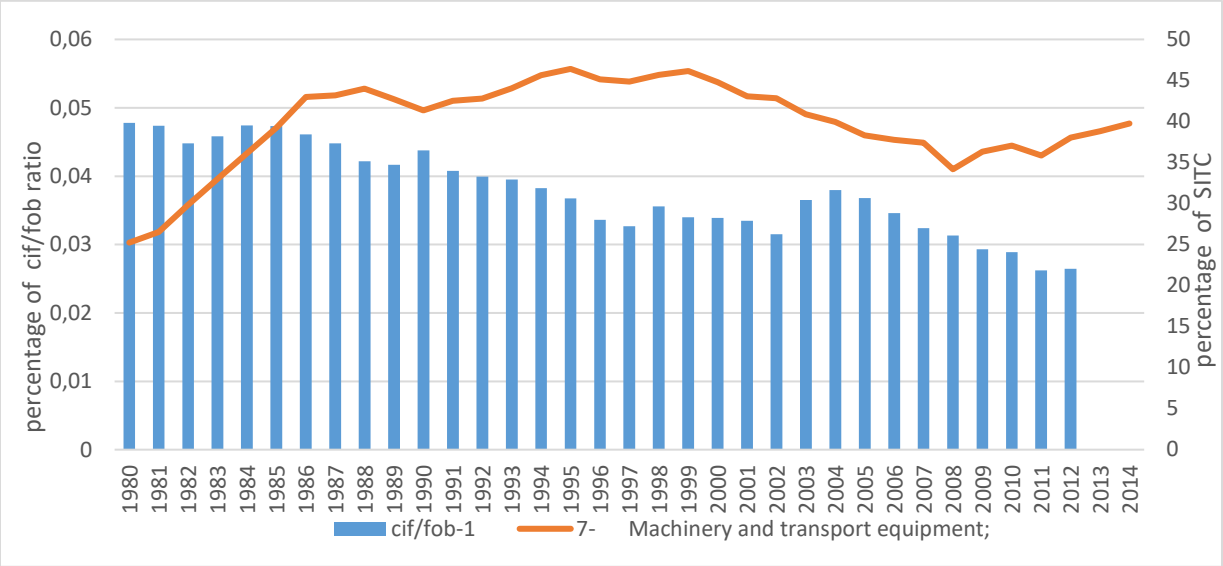


Figure 4. 2. . United States, Imports cif/fob Ratio (1980- 2012) and Manufactured Import (1980 – 2014).

Source: Author's calculations from data sourced from Word Integrated Trade Solution (WITS), World Bank, 2015 and Quantec Easy Data, 2013.

The data and its analysis show that the United States' import cif/fob ratios have fluctuated up and down over the period from 1980 to 2012 and have declined from 4.7% in 1980 to 2.6% in 2012.

Few researchers have questioned the fall in US import cif/fob ratios. Chasomeris (2006) judged it misleading if taken as a general indicator of a drop in the US *ad valorem* shipping costs. However, Hummels (2001) have embraced the fallen United States import cif/fob ratio as an indicator of a decrease in its *ad valorem* shipping costs but have warned at the same time against a similar, or general assumption, of other nations import cif/fob ratios as indicative of their directional *ad valorem* shipping costs.

Many researchers have sought possible justification to defend their assumption of the decline in US imports cif/fob ratios as a true indicator of a drop in the United States' *ad valorem* shipping costs. According to Chasomeris (2006:73), some of this explanation might have included:

“changes in distance from the international markets; improved infrastructures; improved technology; more efficient ports; the benefit derived from economies of scale and scope and a significant reduction in maritime related anti-competitive practise, partially caused by changes in the legislative environment like the Shipping Act of 1984 and the US Ocean Shipping Reform Act of 1998”.

However, US, New Zealand and the Asociación Latinoamericana de Integración (ALADI) countries of Latin America have the most complete data on international trade statistics, as they collect freight expenditures as a part of their import customs declarations (Hummels, 2009:6) and thus their imports cif/fob ratios are true and accurate indicators.

Assessing United States data from composition of trade imports, the United States had without doubt maintained a significant decline in the importation of minerals (SITC 3) as a proportion of their total import from 1980 until 2002. Then from 2003 an increase was experienced which lasted until 2012 and then a slight decrease in 2013 and 2014, the last year of the series analysed. The importation of beverages and tobacco (SITC 1) has been on a decrease from the starting year of analysis (1980) until the last year of the series analysed (2014). It is also observed that the US has equally maintained a significant proportional rise and decline in the importation of machinery and transport equipment (SITC 7), as a proportion of their total imports during this period, as also were observed with its SITC 3 imports classified goods.

A closer observation shows a much lower and stable importation of food and live animals (SITC 0), crude materials, inedible, except fuels; (SITC 2), animal and vegetable oils, fats and waxes (SITC 4) as a proportion of the United States total imports over the analysed years or period. From food and live animals (SITC 0) to animals and vegetable oils, fats and waxes (SITC 4) i.e. SITC 0 to SITC 4 are all classified as lower valued import goods.

As a proportion of the United States, imports for the period were observed to be slightly high in imports of miscellaneous manufactured articles (SITC 8) and manufactured goods classified chiefly by materials (SITC 6). A low rising importation was clearly observed in chemicals and related products (SITC 5). Commodities and transactions not elsewhere classified (SITC 9) witnessed a constant low increase from the starting point of the analysis year 1980 until 2002 and then a low constant decrease from 2003 until the last period year of analysis 2014. Alongside with

machinery and transport equipment (SITC 7), all these categories (SITC 5 to SITC 9) are of higher-valued imports classification.

As a base of argument, the United States composition of imports in its low-valued and high-valued imports as a proportion of its total imports, supports the economic theory that a rise in the country's proportion of high-value imports contributes and motivates for a decline in the country's import cif/fob ratios, *ceteris paribus*. Furthermore, an increase in the proportion of a country's low-valued imports stimulates a rise in that country's import cif/fob ratios, all things being equal (*ceteris paribus*).

The United States composition of imports particularly through its SITC 7 (high-valued imports) and SITC 3 (low-valued imports) emphatically gives a report on the adjustment of the country's imports cif/fob ratios. It shows from this report that the country's imports cif/fob ratios declined through the period in which the country often experienced a rise in its SITC 7 classified imported goods and a related decrease in its SITC 3 classified imported goods, which was between 1980 and 2002.

However, when the country began to experience a slight increase in its imports cif/fob ratio in 2003, a corresponding increase in its SITC 3 and decrease in its SITC 7 were observed. This serves as a clear and further indicator of a likely relationship between the country's import cif/fob ratios and its composition of imports.

This study has the directional flow of the United States import cif/fob ratios and the evolution of its composition of imports along with the economic theory that a rise in the proportion of a country's high-valued composition of imports contributes to a decline in that country's import cif/fob ratios, *ceteris paribus* and if all things being equal (*ceteris paribus*) a rise in the proportion of a country's low-valued imports contributes to a rise in that country's import cif/fob ratios. Therefore, it will be wrong to assume that a change in a country's composition of imports as insignificant to a change in the measurement of that country's import cif/fob ratios. This provides evidence to question the common assumption by some researchers (Radelet and Sachs, 1998) and analysts that a country's composition of imports is constant over time where the cif/fob ratios maybe used as reliable measure of shipping costs. Section 4.5 (correlation analysis) will analyse

data using correlation analysis to test the statistical significance of the relationship between United States import cif/fob ratios and the country's composition of imports.

4.4.2. GERMANY

4.4.2.1. Overview

Germany is an economic giant with a population of about 80.9 million, a GDP of $3.853 trillion, with economic growth rate of about 1.6% and inflation rate of 0.9% (World Bank, 2014c). According to Economy Watch (2013a), Germany is the third largest economy in the world, counting for more than half of EU international trade at 58.2% export and 54.8% import respectively. Germany trades significantly with other large economies like China of which Germany exports 6.1% and imports 8.9% of merchandise and from the United States with 7.0% export and 5.5% import respectively. Germany export's commodities are motor vehicles, machinery, computers, chemicals, electronic products, electrical equipment, pharmaceuticals, metals, foodstuffs, transport equipment, textiles, and rubber and plastic products. Their primary imports include machinery, data processing equipment, vehicles, chemicals, metals, oil and gas, pharmaceuticals, electrical equipment, agricultural products, and foodstuffs (Economy Watch, 2013a).

The history of Germany's trade data collection is rich and can be dated as far back as 1834 with the creation of the German Custom Union (Dedinger, 2015).

4.4.2.2. Germany's SITC Imports

Figure 4.3 shows Germany's SITC imports as a proportion of all imports for periods 1980 to 2014, as sourced and calculated from the World Bank (World Integrated Trade Solution, 2015). In order to identify the imports trends and international transportation of Germany, a very similar calculation, like that of United States SITC imports data, were applied in this case for Germany's data. The SITC data were calculated as a percentage of total imports to examine the relationship

and trends of the nation's imports cif/fob ratios to that of the Germany's composition of imports observed.

Germany's compositions of imports flow pattern and make-up, as it is observed from Germany's trade data in its high-valued goods SITC 5 to SITC 9 imports from the table below, that Germany invests heavily in importation of capital goods, in this case importation of machinery and transport equipment (SITC 7). An increase in SITC 7 was observed between 1980 to 2002. Thereafter, a more stable trend was evident until 2007 from which time there was an observed decline in SITC 7 categorised imports until the last period of the year analysed which is 2014. Germany's miscellaneous manufactured goods in SITC 8 shows slow increase from 1980 to 1993 then a decrease was observed from 1994 to 2009, then a slight rise until 2014.

Manufactured goods classified chiefly by material (SITC 6) declined slightly throughout the period of the analysis and still accounts for a high percentage of trade inflow, except for SITC 7 imports, when compared to all other categories of imports. Germany's chemicals and related products (SITC 5) were observed to have increased slightly all through the period of the analysis. Germany's SITC 9 (commodities and transactions not elsewhere classified) was stable over the period until a sudden increase was evidenced in year 1999 and 2000.

However, the examination of Germany's low-valued imports categories from 1980 to 2014, shows that Germany's imports of mineral fuels, lubricants and related materials (SITC 3) has a downward trend compared to that of Germany's SITC 7 imports (machinery and transport equipment) that has a rising trend as observed in figure 4.3. The country's SITC 3 (low-valued) imports is declining during a period when its SITC 7 (high-valued) imports is rising and only to rise when SITC 7 begins to decrease.

Germany's importation of food and live animals (SITC 0) was observed to have a smooth declining trend throughout the period analysed, a similar trend was observed in the importation of crude materials and inedible, except fuels (SITC 2). The SITC category of importation of animals, vegetable oils, fats and waxes (SITC 4) and beverages and tobacco (SITC 1) is observed to have a stable, very low level, of inflow throughout the period of analysis from 1980 to 2014.

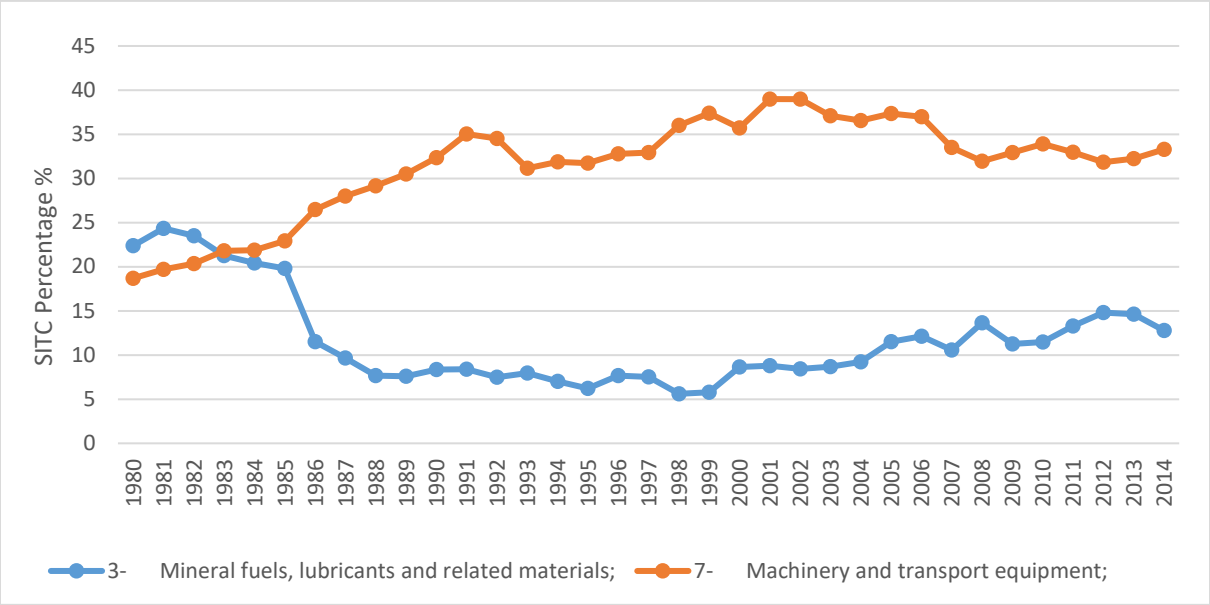


Figure 4. 3. Germany's SITC 7 and SITC 3 category as a Percentage of Total Imports, 1980-2014.

Source: Author's Calculations from data sourced from Word Integrated Trade Solution (WITS), World Bank, 2015.

So to say, in figure 4.4., it is observed generally that Germany experienced a relative increase in its high-valued imports compared to its low valued imports that declined throughout the period of analysis. Despite a slight decline in SITC 7 (high-valued) imports for the last 7 years (2007 to 2014) of the analysis and a slight increase in low-valued imports (SITC 3) towards the same period from 2007 to 2014, it could be seen that overall manufactured imports of Germany overshadowed its low-valued imports.

Without any further assessment or computation of the country's cif/fob ratios and based on the reasoning from the theory "that a rise in the proportion of a country's high-valued imports contributes to a decline in that country's import cif/fob ratios, *ceteris paribus* and a rise in the proportion of a country's low-valued imports equally contributes to a rise in that country's import cif/fob ratios, *ceteris paribus*" (Chasomeris, 2006). Germany should experience a smoother/decline in its imports cif/fob ratios over the periods 1986 to 2006 with the later years

depending on the general difference in weight experienced in the rise and decrease of its low-valued and high-valued imports respectively between 2007 and 2014.

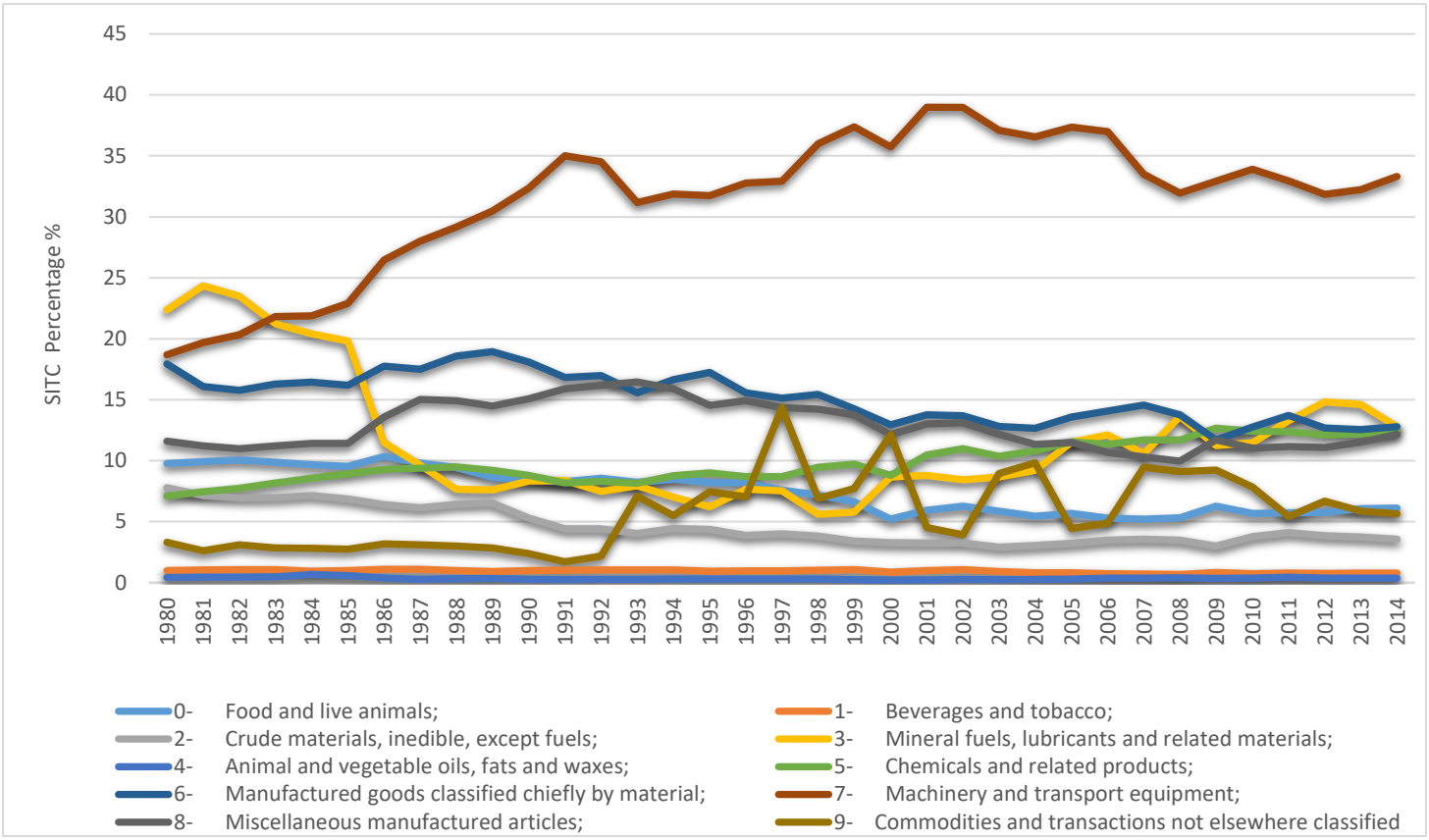


Figure 4. 4. Germany's SITC Imports as a Percentage of Total Imports, 1980-2014

Source: Author's Calculations from data sourced from World Bank, 2015 (Word Integrated Trade Solution).

However, due to the lack of data in computing Germany's imports cif/fob ratios for the periods 1999 to 2014, Germany's import cif/fob ratio could only be analysed up until 1998. Figure 4.5 presents a view of Germany's import cif/fob ratios over the period, and by merely looking at the figures, it is observed that Germany witnessed a stable pattern in its import cif/fob ratios for the period. This is important as Germany's trade pattern, in the composition of its imports, earlier indicated through the theory that the country should undoubtedly experience a stable decline in its imports cif/fob ratios between 1986 and 2006, except for years 1994 and 1995, which experienced

a slight increase in its SITC 0 and SITC 1 and a drop in SITC 8 and SITC 9. However, there was no cif/fob ratio data to check the expected change in the country's imports cif/fob ratios from 2007 to 2014 due to the changes in unweighted composition of the country's low-valued and high-valued imports.

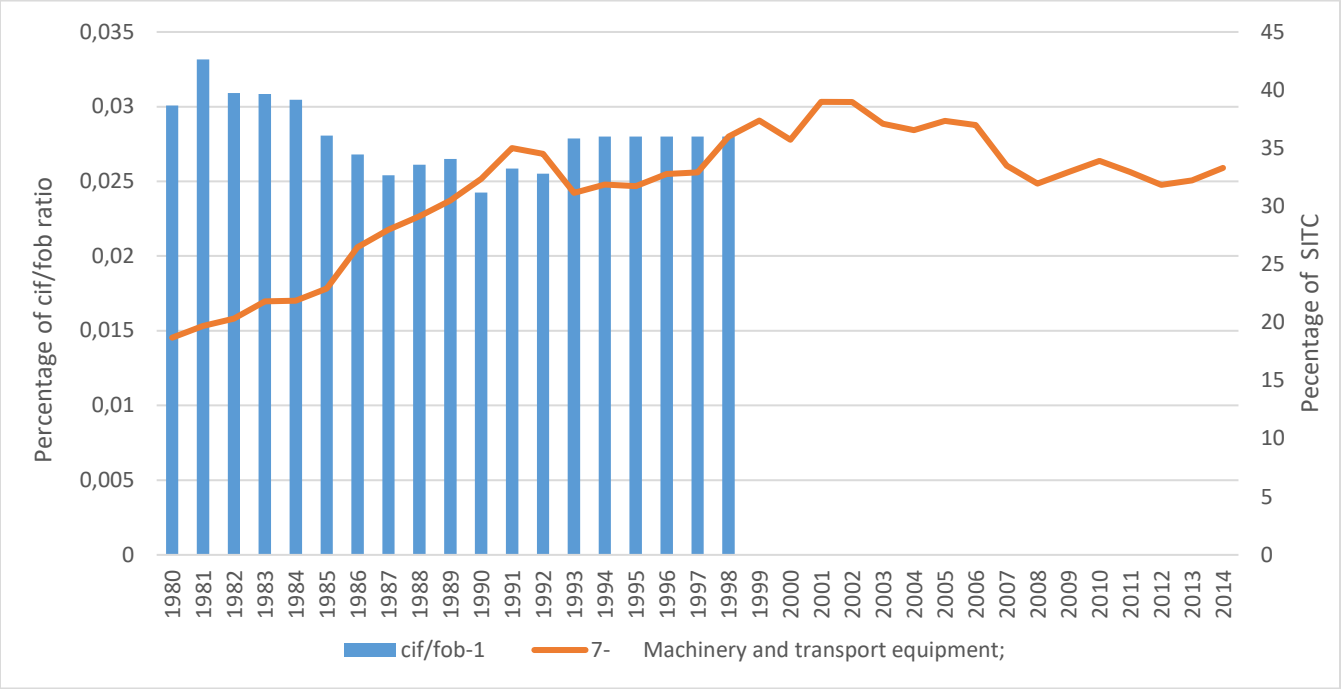


Figure 4. 5. Germany's cif/fob Ratio (1980- 1998) and Manufactured Import from 1980 – 2014

Source: Author's calculations from data sourced from World Bank data, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013.

Figure 4.5. shows that Germany's imports cif/fob ratios when compared against its manufactured imports (SITC 7) as a proportion of its total imports evidenced that the country's cif/fob ratios directional flow is proportionate in trend or movement to the country's manufactured imports as a percentage of the total imports.

The analysis of the unfolding of Germany's composition of trade imports and its cif/fob ratios reveal that it would be incorrect to speculate that a country's imports cif/fob ratios is a direct reflector of changes in the transportation cost of the country or *ad-valorem* shipping cost as it

reveals here that it is partly a reflection of the country's composition of imports. However, having observed the trend of the country's import cif/fob ratios and the evolution of its composition of imports, it is explicit that Germany's composition of imports do, as the theory indicates, play a role in determining the direction of the Germany's imports cif/fob ratios. Section 4.5 uses correlation analysis to test the statistical significance of the relationship between Germany's imports cif/fob ratios and the country's composition of imports.

4.4.3. SOUTH AFRICA

4.4.3.1. Overview

South Africa is, according to Economy Watch (2010b), one of the most stable economies on the African continent. South Africa had about 54 million as its total population in 2014, with a GDP of about $350.1 billion, a growth rate of about 1.5%, an inflation rate of about 6.4% and an unemployment rate of about 25% (World Bank, 2015). The Country has a large coastline, about 2,798 kilometres long, along the Indian and Atlantic oceans (Economy Watch, 2010b). The South African economy succeeded in reinserting itself into world trade in the mid-1990's, following the long period of political difficulties and international sanctions by the world as a reaction to the apartheid regime (Kowalski, Lattimore and Bottini, 2009).

According to WTO (2015), South Africa is ranked 40th in terms of exports and 33rd in terms of imports of world trade merchandise in 2014. South Africa's trade, imports and exports are heavily dependent on the nation's abundance of mineral and natural resources. The country is rich in natural and mineral resources and is the world's biggest exporter of platinum and chromium 9% of total exports, and the second largest exporter of manganese 9%. The country's other exports include: iron ore 14%, motor vehicles and car parts 9%, machinery and mechanical appliances 7%, gold 7%, coal 6% and diamonds 2%. South Africa's export partners are: China 13% percent of total exports, the United States 8%, Japan 7%, Botswana 5% and Germany 5%, others include Namibia, the Netherlands and the UK (Trading Economics, 2015).

The country's main imports include: fuel 24% of total imports, nuclear reactors, boilers, machinery and mechanical appliances 14%, motor vehicles and car parts 9%, telephone sets 3%, pharmaceuticals 2%, vegetables 2% and live animals and animal products 1%. However, its main trading partners in imports are China 15%, Germany 10%, Saudi Arabia 8%, the United States 6%, India 5% and Nigeria 4%; others include the United Kingdom, Brazil and Angola (Trading Economics, 2015).

4.4.3.2. South Africa SITC data Application

South Africa's (SA) SITC data from the World Bank's WITS database was used to examine the evolution of South Africa's composition of imports. Quantec Easy data was used to calculate the imports cif/fob ratios of South Africa for period 1980 to 2012. Like data used previously for US and Germany to compute as a percentage of the total imports, data from table A3 in the appendix were used to observe and graph the evolution of South Africa's composition of imports against its imports cif/fob ratios, in order to find out if the composition of imports do have a significant role in the direction and level of a country's imports cif/fob ratios.

The application presented a very intriguing and interesting outcome for analysis. Figure 4.6 shows, excluding for 1985 and 1986, SA's imports cif/fob ratios between the periods 1980 and 1992. There is little variation over each single year of analysis and a big variation between the 1993 and 2012 years of analysis. Invariably, to say that this would indicate (if assuming from the common assertion that a country's import cif/fob ratios reveals the actual difference in that country's *ad valorem* shipping cost rather than changes in its composition of imports) that SA's shipping costs between year 1980 and 1992 were reasonably stable (a little peak or troughs each year), while between 1993 and 2013 they fluctuated notably. There was a large variation each year, suggesting a large difference in South Africa's shipping costs each year during this period.

SA's data clearly reveal the caution and earlier argument in this study that data for imports cif/fob ratios are unreliable and prone to error. Carbonnier and Zweynert-de-Cadena (2015) believed that more developed countries have a more reliable trade statistics, while developing countries trade statistics are seen as susceptible to manipulation and errors. It is believed that South Africa's pre-

1994 trade data are clearly inaccurate due to economic sanctions placed upon the country due to the apartheid regime that was an unrecognised government by the other nations (Levy, 1999). As it was severe, there was back door trade with some nations that were not recorded when OPEC nations applied an oil embargo in 1973 (Levy, 1999). During this period of the apartheid regime, the largest category of South Africa imports, by value, were under a category classified as SITC 9 (commodities and transactions not elsewhere classified). "A further re-classification of a large portion of other earlier unclassified goods was witnessed after the change in its political agenda and the lifting of its economic sanctions (Chasomeris, 2009:157).

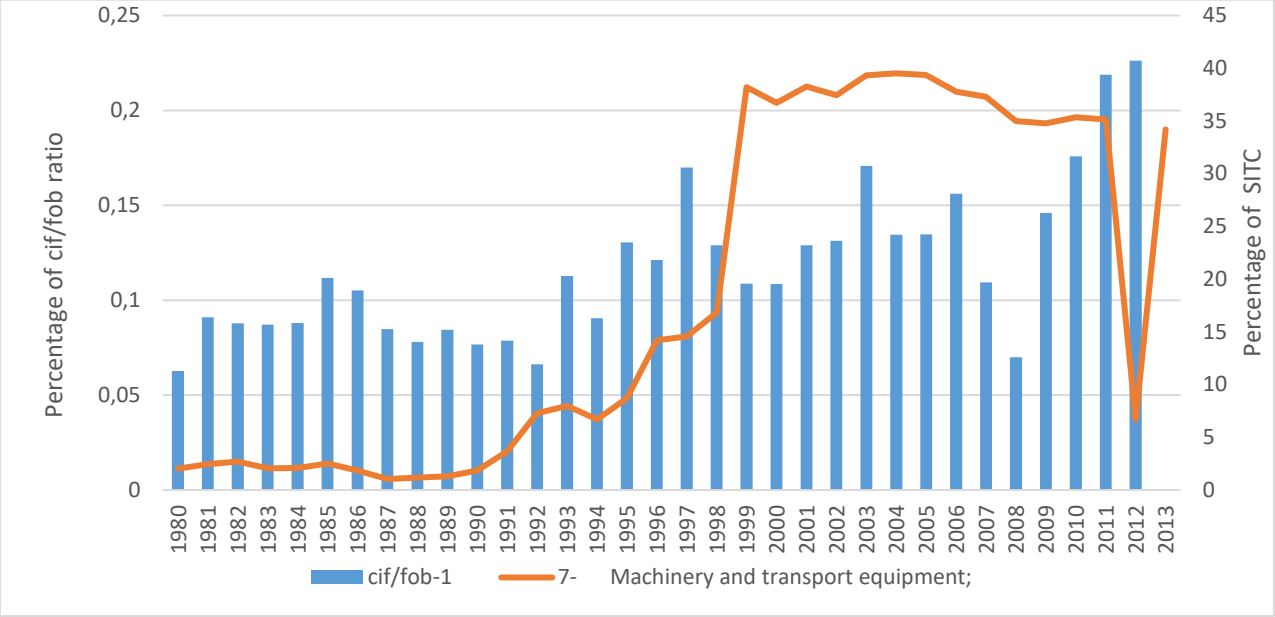


Figure 4. 6. South Africa's cif/fob Ratio (1980-2012) and Manufactured Imports (SITC7) from (1980 -2013)

Source: Author's calculations from data sourced from World Bank (Word Integrated Trade Solution) database and Quantec Easy Data, 2013.

The variation of the imports cif/fob ratio for South Africa is of great interest, looking at it from a comparison point of view with ratios from such countries like the United States and Germany analysed earlier in this study (see figure 4.1). These countries are believed to have more accurate, or close to accurate, trade reports hence more accurate import cif/fob ratios.

However, Table A3 in the appendix shows South Africa's evolution of imports composition through SITC data collected for the period 1980 to 2013. It was telling to note that the graphing of SITC data (figure 4.7) the country's SITC 9 imports between 1980 and 1995 (period of economic sanctions and unclassified imports) were unreasonably very high. The SITC 9 evolution during South Africa's economic sanction was overserved to be very high during that period as it included non SITC 9 classified imports and thus affects the evolution of other SITC categories where those imports would have been properly classified. The SITC 2 imports as observed were slightly higher than other categories of low-valued imports during this period and thus remained so until 1998. This could be because of the South Africa's inclusion of fuel and related petroleum imports in their SITC 2 instead of its proper SITC 3 as structured under the Standard International Trade Classification, Rev.2. This was observed in the downward trend adjustment of SITC 2 from about 13% in 1998 to about 2.9% in 1999.

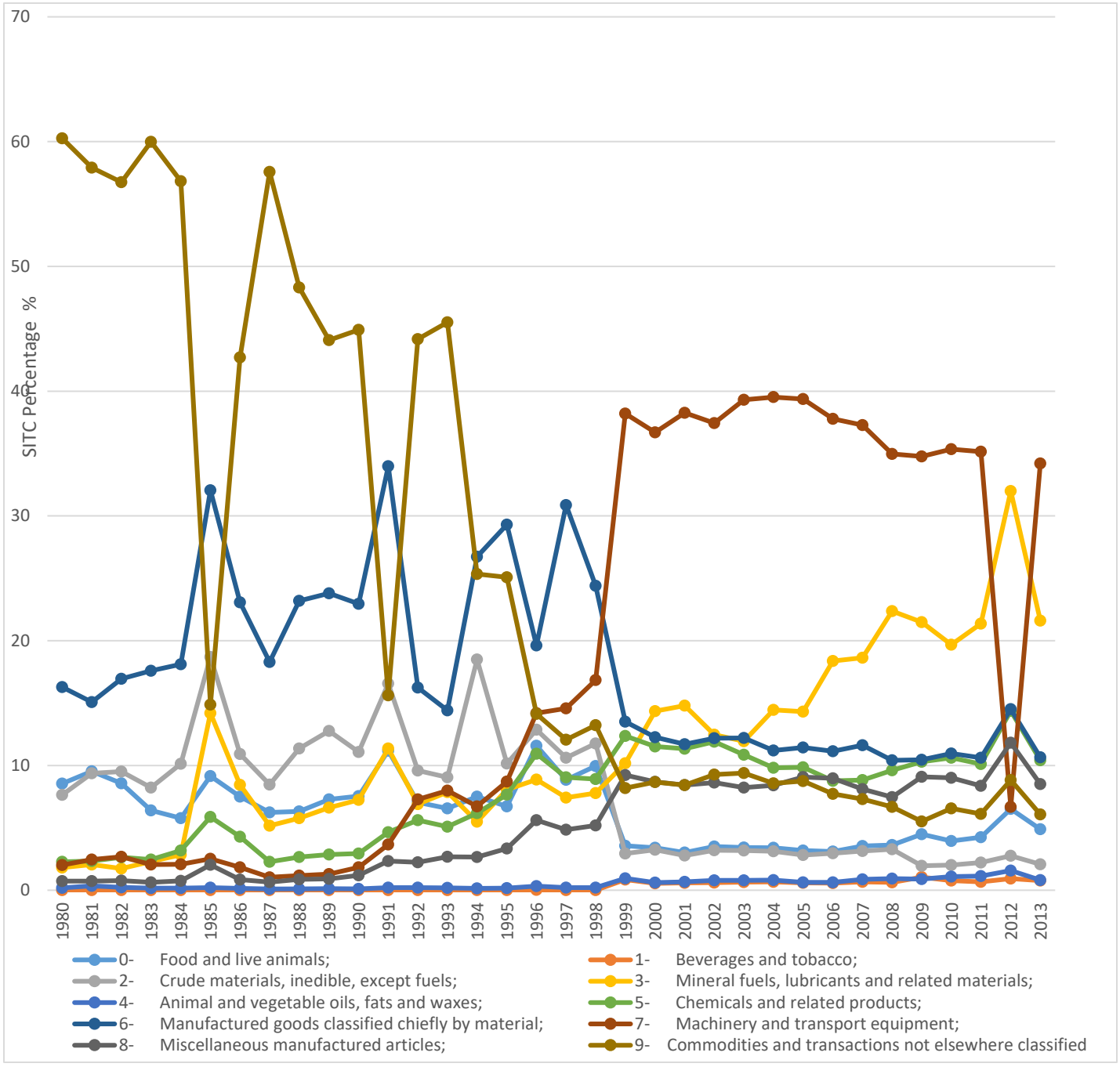


Figure 4. 7. South Africa's SITC Imports as a Percentage of Total Imports, 1980 to 2013.

Source: Author's Calculations from data sourced from World Bank, 2015 (Word Integrated Trade Solution).

The overall country's SITC imports evolution as observed during the period 1980 to 1994, show that high-valued imports like SITC 6 and SITC 9 were constantly higher than the other SITC imports categories observed. This could be the reason for South Africa's low imports cif/fob ratios during the periods (economic sanctions) 1980 to 1994 as observed in figure 4.6., if reasoned from the economic theory that a rise in the country's proportion of high-valued imports do contribute to a decline in that country's imports cif/fob ratios, all things being equal, (*ceteris paribus*) and an increase in the proportion of a country's low-valued imports equally contributed to an increase in that country's imports cif/fob ratios *ceteris paribus.*

South Africa's imports cif/fob ratios evolution from period 1995 to 2012 witnessed some significant changes. The period was immediately after the lifting of the economic sanctions and the significant re-classification and re-enumeration of the country's imports to align with its matched partners report. Impressive changes were notably observed in the country's composition of imports reported from that period, SITC 9 imports decline was instantaneous and with SITC 6 and SITC 8 almost rising simultaneously and SITC 7 rising instantly. The period also saw the country's SITC 0 and SITC 2 dropping and SITC 3 imports maintained its trends at an average flow until 2000 when it was observed as making a substantial rise, which was also associated with the country's imports cif/fob ratios rising too. Chasomeris (2006) believed that this rise in SITC 3 could be observed to be as the result of the rise experienced in the petroleum oil imports as a proportion of total imports during this period and the result of the rise in crude oil prices.

Then it could be asked, what does South Africa's composition of imports pattern imply for imports cif/fob ratios variation for South Africa? The modification of the country's imports composition from 1995 to 2013 could be perceived to support the notion "that a rise in the proportion of a country's high-value imports contributes to a decline in that country's imports cif/fob ratios, *ceteris paribus* and a rise in the proportion of a country's low-valued imports equally contributes to a rise in that country's import cif/fob ratios, *ceteris paribus*" (Chasomeris, 2006:68). As SA's imports cif/fob ratios was noticed as re-aligning with the change in the country's imports composition of trade (re-enumeration and re-classification of the country's imports) reporting.

However, due to the limitation in South Africa's imports data overtime (inconsistency) and the fact that the country's time series data are unreliable (from 1980 to 1994), a fact that is noticeable in this study, though there seems to be improvement in the composition of imports data from 2008

to 2013, although the findings on this data cannot be totally established as evidence sufficient enough to say that the composition of imports have an effect on the variation of SA's imports cif/fob ratios which cannot be used as a direct proxy for the nation's *ad valorem* shipping costs. It could be said that the accuracy of a country's trade composition of imports data does have a significant effect on the accuracy of imports cif/fob ratios of that nation.

4.4.4. AUSTRALIA

4.4.4.1. Overview

Australia is an Island with 7,741,220 square kilometres; land 7,682,300 square kilometres; water 58,920 square kilometres (Economy Watch, 2014a). The country is bordered by sea, Indonesia, Timor-Leste, New Caledonia, New Zealand, Papua New Guinea, and Solomon Islands (Observatory of Economic Complexity, 2013a). The country has a total population of about 23.49 million, a GDP of about $1.455 trillion and GDP per capita was about $43.2 thousand (World Bank, 2014a). The service sector makes up about 70% of the country's annual GDP and 75% of jobs, while mining and agriculture contributes about 12%, forming the backbone of much of Australia's economic growth (Economy Watch, 2014a). Vaughn (2012:20) stated "the Australian economy has undergone massive growth in recent years. Andrew Charlton has pointed out that Australia's economic growth over the past 20 years has been one third faster than the United States, twice as fast as Europe's and three times faster than Japan's".

According to OEC (2013) Australia is ranked 19th largest export economy and 23rd largest import economy in the world. The country's main exports includes iron ore (26%), coal briquettes (16%), petroleum gas (5.7%), gold (8.1%), crude petroleum (3.1%), wheat (2.3%) and copper ore (2.2%), while the country's main imports includes cars (7.9%), crude petroleum (7%), refined petroleum (7.4%), computers (3.3%), packaged medicaments (3.2%), gold (1.9%) and petroleum gas (1.1%).

The top export destinations of the country include China (36%), Japan (17%), South Korea (7.4%), India (4.1%), Hong Kong (3.9%) and United States (3.2%), while the main import origins of the

country include: China (20%), United States (11%), Japan (8%), Singapore (5.4%), Germany (5%), Thailand (4.9%), South Korea (4.2%), and Malaysia (3.8%) (OEC, 2013).

Much of the wealth that Australia has is derived from the fact that the country has 19% of the total world's known mineral resources with only about 0.3% of the world's total population (Vaughn, 2012).

4.4.4.2. Australia's SITC Data

The Table A4 in the appendix shows Australia's SITC imports as a proportion of all imports for the periods 1980 to 2014 as sourced and calculated from World Bank (World Integrated Trade Solution, 2015). In order to identify the imports trends and international transportation of Australia, a very similar calculation like that of South Africa's SITC imports data was applied in this case for Australia's data. The SITC data was calculated as a percentage of total imports to examine the graphical relationship and trends of Australia's imports cif/fob ratios to that of the Australia's composition of imports observed. Quantec Easy data was used to calculate the imports cif/fob ratios of Australia for period 1980 to 2012 (see appendix Table A4). Australian is one of the few countries that collect consistent cif/fob data and is appropriate for this study, since the country is an Island and no imports arrive there by land, therefore giving no need to allow for geographical contiguity (Pomfret and Sourdin, 2010:711).

Australia's compositions of imports flow pattern and make-up, as it is observed from its trade pattern in its high-valued goods of SITC 5 to SITC 9 imports, (see appendix A, table A4) figure 4.8 shows that Australia invests heavily in importation of capital goods, in this case importation of machinery and transport equipment (SITC 7) was observed between 1980 to 2007. Thereafter, a decline was evident until 2014, which is the last year of analysis. However, miscellaneous manufactured goods SITC 8 has a smooth fluctuation, which was evidenced throughout the period of analysis (1980 to 2014). Manufactured goods classified chiefly by material (SITC 6) declined slightly throughout the period of the analysis, but still represent a high number of percentage imports except for STIC 7 imports, and SITC 8 which outweighs SITC 6 from 1996 to 2014, when compared to all other categories of imports. Australia's chemicals and related products (SITC 5)

were observed to have increased slightly from 1980 to 2002 and then a decrease was evidence from 2006 to 2014. Australia's SITC 9 (commodities and transactions not elsewhere classified) was stable over the period, and then a sudden increase was evidenced in 2003, which was observed to have a decreasing effect in SITC 7 categories of imports as seen in figure 4.8.

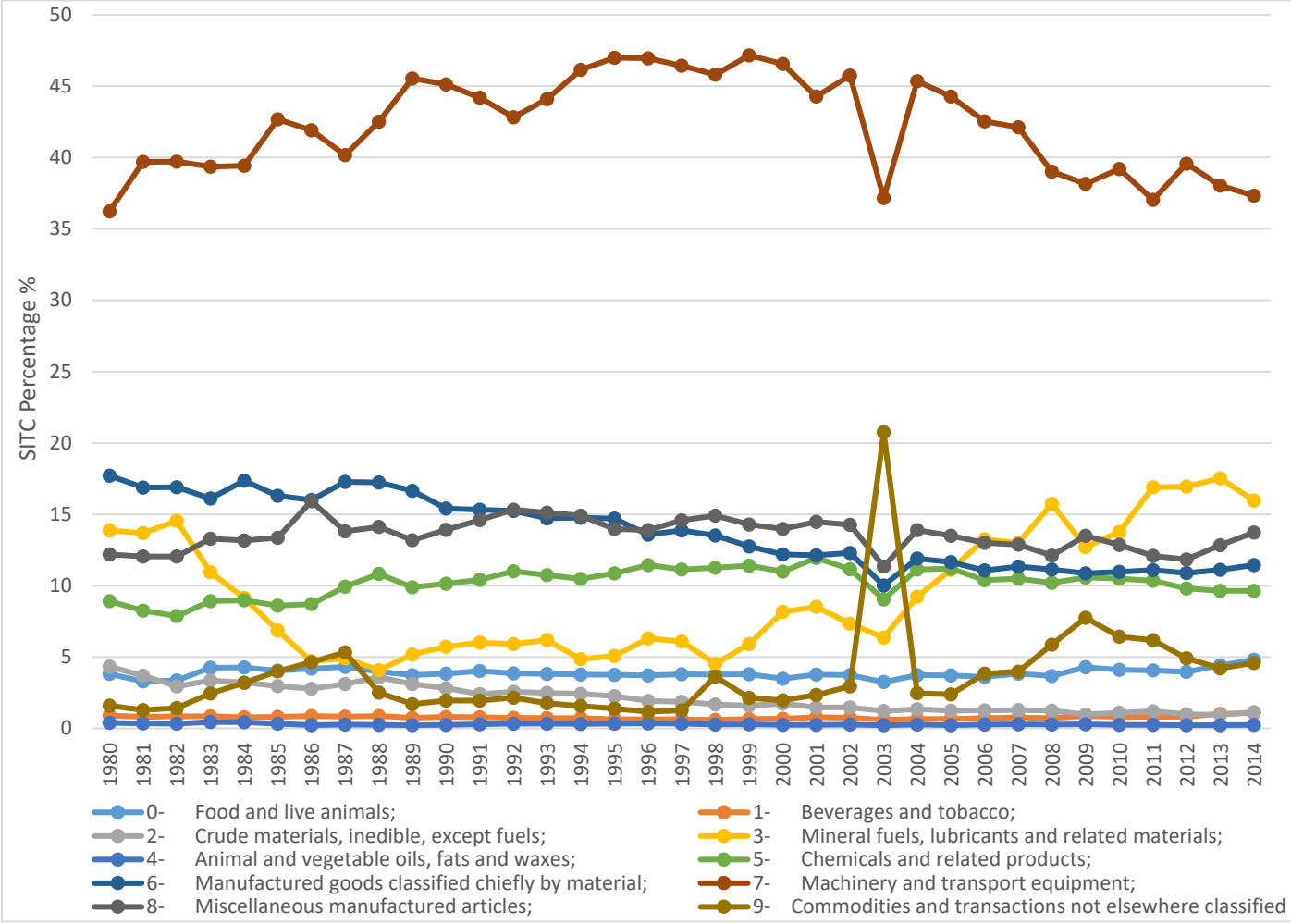


Figure 4. 8. Australia's SITC Imports as a Percentage of Total Imports, 1980-2014.

Source: Author's Calculations from data sourced from World Bank, 2015 (Word Integrated Trade Solution)

Australia's importation of food and live animals (SITC 0) was observed to have maintained about between 4.33% in 1980 and 4.58% in 2014 throughout the period analysed especially between 1992 (3.85%) to 2008 (3.66%), crude materials and inedible, except fuels (SITC 2) was observed

to have declined throughout the period of analysis. Australia's SITC category of importation of animals, vegetable oils, fats and waxes (SITC 4) and beverages and tobacco (SITC 1) was observed to have declined from about 0.39% in 1980 to about 0.24% in 2014.

In figure 4.8., it is observed generally that Australia experienced an increase in its high-valued imports relative to its low valued imports that declined throughout the period of analysis. Despite a slight decline of about 5.20% in SITC 7 (high-valued) imports towards the last 6 years (2006 to 2014) of the analysis and a slight, increase of about 4.52% in low-valued imports (SITC 3) towards the same period from 2006 to 2013.

However, without any further assessment or computation of the country's imports cif/fob ratios and based on the reasoning from the theory "that a rise in the proportion of a country's high-valued imports contribute to a decline in that country's import cif/fob ratios, *ceteris paribus* and a rise in the proportion of a country's low-valued imports equally contribute to a rise in that country's import cif/fob ratios, *ceteris paribus*" (Chasomeris, 2006). Hence, Australia should experience a smoother decline in its imports cif/fob ratios over the periods 1980 to 2014 depending on the rise and decrease of its low-valued and high-valued imports respectively.

Figure 4.9, presents a view of Australia's import cif/fob ratios over the period and merely looking at the figure it is observed that Australia witnessed a decline from about 14.23% in 1984 to about 4.12% in 2012 in its import cif/fob ratios for the period. This is important as Australia's trend in imports composition and trade pattern in the composition of its imports earlier indicated through the theory that the country should undoubtedly experience a decline in its imports cif/fob ratios over the period of analysis.

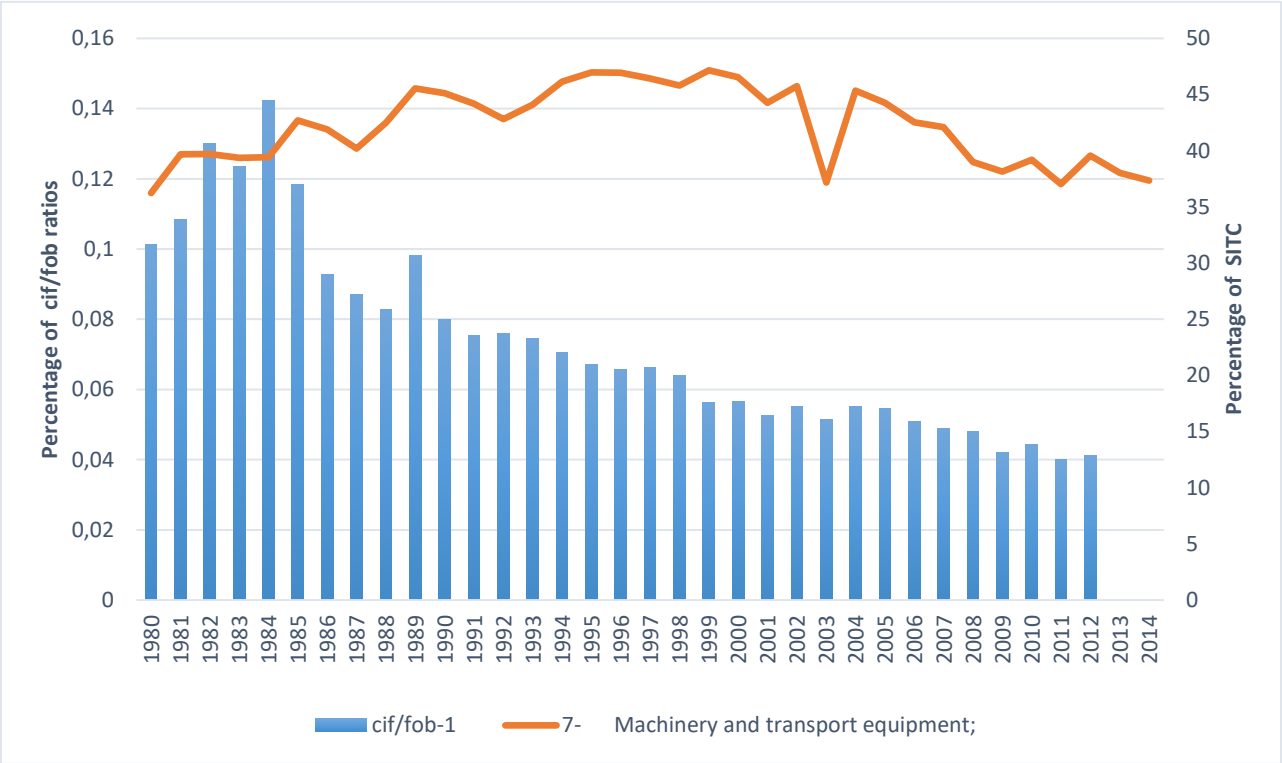


Figure 4. 9. Australia's cif/fob Ratio (1980-2012) and Manufactured Imports (SITC 7) from (1980 -2014)

Source: Author's calculations from data sourced from World Bank (Word Integrated Trade Solution) database, 2015 and Quantec Easy Data, 2013.

Pomfret and Sourdin (2010) argued that a country trading low-value goods will undoubtedly have a higher *ad-valorem* transport costs than a country trading a high value goods (e.g. if Saudi Arabia sells oil and Israel sells diamonds to Australia then Saudi trade costs, as a percentage of the value of the product, will be higher). Therefore, a change in a country's composition of imports has a substantial impact on the transport cost and in measurement of that country's import cif/fob ratios.

4.4.5. VENEZUELA

4.4.5.1. Overview

Venezuela is a nation located at the Northern coast of the South American continent. The country has a total area of 912,050 square kilometres, land: 882,050 square kilometres; water: 30,000 square kilometres and the country borders Argentina, Bolivia, Colombia, Guyana, Peru, Paraguay, Suriname and Uruguay by land, and Brazil by sea (Economy Watch, 2014b). Venezuela has a total population of about 30.69 million in 2014, a GDP of about $381.3 billion as recorded in 2012, a negative GDP growth rate of -4% in 2014 and inflation rate of about 62% in 2014 (World Bank, 2014b).

According to the Observatory of Economic Complexity (2013b), the country is ranked the 99th most complex economy by ECI (Economic Complexity Index), in 2013 Venezuela's exports amounted to about $143 billion, making the country the 34th largest exporter in the world and with importation of about $44.5 billion in the same year, the country was ranked the 57th largest importer in the world.

Venezuela is rich in mineral resources that are: petroleum, natural gas, iron ore, gold, bauxite and diamonds. Crude petroleum represents about 88.8% ($127 billion) of the country's total export, other export products include: refined petroleum ($12 billion), acyclic alcohols ($708 million), petroleum coke ($432 million) and Iron reductions ($381 million), while the country's main imports are: packaged medicaments ($2.4 billion), frozen bovine meat ($1.09 billion), iron pipes ($883 million), concentrated milk ($820 million), and bovine ($807 million) (OEC, 2013)

According to OEC (2013), Venezuela's top export destinations include: United States ($29.4billion), North America and Central America ($29.9 billion), other Asian countries ($28.1 billion), and India ($13.1 billion) while the country's top import origins include the United States ($10.3 billion), China ($6.4 billion), Brazil ($4.75 billion), Colombia ($2.28 billion) and Argentina ($2.19 billion).

4.4.5.2. SITC data for Venezuela

Venezuela is the last country to be examined in this study, SITC data collected from the World Bank's WITS database was used to examine the evolution of Venezuela's composition of imports (SITC) from 1982 to 2013, as there were no data available for 1980, 1981 and 2014 from the database. Quantec Easy data was used to calculate the imports cif/fob ratios of Venezuela for period 1982 to 2012 (see appendix A, table A5). Like data used previously for US, Germany, South Africa and Australia to compute as a percentage of the total imports, data from appendix A table A5 were used to construct and observe the evolution of Venezuela's composition of imports against its imports cif/fob ratios in order to find out if the composition of imports do have a significant role in the direction and flow of a country's imports cif/fob ratios.

Considering Venezuela's imports cif/fob ratios from figure 4.10, as calculated using Quantec easy data in table A5 in the appendix, it shows that something is wrong with Venezuela's imports cif/fob ratios as it does not align in any way (responding to movement) with its manufactured goods as a proportion to its imports comparing it to that of Australia, Germany and United States. Neither does it look like the pattern emanating from South Africa, which still provides an insight, into its composition of imports of low-value and high-value imports on its imports cif/fob ratios variation and trends. Venezuela's imports cif/fob ratios between the periods 1980 to 2003 has a mean of 11% and standard deviation of 0.00% (see table 4.3) shows no variation of the import cif/fob ratio from the mean, it then decreased to 9.99% for the period 2004 and 2012 and was essentially constant. To say invariably that this would indicate (if assuming from the common assertion that a country's import cif/fob ratios reveals the actual difference in that country's *ad valorem* shipping cost rather than changes in its composition of imports) that Venezuela's shipping costs between year 1982 and 2003 were reasonably stable and constant and then a slight decrease, without fluctuation, between 2004 and 2012 were notably fascinating, as there was no variations in the country's import cif/fob ratio evidence observed, as the standard deviation was at 0.00% for both periods (see table 4.3.), advocating that Venezuela's shipping costs each year during this period was essentially constant.

The Venezuela's data clearly reveals the caution and earlier argument in this study that data for imports cif/fob ratios are unreliable and prone to error. This Study has shown in the case of

Venezuela that imports cif/fob ratio cannot be relied on as a direct measure of international transport cost, as the country's imports cif/fob ratio is essentially constant at about 11 percent *ad valorem,* from 1982 to 2003 and at about 10 percent *ad valorem* from 2004 to 2012, evidence of a possible IMF staff data imputations as was found in the similar study by Chasomeris (2006) in the case of Malawi. Chasomeris (2006:80) stated, "it appears that Malawi's consistently high ratio of 67 per cent *ad valorem* is largely the result of IMF staff imputations. IMF staff imputations either Malawi's imports cif or imports fob data are available, but not both. Using a constant conversion factor, in this case apparently 67 per cent, the IMF staff calculates the missing import time series values". This could be the possible explanation why Venezuela's import cif/fob ratios were consistent over time.

Venezuela's political instability dating back as from 1980's which has seen high crime rate, violence and the collision of power between the country's two traditional parties (Sullivan, 2014). It is believed that Venezuela's long history dependent on oil as their major source of economic income and failure to diversify their economy was their biggest mistake. In 1992, about 120 people were killed in two-attempted coups, not forgetting the 1989 Caracas riot in which between 300 and 2000 people were killed as part of the country's political unrest (BBC, 2012).

Aisen and Veiga (2010) found political instability as having a harmful and negative effect on economic growth of a country, which among other things increases inflation rate and reduces GDP of that country. The above statement was evidenced from data on Venezuela by World Bank (2014b) Investment in infrastructures as recorded earlier which was believed to play an important role in trade cost reduction has eluded Venezuela according to findings by Hausmann and Rodríguez (2006). "The roots of Venezuela's economic misfortunes are rooted in five factors: corruption and authoritarianism, the resource curse, the decline of Venezuela's state oil company, state control over the economy, and drug gangs and violence" (International Policy Digest, 2015).

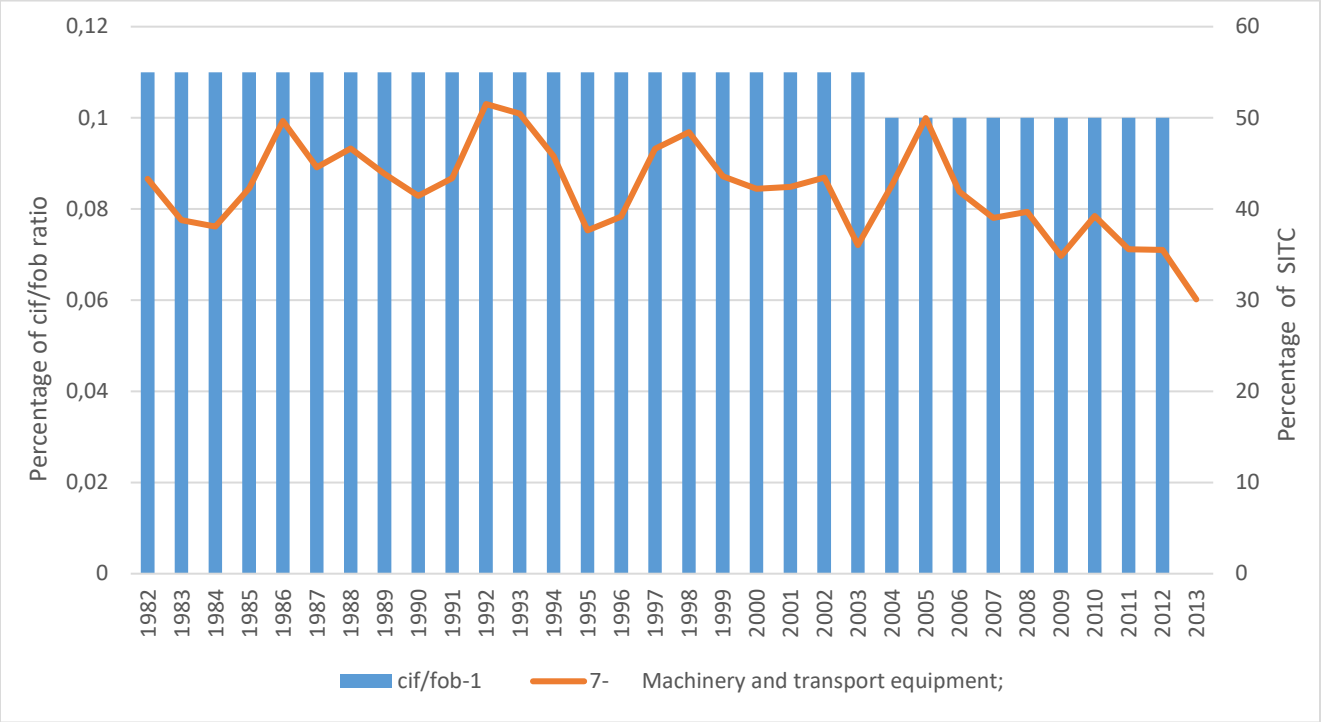


Figure 4. 10. Venezuela's cif/fob Ratio (1980-2012) and Manufactured Imports (SITC 7) from (1982 -2013).

Source: Author's calculations from data sourced from World Bank (Word Integrated Trade Solution) database, 2015 and Quantec Easy Data, 2013.

The imports cif/fob ratios of Venezuela is of great interest, looking at it from a comparison point of view with ratios from such countries like Australia, United States and Germany analysed earlier in this study. These countries are believed to have more accurate or close to accurate trade reports hence more accurate import cif/fob ratios. Carbonnier and Zweynert-de-Cadena (2015) believed that more developed countries have more reliable trade statistic, while developing countries trade statistics are seen as susceptible to manipulation and errors.

The evidence from the data gathered appears that Venezuela's consistent ratios of 11 percent and 10 percent could be as a result of IMF staff imputations as earlier indicated. It could be that Venezuela's imports cif or import fob trade data are available but not both, therefore IMF staff using a constant conversation factor, in this case 11 percent and 10 percent to calculate the other missing import time series value. This could be the reason why Venezuela's import cif/fob ratios

does not reflect the observed changes in its composition of imports (SITC Imports) in figure 4.11., over the entire period of the analysis.

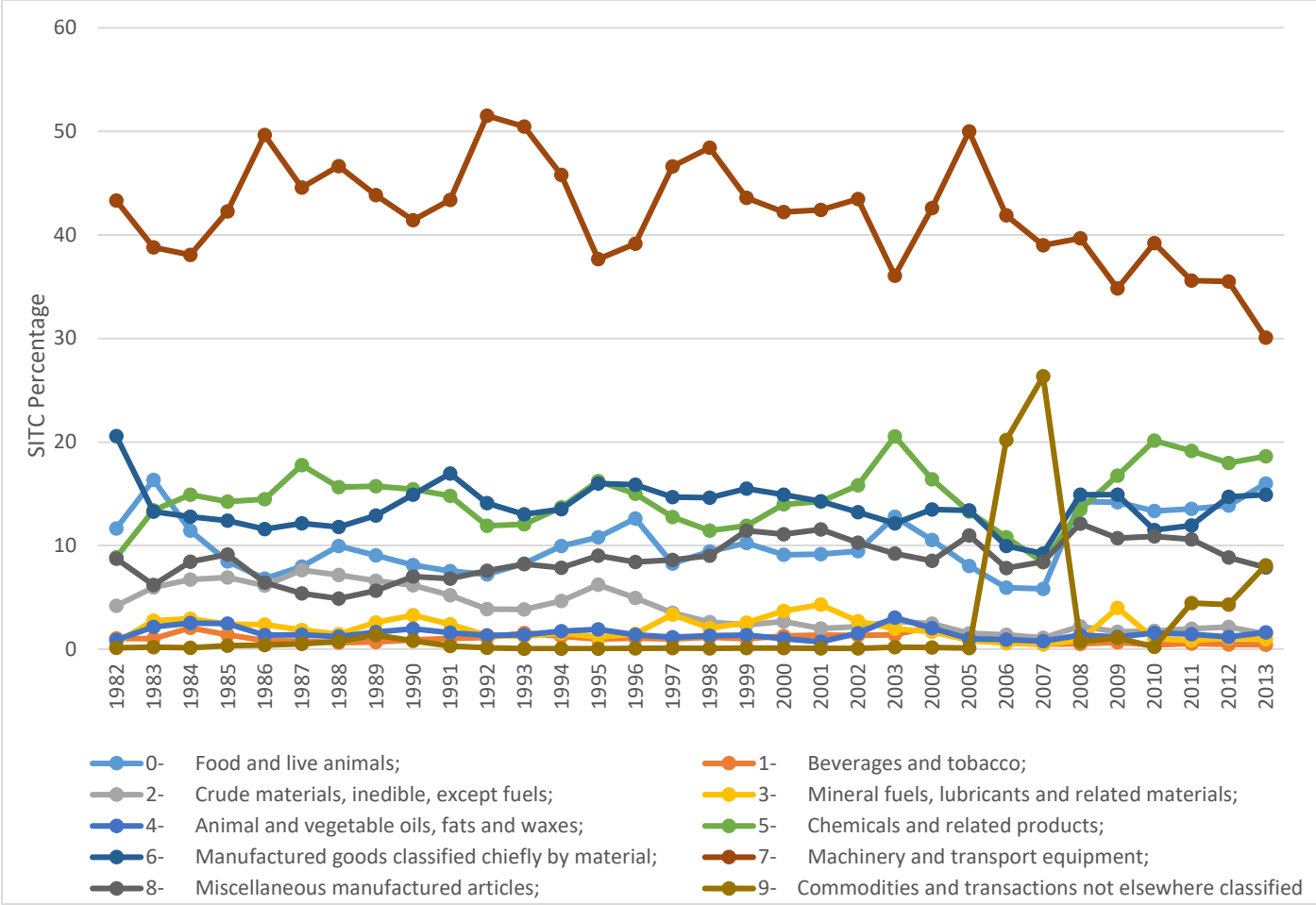


Figure 4. 11. Venezuela's SITC Imports as a Percentage of Total Imports, 1982-2013.

Source: Author's Calculations from data sourced from, Word Integrated Trade Solution, World Bank, 2015.

4.5. CORRELATION ANALYSIS AND STATISTICAL SIGNIFICANCE

This study used correlation between a country's composition of imports and a country's import cif/fob ratios in analysing data for this study.

Correlation coefficient as clarified by Abdi and Williams (2007) evaluates the closeness or relationship between two sets of measurements obtained from an observation, and tries to indicate vast amounts of information similar to the two variables (observation).

Correlation coefficient (r) may vary from -1 through to +1, with the negative value (-) showing an inverse relationship, 0 (zero) showing that there is no relationship and the positive value (+) indicating an increasing relationship (Pagano, 2012).

The choice for correlation coefficient chosen by the researcher for this study and not regression analysis is due to known argued facts that regression analysis focus more with statistical relationship of variables, as opposed to correlation analysis, which, tends to be more accustomed to functional, and dependence in relationship of variables, which is of more importance for this study.

The five countries from which data was collected for the purpose of this study, were used to measure the direction and strength of the relationship between the compositions of imports and imports cif/fob ratios.

Every SITC import data of each country were cross-tabulated to factor in the imports cif/fob ratios across the prescribed period to find out if the imports cif/fob ratios of these countries shows the accurate or exact value of their transport cost and if these ratios could be reliably used as an accurate measure (proxy) for international transport costs.

Firstly, to know the kind of correlation that exists between the variables (import cif/fob ratio as an international transport cost indicator and the composition of imports) the analysis was later used to describe such. Secondly, to know whether the correlation is weighty enough on which to base the theory that the weight of import composition of a nation in high and low valued imports do have substantial impact on the variation of import cif/fob ratios as a measurement for international transport cost. The analysis was used to further answer if there is a statistically significant cause-

and-effect relationship between the variables or if as a result of a third variable emanates a relationship between the variables.

In a country's analysis in section 4.4, focus was on gaining a clear understanding of a country's composition of imports as an element to be considered as indicative of the variation of the import cif/fob ratios of a nation. Using insight gained from literature reviews and the SITC data, this section focuses on appraising the relationship between the country's imports cif/fob ratios and the composition of imports.

The countries analysed in section 4.4 are used to substantiate and examine if there is a strong evidence of existence of a relationship and a platform that the import cif/fob ratio is not adequate to be used as a proxy for direct shipping costs.

Countries analysed have provided insight to why imports cif/fob ratios measures are predominantly not suitable as an interpretation or use as a direct proxy to measure shipping cost (*ad valorem* cost) and that trade composition on imports of a nation does influence considerably the variation and flow of a nation's or a country's imports cif/fob ratios.

As demonstrated earlier in chapter 3 of this study, which shows that coefficient maybe negative or positive? According to Stockburger (1998:149), "The sign of the correlation coefficient (+,-) defines the direction of the relationship, either positive or negative. A positive correlation coefficient means that as the value of one variable increases, the value of the other variable increases; as one decreases the other decreases. A negative correlation coefficient indicates that as one variable increases, the other decreases and vice-versa".

Table 4. 4. Cross Correlation Analysis Results of Countries Imports cif/fob Ratios and their SITC Imports as a Proportion of Total Imports.

Country	Germany	USA	Australia	South Africa	South Africa	Venezuela
SITC	1980-2012	1980 - 1998	1980-2012	1980-2012	1995-2012	1982-2012
0	0,39	.825**	0,128	-0,32	0,094	-0,224
1	0,052	.712**	.412*	.612**	0,197	.412*
2	.458*	.870**	.861**	-.494**	-0,147	.658**
3	.788**	0,215	-0,164	.678**	0,405	.445*
4	.657**	-0,204	.681**	.703**	0,423	0,276
5	-.625**	-.894**	-.704**	.712**	0,285	-0,134
6	-.472*	.891**	.880**	-0,282	0,023	0,315
7	-.730**	-0,26	-0,162	.485**	-0,269	.379*
8	-.781**	-.402*	-0,015	.717**	0,314	-.399*
9	0,037	-.665**	-0,309	-.638**	-0,116	-.486**

Notes: SITC Codes: 0- Food and live animals; 1- Beverages and tobacco; 2- Crude materials, inedible, except fuels; 3- Mineral fuels, lubricants and related materials; 4- Animal and vegetable oils, fats and waxes; 5- Chemicals and related products; 6- Manufactured goods classified chiefly by material; 7- Machinery and transport equipment; 8- Miscellaneous manufactured articles; 9- Commodities and transactions not elsewhere classified.

Source: Authors' correlation calculations using data from the Quantec Easy data and SITC imports reports from the World Bank (Word Integrated Trade Solution) database. (See Appendix Table A6, A7, A8, A9, A10 and A11 for the decomposition of correlation analysis for each country)

Note:-

**. Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).

Negative correlation values are highlighted for references purposes.

The observation from table 4.4 shows that Germany, Australia and United States all have a negative correlation coefficient in their high-value SITC 5 through to SITC 9, except for Germany's SITC 9, US and Australia's SITC 6, which are positive for the period analysed. However, Germany's SITC 5, SITC 6, SITC 7, and SITC 5, SITC 8 and SITC 9 are negative and statistically significant; SITC 6 appears positive and significant while SITC 7 is negative and insignificant. Australia's SITC 7 through to SITC 9 is negative and statistically insignificant; its SITC 6 appears positive and significant, while SITC 5 is negative and extremely significant.

On the other hand, Germany, Australia and United States low-value imports all have a positive correlation coefficient, except for US SITC 4 and Australia's SITC 3 that are negative for the period analysed. Germany's SITC 0 and SITC 1 are positive and statistically insignificant, while it's SITC 2 through SITC 4 are positive and extremely significant. US SITC 0 through to SITC 2 are positive and significant, and SITC 3 is positive and insignificant, while SITC 4 is negative and insignificant. Australia's low–value imports in SITC 1, SITC 2 and SITC 4 are positive and statistically significant, while its SITC 0 is positive and insignificant and SITC 3 appears negative and insignificant.

Pearson's correlation coefficients were observed and compared for SA as not being consistent with those of Australia, the United States and Germany where the data are regarded as being more reliable. This is because SITC 1 through to SITC 4, which represents low-valued, imports for South Africa for periods 1980 through to 2012 have a significant positive correlation except for SITC 2, which is negative. South Africa's low-value imports in SITC 0 are negative and not significant. South Africa's SITC 1 through to SITC 4 are significant at a probability level of 0.01 (2-tailed test). South Africa's high-valued imports in SITC 5 through to SITC 9 have a positive significant correlation expect for SITC 6, which is negative and not significant and SITC 9, which is also negative and statistically significant. Due to irregularities analysed and reported (South Africa's trade reports as a result of economic sanctions on the apartheid regime and its SITC imports misclassification between 1980 through to 1994 of data analysed) it will be dubious to consider South Africa's correlation result for the whole period, references however might be for explanation purposes. The year 1995 through to 2012, imports composition of trade data and

country's imports cif/fob ratios, were analysed for correlation as being more appropriate to consider.

However, table 4.4 shows South Africa's correlation results for the period 1995 through to 2012, a correlation between SA's imports cif/fob ratios and the country's composition of imports are all statistically insignificant. It is obvious, that in comparison, that South Africa's correlation coefficients are not consistent with those of United States, Australia and Germany where data are considered more reliable.

Venezuela's several coefficients are significant in low-value imports in SITC 1 through to SITC 3, SITC 0, appears negative and insignificant and SITC 4 is positive and insignificant while its high-value imports in SITC 8 and SITC 9 are negative and significant, while SITC 7 is positive and significant, its SITC 5 appears negative and insignificant and SITC 6 is positive and insignificant, these do not mean that Venezuela's data could be relied on as accurate, as there is a possibility of IMF staff imputation of Venezuela's import cif or import fob data, as similar evidence observed from a study conducted on Malawi by Chasomeris, 2006.

However, whether a developing or a developed country, where the data quality is reliable, the findings always provides the facts that a country's imports composition has a significant effect on the variation of that country's imports cif/fob ratios and as such should not be ignored or treated as constant (Chasomeris, 2006:80)

Notwithstanding the exclusion of the identified errors reported in periods 1980 through to 1994, South Africa's correlation results for the after economic sanction period still remain statistical insignificant. This could suggest a magnitude of error in the country's trade statistic data, even after economic sanctions. This indicates that using the reported trade statistic data for SA for computing any trends or levels for shipping costs will not be accurate or reliable. Although correlation for SA in the periods (1980-2012) might show signs of statistical significance, it would be believed to be a mere coincidence as there is evidence and theoretical foundations that the country's trade reports in the period of economic sanctions were purposefully incomplete and misclassified.

These analyses show that the relationship and trends in the composition of imports and imports cif/fob ratios in developed countries like Germany, US and Australia is strong in the cases where

the correlation is significantly present. Germany's SITC 2, SITC 3, and SITC 4 have values of .458*, .788**, and .657** respectively, which have a strong positive correlation which shows that some variation in imports cif/fob ratio is explained by variation in a country's composition of imports (SITC 2, SITC 3 and SITC 4), likewise the evidence in US SITC 0 (.825**), SITC 1 (.712**) and SITC 2 (.870**) and Australia's SITC 2 (.861**) and SITC 4 (.681**). These correlation results undeniably and evidently support the theory that a variation in the proportion of a country's low-valued imports in SITC 0 through SITC 4 do have a substantial significant effect on the country's imports cif/fob ratios measure.

There is strong statistically significant evidence in the correlation results observed from the developed countries like Germany's SITC 5 (-.625**), SITC 6 (-.472*), SITC 7 (-.730**), and SITC 8 (-.781**), Australia's SITC 5 (-.704*) and United States' SITC 5 (-.894**), SITC 8 (-.402*) and SITC 9 (-.665**) to support the theory (inverse relationship or negative relationship) that an increase or variation in the proportion of a country's high-value SITC 5 through to SITC 9 composition of imports may cause a decrease in the variation of the country's imports cif/fob ratios.

However, it would be correct to say, as it is obvious that a country's import composition of trade does have a reasonable impact on the country's import cif/fob ratios. It will be inaccurate to conclude that the imports cif/fob ratios will tell the actual difference in shipping cost rather than commodity mix effects for a country.

Based on the country analyses and the outcomes of the correlation analysis results, it is certain that a variation in a country's imports composition of goods, that is the country's high-value and low-value imports directly affects variation in the form of a decrease or rise in the country's imports cif/fob ratios. The evidence of the presence of a statistically significant relationship between a country's import cif/fob ratios and that country's composition of imports are not just a coincidence. The relationship between a country's composition of imports and that country's imports cif/fob ratios is supported by both economic theory and statistical significance. Therefore, the possibility of a causal straightforward relationship between the composition of imports and the imports cif/fob is an entirely plausible one. Furthermore, it will be correct to say that a shift in the trend or pattern of a country's composition of imports will undoubtedly cause a rise or decrease in the country's imports cif/fob ratios, evidence that a causal relationship exists between the variables.

4.6. CONCLUSION

The chapter sourced, compiled calculated and compare the country cif/fob ratios for South Africa, the United States of America, Germany, Venezuela, and Australia from the year 1980 to 2012. The chapter used correlation analyses to examined whether there is a relationship between a country's import cif/fob ratio and a country's composition of imports, as measured by the standard international trade classification (SITC) data. The results for the United States of America, Germany and Australia show that when a country's trade data are correct and reliable, a country's imports composition of trade has a substantial and statistically significant effect on the level and variation of that country's imports cif/fob ratios. Hence, the ratio cannot be relied on or be used as a measure of a country's direct shipping costs (*ad valorem* shipping costs) without the context of the country's imports composition. Furthermore, the results for South Africa and Venezuela show that import cif/fob ratios are inaccurate and unreliable indicators of shipping costs and should not be used as a direct measure of international transport costs. The conclusions and recommendations that stem from chapter four are discussed further in chapter five.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

5.1. CONCLUSION

This chapter presents analyses of WITS and Quantec data gathered for Germany, United States, South Africa, Australia and Venezuela in contributing towards a better understanding of the relationship between the composition of imports and a country's import cif/fob ratios.

United States is one of the largest traders on the globe, a complex economy with an effective national statistical agency that assures a quality trade reporting system and data that is reliable. Through the analysis of its trade data, the United States provided evidence that a rise in the proportion of a country's high-valued manufactured imports contributes to the decline in that country's imports cif/fob ratios, all things being equal (*ceteris paribus*), and an increase in the proportion of a country's low-value imports composition, equally contributes to a rise in that country's imports cif/fob ratios, *ceteris paribus.* Therefore, it would be inaccurate to ignore or assume a change in a country's imports composition, as insignificant to a change, in the variation of that country's import cif/fob ratios. The United States data seemingly provided similar evidence that when a country's trade data are correct and reliable, a country's imports composition of trade has a significant and substantial effect on that country's imports cif/fob ratios. Hence, the ratio cannot be relied on or be used as a measure of a country's direct shipping costs (*ad valorem* shipping costs) without the context of the country's imports composition.

In the case of Australia, Germany and United States, the correlation analyses shows that their high-valued imports from SITC 5 to SITC 9, and their imports cif/fob ratios, were negative and significantly correlated (note: except for Germany's SITC 9 (0.037), USA SITC 6 (.891**) and SITC 7 (-0.26, though negative but statistically insignificant), Australia's SITC's 7,8 and 9 (which are all negative but statistically insignificant) and SITC 6 (.880**) while their low-valued imports SITC 0 to SITC 4 were positive and some statistically correlated, with the exception of Australia's SITC 3 and US SITC 4, which are negative and statistically insignificant. See table 4.4 in chapter 4). The data analysis of Australia, USA and Germany shows that a change in imports composition of a country has a significant change in that country's import cif/fob ratios variation.

Venezuela's high-value imports from correlation analyses in SITC 8 and SITC 9 are negative and statistically significant except for SITC 5, which is negative and statistically insignificant, its SITC

7 is positive and statistically significant while SITC 6 is positive and insignificant. While its low-value imports in SITC's 1, 2 and 3 are positive and statistically significant with exception of SITC 4 which is positive and insignificant and SITC 0 which is negative and insignificant. However, due to data imputation by the IMF, the results from the analyses of Venezuela shows that the cif/fob ratio, measure is inaccurate and unreliable and should not be used as a direct measure of shipping cost. This study has shown, in the case of Venezuela, that imports cif/fob ratio cannot be relied on as a direct measure of international transport cost, as the country's imports cif/fob ratio is consistent at 11% and 10 % ad *valorem,* evidence of possible IMF staff data imputations and manipulations, as was found in the similar study by Chasomeris (2006:80) for the case on Malawi.

South Africa's correlation analyses (table 4.4) shows evidence of a statistically significant relationship between the country's cif/fob ratios and the country's composition of imports, though not consistent with those of Germany, USA and Australia, where data are considered more accurate and reliable. South African data cannot be relied on as a direct measure for shipping costs, due to some data manipulation and deliberate misclassification during the country's period of economic sanctions.

In comparison, analyses of Venezuela and South Africa provided evidence that data inaccuracy and unreliability of a nation's trade data are synonymous with unreliability and inaccuracy of the country's imports cif/fob ratios, which, without doubt, leads to inconsistencies, inaccuracies and misinterpretation of the actual *ad valorem* shipping costs of a country.

The correlation analyses presented for the five countries provide insight into the particular nature of imports cif/fob ratios and its flaws as a proxy for a country's direct *ad valorem* shipping costs. The correlation result for Germany, Australia and United States showed that changes in the proportion of the country's high-value imports and low-valued imports have substantial significant effect on the variation of the country's cif/fob ratios with a rise or fall in imports composition of trade leading to a corresponding decrease or increase in the country's cif/fob ratios.

The analysis of Australia, United States and Germany affirmed that imports composition of trade (composition of imports) of a country do contribute to the variation in a country's imports cif/fob ratios and that it would be incorrect to believe that a change in a country's imports cif/fob ratios

will reveal the actual difference in a country's direct shipping costs rather than the commodity mix effect for the country. On the other hand, it was established through the data analyses and the correlation analyses, that using a country's import cif/fob ratios to measure a country's direct costs of transportation may be misleading, misinterpreted and misrepresent the country's direct shipping cost. It is important when examining a country's import cif/fob ratios to view the ratios in context and understanding measurement analyses of that country's composition of imports.

The interpretation and measurement of international transport costs figures of trade are of great interest to both countries and merchants. According to Chasomeris (2009:149), "In the absence of direct measures, researchers have used an indirect measure of international transport costs - a country's import cif/fob ratios". Therefore, the objectives of this study are:

- To source, compile, calculate and compare the country cif/fob ratios for South Africa, United States, Germany, Venezuela and Australia from year 1980 to 2012 (see results in table 4.2)
- To establish using correlation analysis, the relationship between a country cif/fob ratio and a country's SITC trade data at HS (Harmonized System) revision 2-digit code 1 (see results table 4.4)
- To examine the use of imports cif/fob ratios as a measurement for international transport costs.

In the analysis of a comparative study on the use of country import cif/fob ratios to measure international transport costs, one of the main challenges faced is that of obtaining reliable data. This is because the cif/fob ratio data are believed to be unreliable and error ridden and susceptible to manipulations (Chasomeris, 2006; Hummels and Lugovskyy, 2006). However, notwithstanding this drawback, the study was able to provide substantial evidence and explanation in the comparative study on the use of a country's imports cif/fob ratios to measure international transport costs.

The literature review chapter deals with lots of key definitions important to this study, like imports cif/fob ratio, giving more insight in what international trade represents and international transport costs as a whole.

The data from the five countries analysed provided enough evidence that import cif/fob ratios alone are not sufficient to be used as a proxy for direct shipping cost. Hummels and Lugovskky (2003) believed that IMF cif/fob ratios are error-ridden and contains no beneficial information for cross commodity or time series variations. Users should be aware because IMF databases are the major data hub for almost all imports cif/fob ratios computed.

The study shows that in the case where data are reliable and accurate, a country's composition of imports in its high-value and low-valued imports have a significant effect in the variation of the country's imports cif/fob ratios, such as the case of Australia, Germany and the United States. There is a relationship between the two variables, that is, a country's imports cif/fob ratio and the country's composition of imports. Chasomeris (2006:68) explained, "a rise in the proportion of a country's high-valued imports contributes to a decline in that country's imports cif/fob ratios, *ceteris paribus* and a rise in the proportion of a country's low-valued imports equally contributes to a rise in that country's import cif/fob ratios, *ceteris paribus*".

The study showed the case of South Africa and Venezuela; where trade data are unreliable and inaccurate, and as such, the import cif/fob ratio computed from the data have no economic significance. Therefore, ratios were unable to reveal the country's direct transport costs or the *ad valorem* shipping costs. This was evident in the lack of significant correlation between South Africa's imports composition of trade (composition of imports) and the country's imports cif/fob ratios. As well as South Africa and Venezuela's lack of directional sign when compared to countries such as Australia, Germany, and the United States.

The study shows that uneven development has a possible impact on trade flows, pattern and freight transportation flows, and undoubtedly, the results of each country's imports cif/fob ratios.

In total, the study has shown that

- the composition of imports of a country do have a significant contribution to the variation in imports cif/fob ratios of the country;

- it would be unwise to assume that a change in a country's imports cif/fob ratio would reveal the true or exact difference in direct shipping costs of that country, rather than the commodity mix effect of the country;
- the measurement of a country's imports cif/fob ratios result in the misrepresentation or misinterpretation of that country's direct international transport costs; and
- where trade data are accurate and more reliable, like in Germany, the USA and Australia, statically significant relationships are observed between a country's composition of imports and the country's imports cif/fob ratios.

5.2. RECOMMENDATIONS AND FUTURE RESEARCH

The composition of imports of a country does have a direct impact on, and a statistically significant relationship with, the country's imports cif/fob ratios. However, based on this evidence, it is recommended that it will be unwise to make use of, or substitute, the imports cif/fob ratios as a direct measure for international transport costs.

However, if the imports cif/fob ratio is to be used, Chasomeris (2009:160) recommended that "it should be analysed within the evolving context of a country's import composition, within its historical context and, where possible, compared with other more direct indicators of international transport costs like ocean freight rates" of any country in question. This is necessary to ensure the highest standard in the quality of data and that a country's import cif/fob ratios results, thereafter, are reliable and useful.

In the case of Venezuela, and from insight gained in a similar case with Malawi, where import cif/fob data are constant, researchers should not use the cif/fob data. Researchers should always check the data using descriptive graphical analyses to see if the data appears reasonable and there is a useful variation in the data.

The results as presented by this study provides ample information on a comparative study on the use of country import cif/fob ratios to measure international transport costs, therefore providing a

useful baseline from which extensive further research can base their study. Several drawbacks of this study could be taken into consideration for future or further research as the presented analysis of this study can be revisited at a more advanced level of disaggregation.

The results from this study have presented a series of questions that are suitable for further analysis and investigation. Future research may examine the notion of why some countries have consistent import cif/fob ratios, why some countries manipulate their import cif/fob ratio data reports, and why some analysts and researchers do not compare the import cif/fob ratios with a more direct transport cost indicator. Many researchers, despite the knowledge of the problem of misinterpretation of international transport costs, persist to use the import cif/fob ratios as a proxy for direct shipping costs. However, there is no doubt that more reliable, accurate and more updated imports cif/fob time series data would improve the usefulness of measuring and analysing a country's cif/fob ratio.

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Appendix A

TABLE A1 USA'S CIF/FOB RATIOS 1980 -2012 AND SITC IMPORTS AS A PERCENTAGE OF TOTAL IMPORTS, 1980-2014

Percentage of Total Imports											
	CIF/FOB	0	1	2	3	4	5	6	7	8	9
1980	4.780213731	6.683140361	1.196392063	4.4974015	32.5108155	0.22754038	3.53999918	13.55563205	25.2322569	9.822832685	2.733989374
1981	4.739389156	6.04261013	1.250477893	4.465911907	30.8454689	0.19265558	3.56334342	14.46317828	26.5114936	10.03501453	2.629845764
1982	4.481209418	6.166300881	1.4382908	3.702750287	26.484791	0.17548404	3.87860583	13.80554386	29.8607722	11.55434943	2.933111633
1983	4.584013114	6.180529043	1.374679612	3.854230634	22.2609173	0.20051256	4.1760073	13.70459612	32.993251	12.3983906	2.856885822
1984	4.742651506	5.689870937	1.174305344	3.541488101	18.5063251	0.21836862	4.18688617	14.4667744	36.1160236	13.20855641	2.891401284
1985	4.731695286	5.607426606	1.141211456	3.139673482	15.4256903	0.20309379	4.17672052	13.77282454	39.2468871	14.19505761	3.091414566
1986	4.612547135	5.780269567	1.091965573	2.930287975	10.2844364	0.15207627	4.01493052	13.49139832	42.9980013	15.39744999	3.85918412
1987	4.48059157	5.238873148	1.051985122	2.942723415	11.0281502	0.15045157	3.94367772	13.40599998	43.1728521	16.13512921	2.930157573
1988	4.216105154	4.72883725	0.973575365	3.131162044	9.58745244	0.20117622	4.4381382	14.22170368	43.9926177	15.95771063	2.76762648
1989	4.165372318	4.553296016	0.951282616	3.350725693	11.3816027	0.15909465	4.3187824	13.33180685	42.7296082	16.22208603	3.001714839
1990	4.376240382	4.629338678	0.960966266	3.061515342	13.2862744	0.16807078	4.46926031	12.34092421	41.3305624	16.4001733	3.352914374
1991	4.07634244	4.68782179	1.007626015	2.802081175	11.4505118	0.18029459	4.91262839	11.94374218	42.5170965	17.00717307	3.491024469
1992	3.990876067	4.447248362	1.03209591	2.749778905	10.602123	0.20708585	5.16278528	11.60618296	42.8049044	17.82954226	3.558253064
1993	3.949451432	4.137426694	0.970664898	2.767508076	9.82706822	0.18045316	5.00730591	11.65422715	44.032658	17.97763796	3.445049944
1994	3.824177612	3.991132929	0.800840838	2.777906105	8.72978076	0.19159061	5.09102675	12.16739066	45.6474617	17.16852035	3.434349296
1995	3.672959967	3.803456779	0.736061334	2.894488135	8.17980992	0.19606223	5.40127739	12.29282811	46.4049336	16.69165124	3.399431215
1996	3.361536846	3.805403618	0.859974525	2.797281526	9.43294123	0.20553067	5.6417772	11.83950683	45.1418723	16.65789713	3.617814948
1997	3.268092477	3.846585908	0.89695027	2.634476819	9.20021898	0.18644107	5.74703222	11.85239225	44.8464288	17.12625684	3.663216883
1998	3.559060334	3.791663904	0.868372538	2.40986289	6.58908748	0.17236263	5.91733138	12.53691581	45.6862189	17.83683884	4.1913456
1999	3.398333041	3.555701874	0.855987458	2.20627893	7.49115593	0.14015319	5.99445824	11.72035977	46.1478482	17.38745667	4.500599696
2000	3.389106911	3.143460316	0.773915369	1.914484517	11.1046823	0.11855336	5.97351754	11.26448428	44.7918592	16.70617182	4.208871327
2001	3.346187555	3.388942377	0.868812432	1.85739815	10.9388867	0.10812617	6.82391936	11.02417751	43.0756818	17.52187782	4.392177658
2002	3.151534944	3.500028732	0.942601834	1.784526104	10.1493186	0.11863336	7.28792252	11.20012479	42.8268316	17.80749355	4.382518878
2003	3.653589156	3.534366201	0.965444198	1.67477657	12.5178992	0.12809978	7.89258568	10.83283421	40.8997539	17.56947662	3.984763654
2004	3.7984417	3.303074116	0.880427883	1.873971283	14.1932434	0.15683953	7.54947525	11.86140123	39.9258166	16.60293163	3.65281908
2005	3.681615824	3.178959791	0.849996837	1.799542202	17.2120903	0.14482652	7.55399031	11.6633713	38.3152021	15.75769424	3.524326389
2006	3.459658889	3.125776375	0.870485442	1.717195974	17.9882978	0.15501192	7.57159212	12.23189119	37.7729234	15.10627747	3.460548303
2007	3.241762734	3.220472364	0.905511778	1.617092043	18.4619442	0.17821516	7.84187294	11.82635453	37.3944951	15.15910124	3.394940571
2008	3.130288452	3.248434285	0.835572387	1.61554288	23.1897932	0.2506853	8.31287288	11.06970542	34.167984	13.91482805	3.394581622
2009	2.928918583	4.105803054	1.022408232	1.375232462	17.4293883	0.2432936	9.56351516	9.85895444	36.303924	15.86411539	4.233365402
2010	2.890493558	3.782763044	0.888587449	1.518513964	18.448642	0.23011439	8.95324398	10.31763234	37.062217	15.12482981	3.673456036
2011	2.619505899	3.836376223	0.847276207	1.597093303	20.525598	0.30329367	8.91360424	10.5676955	35.8560893	14.07740563	3.475567922
2012	2.646660689	3.815545952	0.879635606	1.498677881	18.5724444	0.26775561	8.63649337	10.42879425	38.0261481	14.11827878	3.75622606
2013		3.998003421	0.936816964	1.506189031	16.7233929	0.26300577	8.58124881	10.53252877	38.8057082	14.78655432	3.866551819
2014		4.231050321	0.932231783	1.542841568	14.7979585	0.26072823	8.76940229	10.99010855	39.7540988	14.96401943	3.757560545

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified. SITC Revision Standard 2, Code digits 1.

Source: Author's calculations from data sourced from World Bank, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013.

TABLE A2 GERMANY'S CIF/FOB RATIOS, 1980 -1998 AND SITC IMPORTS AS A PERCENTAGE OF TOTAL IMPORTS, 1980-2014

Percentage of Total											
	CIF/FOB	0	1	2	3	4	5	6	7	8	9
1980	3,008358227	9,766360997	0,998763718	7,788499317	22,3758759	0,42454655	7,10169872	17,94729712	18,69151435	11,60183633	3,303607023
1981	3,316271559	9,930232446	1,034835241	7,14794884	24,346745	0,46707018	7,45598574	16,07810593	19,69895886	11,21931333	2,620804482
1982	3,091676844	10,06069592	1,084335142	6,932414862	23,5095337	0,46136625	7,75448313	15,77702804	20,3343423	10,97808503	3,10771562
1983	3,085767426	9,887979309	1,079942268	6,958889036	21,2395042	0,47397308	8,18223832	16,28177457	21,81857301	11,21895625	2,858169963
1984	3,046877781	9,684243291	0,945382729	7,149327716	20,418874	0,6788579	8,55879753	16,44602835	21,87505381	11,41950377	2,823930954
1985	2,80616203	9,554370948	0,999867471	6,860620974	19,8210727	0,58958975	8,91528135	16,17811583	22,90707367	11,43134467	2,742662607
1986	2,680273189	10,3457979	1,093333565	6,409838352	11,4954283	0,36519169	9,27756197	17,76735803	26,46411611	13,59456281	3,186811288
1987	2,540726723	9,811830448	1,097713797	6,136595685	9,64260305	0,28645811	9,40043284	17,50138295	27,99840494	15,0194998	3,10507839
1988	2,611928976	9,435542641	0,997891985	6,424711768	7,66037446	0,32731168	9,48970769	18,57668079	29,1547487	14,9378321	2,995198188
1989	2,648987831	8,633077043	0,930623982	6,531090462	7,60074038	0,3398694	9,20670276	18,94493029	30,48348487	14,47567488	2,853805932
1990	2,425421244	8,410913963	0,989438777	5,294979076	8,34684217	0,27454353	8,7872976	18,08165608	32,36210048	15,0718882	2,38034012
1991	2,585747869	8,282829881	1,020871794	4,410505086	8,37489293	0,24734222	8,18638664	16,84098107	35,01588314	15,90719952	1,713107724
1992	2,551574287	8,570759918	1,055804939	4,425474155	7,47569343	0,27087111	8,30814048	16,99200591	34,52548894	16,19348644	2,182274675
1993	2,786998679	8,240673947	1,056478439	4,033396189	7,94722761	0,27566019	8,14148822	15,57034677	31,16244346	16,46141186	7,110873309
1994	2,800038287	8,488212869	1,04705077	4,44588552	7,01166421	0,31293845	8,77772491	16,64358104	31,87116846	15,90710195	5,494671813
1995	2,800008048	8,204064624	0,951340854	4,371505753	6,21987046	0,29746716	9,00159203	17,23197933	31,74288127	14,53151231	7,447786202
1996	2,800063134	8,212897665	0,95821724	3,8829528	7,66276973	0,29049818	8,69166478	15,56233254	32,77373892	14,92388827	7,041039869
1997	2,799984027	7,576293915	0,968306782	4,003238463	7,53481037	0,29464182	8,70404582	15,13230439	32,91266767	14,3612541	14,3612541
1998	2,799962766	7,198557912	1,010000071	3,830483158	5,60869502	0,29589158	9,46653649	15,44478839	36,00191638	14,23752243	6,905608567
1999		6,625578615	1,076889649	3,413653922	5,79664584	0,25765874	9,72269653	14,24591376	37,37717653	13,77929654	7,704489877
2000		5,226470787	0,860612738	3,284498362	8,65850823	0,21541141	8,79844572	12,94616669	35,7337605	12,1360054	12,14012017
2001		5,950362937	0,984895196	3,271021019	8,80518536	0,21998898	10,4800198	13,76610619	38,98651059	13,01919031	4,516719599
2002		6,265304616	1,060873362	3,264373977	8,44541508	0,26752959	10,9813824	13,68801944	38,97202654	13,1226897	3,932385319
2003		5,867850311	0,906322577	2,918933656	8,6666253	0,26075268	10,3716387	12,81299672	37,08866358	12,15904542	8,947171058
2004		5,44376203	0,805423359	3,054209629	9,21815169	0,27264819	10,8156442	12,66641171	36,54276118	11,35567959	9,825308394
2005		5,687846372	0,805261674	3,241029665	11,5187049	0,29946755	11,5488909	13,57847438	37,35641672	11,5078743	4,456033569
2006		5,296001486	0,741581943	3,505437163	12,1096803	0,37096859	11,3521816	14,06835706	37,00132839	10,68112736	4,873336078
2007		5,213850433	0,704941747	3,580645449	10,5831748	0,3742407	11,7102667	14,55869872	33,49555839	10,31751089	9,461112225
2008		5,32347397	0,674088877	3,495477635	13,6357227	0,39806693	11,6983725	13,75545572	31,94465628	9,966981512	9,107703815
2009		6,265820582	0,840332508	3,010072391	11,2563638	0,35880983	12,6710177	11,70215105	32,93680459	11,71234326	9,246284285
2010		5,672215062	0,739554532	3,774307861	11,4840898	0,37085901	12,4394363	12,7535076	33,89639772	11,0255712	7,844060947
2011		5,723856319	0,778805603	4,118515653	13,2732997	0,45769948	12,3741428	13,72441657	32,95432161	11,17056625	5,424376002
2012		5,758845504	0,759274526	3,863224521	14,8113217	0,38130266	12,1185754	12,68257267	31,85162134	11,09309194	6,680169719
2013		6,057048327	0,794410303	3,743205288	14,615974	0,39017336	12,2078824	12,5675626	32,22913068	11,52319627	5,871416703
2014		6,123639861	0,789122779	3,571279036	12,7879169	0,37217606	12,4293546	12,79639566	33,29930067	12,164985	5,66582938

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified. SITC Revision Standard 2, Code digits 1.

Source: Author's calculations from data sourced from World Bank, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013.

TABLE A3 SOUTH AFRICA'S CIF/FOB RATIOS, 1980 -2012 AND SITC IMPORTS AS A PERCENTAGE OF TOTAL IMPORTS, 1980-

Percentage of Total Import											
	CIF/FOB	0	1	2	3	4	5	6	7	8	9
1980	6.273194	8.544831	0.002129	7.651561	1.819554	0.18452	2.275807	16.28819	2.024381	0.733123	60.26513
1981	9.109102	9.527566	0.001845	9.370762	2.05391	0.354449	2.347996	15.07048	2.453513	0.73144	57.90542
1982	8.777764	8.561749	0.001699	9.510174	1.737446	0.220265	2.647402	16.94552	2.690009	0.778144	56.73938
1983	8.720069	6.395873	0.001869	8.233058	2.297337	0.16575	2.468285	17.58889	2.048703	0.633075	59.98209
1984	8.791448	5.777201	0.001307	10.13805	2.839256	0.158556	3.188449	18.10353	2.082352	0.759031	56.82286
1985	11.17511	9.141276	0.003847	18.70115	14.19624	0.205771	5.873182	32.06281	2.516362	2.044632	14.87388
1986	10.51199	7.50214	0.00223	10.9269	8.436718	0.1492	4.278831	23.07158	1.84277	0.85888	42.71003
1987	8.482663	6.244847	0.001812	8.462882	5.177708	0.100654	2.282016	18.29835	1.040677	0.648126	57.5635
1988	7.805713	6.320763	0.002146	11.35521	5.774179	0.112956	2.666781	23.19979	1.169041	0.877872	48.30885
1989	8.435383	7.285757	0.002344	12.77136	6.623753	0.135855	2.861732	23.79469	1.297465	0.902171	44.09281
1990	7.674665	7.538593	0.001875	11.08845	7.240296	0.110587	2.942422	22.94992	1.845855	1.187785	44.90861
1991	7.876521	11.18782	0.004383	16.56361	11.3621	0.200867	4.653931	33.98125	3.658753	2.340183	15.61319
1992	6.622548	7.04357	0.007321	9.599883	6.903832	0.198849	5.612322	16.24646	7.273223	2.228216	44.16159
1993	11.28294	6.562363	0.006455	9.050726	7.856687	0.193961	5.100864	14.40796	7.986351	2.684167	45.51139
1994	9.04483	7.507268	0.007426	18.4962	5.486915	0.144182	6.175442	26.72745	6.71555	2.665433	25.33896
1995	13.04277	6.727401	0.007691	10.15528	8.063978	0.177874	7.660114	29.29774	8.717098	3.350688	25.08071
1996	12.11696	11.58246	0.018677	12.8677	8.862896	0.325119	10.93268	19.61453	14.19749	5.610211	14.13922
1997	16.99156	8.853704	0.015035	10.61056	7.41748	0.215265	9.047216	30.87424	14.56483	4.846713	12.06644
1998	12.89089	9.948769	0.017192	11.76451	7.782921	0.217127	8.899733	24.40335	16.83862	5.188335	13.23742
1999	10.8783	3.570212	0.850703	2.948256	10.17909	0.945888	12.37051	13.51566	38.20077	9.227829	8.19108
2000	10.85834	3.39966	0.548942	3.246417	14.34633	0.611275	11.52256	12.27274	36.70532	8.680305	8.666454
2001	12.88717	3.019787	0.590316	2.776203	14.79	0.673968	11.33584	11.70252	38.26552	8.418129	8.427719
2002	13.13398	3.509261	0.609541	3.19887	12.47245	0.79154	11.90094	12.18503	37.43187	8.625812	9.274677
2003	17.07374	3.428522	0.651896	3.179503	11.94437	0.797956	10.85825	12.20182	39.31556	8.22261	9.399509
2004	13.44832	3.400155	0.669252	3.130002	14.46006	0.819376	9.821569	11.20874	39.51992	8.406971	8.563954
2005	13.46952	3.173404	0.594159	2.817835	14.30499	0.63628	9.861238	11.43354	39.36531	9.069881	8.743366
2006	15.61203	3.094138	0.572081	2.957152	18.37387	0.631308	8.761377	11.13078	37.78821	8.961043	7.730035
2007	10.94613	3.541072	0.667234	3.137066	18.64055	0.86993	8.826529	11.62535	37.27853	8.114145	7.299587
2008	7	3.626384	0.638538	3.287156	22.38004	0.939789	9.619794	10.41074	34.97162	7.453228	6.672716
2009	14.60138	4.496133	1.046864	1.962047	21.48485	0.89475	10.29647	10.4526	34.7627	9.090882	5.512704
2010	17.57509	3.950601	0.764687	2.017914	19.68669	1.089731	10.6262	10.95071	35.35858	9.002431	6.552446
2011	21.87983	4.251786	0.67146	2.220843	21.36226	1.138629	10.11652	10.60679	35.14774	8.375071	6.108899
2012	22.61542	6.527153	0.941825	2.750964	31.98741	1.577303	14.3714	14.51922	6.682425	11.8197	8.822591
2013		4.893183	0.768861	2.082238	21.59905	0.819618	10.4066	10.65105	34.21126	8.500935	6.067197

2013

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified. SITC Revision Standard 2, Code digits 1.

Source: Author's calculations from data sourced from World Bank, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013.

TABLE A4 AUSTRALIA'S CIF/FOB RATIOS, 1980 -2012 AND SITC IMPORTS AS A PERCENTAGE OF TOTAL IMPORTS, 1980-2014

Percentage of Total Imports											
Year	CIF/FOB	0	1	2	3	4	5	6	7	8	9
1980	10.13435808	3.811402571	0.91597436	4.336364727	13.8678917	0.39456076	8.92506047	17.7215816	36.23296788	12.1864888	1.607707112
1981	10.83754607	3.299336349	0.807929242	3.688105781	13.6830642	0.35758831	8.24926108	16.89258651	39.69287035	12.05240823	1.276849954
1982	13.00336294	3.350842979	0.847740841	2.95083841	14.5348021	0.33664441	7.87464515	16.9062425	39.70961091	12.05647886	1.432153806
1983	12.34213007	4.248938504	0.859243189	3.358269452	10.9468549	0.45136921	8.91729234	16.11630389	39.36019328	13.2876931	2.453842172
1984	14.23271631	4.279024601	0.782071271	3.221848653	9.15578705	0.43959624	8.98285153	17.35869792	39.42128085	13.16431046	3.194531425
1985	11.84424992	4.054842276	0.81720127	2.9749502	6.87425738	0.32553362	8.61219987	16.29310546	42.68684224	13.36304216	3.998025531
1986	9.287154217	4.187627115	0.870870408	2.772205462	4.71302799	0.23524989	8.72091865	16.01686356	41.91110628	15.92649757	4.645633072
1987	8.700512101	4.313167934	0.83722685	3.10660778	4.92236434	0.26543578	9.93525056	17.2845432	40.18117233	13.82271269	5.331518544
1988	8.272821577	3.989053195	0.867291697	3.582418829	4.08674675	0.26015928	10.8314626	17.2439084	42.50697055	14.12268732	2.509301389
1989	9.811313459	3.731982459	0.755399302	3.106341045	5.17903049	0.23797028	9.89044664	16.661699	45.54374809	13.18849572	1.70488698
1990	7.987029936	3.831532866	0.810214078	2.826152202	5.72006333	0.25255819	10.1501068	15.40662524	45.12656895	13.91887913	1.957299248
1991	7.546600105	4.020810547	0.78482056	2.411459568	6.0220174	0.28195811	10.4124453	15.32644586	44.19381768	14.6057487	1.94047624
1992	7.600021617	3.855804664	0.746395812	2.568837142	5.91949152	0.32881846	11.0109754	15.25162837	42.8245789	15.32762192	2.165847761
1993	7.44089124	3.819464805	0.726912181	2.481777443	6.19205125	0.3264419	10.7509209	14.71903462	44.1007373	15.11399649	1.768663132
1994	7.042460382	3.782117698	0.73342728	2.42053256	4.85944425	0.32155984	10.4687333	14.77410989	46.14698441	14.91277768	1.580313047
1995	6.720280894	3.759765044	0.650683564	2.258152963	5.07785872	0.33671087	10.86648	14.70217058	46.98563867	13.96952917	1.39301046
1996	6.557230683	3.708005794	0.65113221	1.926970382	6.30595373	0.34774096	11.455395	13.57813516	46.95545075	13.90306883	1.168147172
1997	6.621563265	3.792401265	0.650536154	1.868073342	6.08823531	0.32432218	11.1373823	13.8698975	46.43241415	14.57610036	1.260637457
1998	6.391447743	3.781871357	0.607885715	1.674795245	4.53228574	0.27835273	11.2587609	13.52703756	45.80836168	14.90624071	3.624408387
1999	5.626638803	3.788177664	0.662762852	1.605544529	5.90647543	0.2827838	11.4065307	12.75310567	47.15820501	14.28895253	2.147461827
2000	5.666723725	3.48683628	0.681082936	1.744425948	8.16359841	0.24103878	10.9833912	12.18997492	46.55624939	13.98869679	1.964705356
2001	5.267687483	3.78456124	0.794600026	1.4795856	8.51788754	0.24325902	11.9487718	12.12584986	44.27533342	14.48255967	2.347591774
2002	5.509382636	3.734235932	0.757757961	1.47699719	7.3473473	0.26510373	11.1613844	12.2920713	45.74207359	14.26760162	2.955427022
2003	5.153059653	3.247784762	0.603367113	1.216653013	6.37462309	0.22307319	9.03711653	10.0115758	37.16707203	11.35436769	20.76436678
2004	5.525128409	3.734505878	0.67258292	1.339011197	9.23383445	0.26998461	11.1375464	11.90786048	45.34709901	13.88656813	2.471006914
2005	5.468880521	3.705455148	0.661868865	1.247890628	11.1229502	0.23662614	11.2024947	11.65208399	44.27591962	13.50685039	2.387860315
2006	5.099382203	3.615551244	0.726170711	1.267579609	13.2472169	0.27699984	10.3879227	11.07976017	42.54133416	13.0094595	3.848005181
2007	4.87444766	3.832881124	0.760998517	1.29211054	12.999879	0.28785815	10.4970859	11.35487919	42.1146574	12.88198694	3.977663216
2008	4.813308163	3.664166842	0.733534844	1.255219276	15.746167	0.26962918	10.2098607	11.1372276	39.0053871	12.10580142	5.873006077
2009	4.212222982	4.301522657	0.871561588	0.982037376	12.7079332	0.28216944	10.5690654	10.87751861	38.15227745	13.4988986	7.757015648
2010	4.423703619	4.111142316	0.812453812	1.093592764	13.7701693	0.25385579	10.5011153	10.97220718	39.19697433	12.8570124	6.431476814
2011	3.999947143	4.07330897	0.800307975	1.201636423	16.9065133	0.24371723	10.3541957	11.0978645	37.03462084	12.0981522	6.189682817
2012	4.124635825	3.964477848	0.826491686	1.005026508	16.9374245	0.2298596	9.80478655	10.89490739	39.5650761	11.84671257	4.92523727
2013		4.410239512	1.007917993	0.952470819	17.5302052	0.22701467	9.64719752	11.12071567	38.03982307	12.84707175	4.217343781
2014		4.80875626	1.085482298	1.137328066	15.9676556	0.24614146	9.64940398	11.44972526	37.34110602	13.73245261	4.581948426

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified. SITC Revision Standard 2, Code digits 1.

Source: Author's calculations from data sourced from World Bank, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013.

TABLE A5 VENEZUELA'S CIF/FOB RATIOS, 1982 -2012 AND SITC IMPORTS AS A PERCENTAGE OF TOTAL IMPORTS, 1982-2013

Percentage of Total Import											
	CIF/FOB	0	1	2	3	4	5	6	7	8	9
1982	10.99994011	11.65232272	1.033464689	4.186551952	0.61889536	0.87359978	8.87736349	20.58134341	43.311759	8.74181482	0.122885062
1983	11.00002964	16.3442789	0.994404992	5.957579227	2.73864862	2.12310021	13.3961742	13.28716766	38.784285	6.197297471	0.17706331
1984	11.00008409	11.4539152	2.051342417	6.719965627	2.91582366	2.52797488	14.9223202	12.76947615	38.074868	8.428905926	0.135408377
1985	11.00005392	8.470896103	1.375475255	6.916010347	2.41084732	2.44759705	14.2378048	12.4177151	42.273538	9.122655338	0.327460536
1986	10.99995563	6.795959886	0.838325617	6.131950688	2.38232655	1.34968034	14.4704425	11.5734648	49.649633	6.420899575	0.387317239
1987	11.00003474	7.983123174	0.775928539	7.622623062	1.85048996	1.39154039	17.7614831	12.14763132	44.581925	5.368228014	0.517027206
1988	11.00005634	9.942972425	0.610138039	7.143944276	1.44906549	1.19482377	15.6280116	11.79261338	46.632756	4.873869591	0.73180518
1989	10.99993749	9.061398459	0.675873963	6.600287174	2.57165974	1.64453393	15.7293458	12.8960134	43.853225	5.627923821	1.339738439
1990	10.99985961	8.124464636	0.879379528	6.168963697	3.28815129	1.95618716	15.4412364	14.90504459	41.430438	7.020342659	0.785792213
1991	10.99998433	7.530217446	1.018228952	5.197554506	2.40748224	1.5781835	14.8042293	16.95395911	43.383526	6.816105191	0.310513763
1992	11.00004616	7.204272256	1.113430556	3.850706743	1.32013544	1.32177686	11.9022521	14.08861422	51.51431	7.569705657	0.114796286
1993	11.0002727	8.262518534	1.543308608	3.831939049	1.226639	1.37349279	12.0406578	13.01555947	50.454124	8.201403133	0.050357904
1994	11.00035212	9.967144531	1.234152046	4.655892875	1.54221343	1.73550634	13.6781403	13.50903911	45.793423	7.843921306	0.040566564
1995	11.00021172	10.7956212	0.974094312	6.218216382	1.15837084	1.90229506	16.2167028	16.00119216	37.667209	9.027439056	0.038859115
1996	11.00010888	12.61405479	1.067548078	4.947791516	1.47905699	1.37684409	14.9987035	15.87417715	39.153992	8.41671629	0.071115253
1997	11.0000233	8.266154329	0.977569853	3.497773129	3.34596886	1.14724579	12.7409172	14.68936134	46.603734	8.625132799	0.106142545
1998	11.00006192	9.421882882	1.141396855	2.598990396	2.02150786	1.28972927	11.4295745	14.61258717	48.420314	9.008995871	0.055021071
1999	11.00010331	10.23738597	0.994755893	2.343611988	2.55121448	1.35744494	11.9208501	15.48703769	43.569925	11.43716621	0.100607183
2000	10.9997469	9.103449414	1.255971751	2.659413254	3.6930562	0.99953911	13.9754654	14.92159798	42.207329	11.08972294	0.094454472
2001	11.0000084	9.167569206	1.3462583	1.991169458	4.28125806	0.70400596	14.2319563	14.25829531	42.415526	11.54311896	0.060842285
2002	11.00049435	9.471618728	1.331762992	2.153616294	2.67771297	1.52416699	15.8257474	13.22742647	43.453364	10.26839377	0.06619063
2003	11.00045642	12.768242	1.393206346	2.700549315	1.96298073	3.03830518	20.5485671	12.15312808	36.050987	9.211052755	0.17298113
2004	9.999860968	10.54912024	2.176245964	2.45190142	1.683924	2.00935541	16.3951181	13.48560917	42.58668	8.521457173	0.140588295
2005	9.999978424	8.041197059	0.822210356	1.516355571	0.86642327	1.00949485	13.2770164	13.39461999	49.987795	10.97808991	0.106797837
2006	10.00012157	5.929237105	0.611733545	1.36930054	0.55179394	0.8986515	10.7991199	9.953082696	41.884226	7.812025825	20.19082871
2007	10.00002221	5.821289227	0.483792312	1.084986192	0.45008963	0.77975007	8.37359011	9.237592878	39.006142	8.429332922	26.33343439
2008	10.00016506	14.252248	0.506041494	2.181315032	0.83316063	1.35414111	13.4804337	14.90184331	39.679595	12.11612622	0.695094999
2009	9.999987481	14.1969115	0.654536717	1.674122466	3.97393125	1.18097977	16.7596807	14.91247246	34.83582	10.72486482	1.0866806
2010	10.00031747	13.33262119	0.399257958	1.749753658	1.00518647	1.55126072	20.1282436	11.49469285	39.218172	10.89670351	0.224108358
2011	9.99985143	13.54332474	0.526075951	1.965885495	0.81167741	1.44327362	19.1388908	11.9461111	35.594696	10.60017009	4.429894996
2012	10.00005882	13.86867766	0.441998981	2.132622896	1.0692472	1.17993601	17.9712174	14.70247365	35.496551	8.831068075	4.306207445
2013		15.9778764	0.409573585	1.462099151	0.95253736	1.62212934	18.6059595	14.9162071	30.086258	7.868604544	8.098755476

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified. SITC Revision Standard 2, Code digits 1.

Source: Author's calculations from data sourced from Word Integrated Trade Solution, World Bank, 2015 and Quantec Easy Data, 2013.

TABLE A6 UNITED STATES' CIF/FOB RATIOS AND SITC CORRELATION ANALYSIS RESULTS AS A PERCENTAGE OF TOTAL IMPORTS, 1980-2012

		SITC0	SITC1	SITC2	SITC3	SITC4	SITC5	SITC6	SITC7	SITC8	SITC9	CIFFOB
SITC0	Pearson Correlation	1	.885**	.871**	.477**	.200	-.760**	.770**	-.524**	-.673**	-.680**	.825**
	Sig. (2-tailed)		.000	.000	.005	.265	.000	.000	.002	.000	.000	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC1	Pearson Correlation	.885**	1	.700**	.575**	.090	-.568**	.644**	-.642**	-.670**	-.572**	.712**
	Sig. (2-tailed)	.000		.000	.000	.617	.001	.000	.000	.000	.001	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC2	Pearson Correlation	.871**	.700**	1	.312	.028	-.920**	.865**	-.337	-.529**	-.723**	.870**
	Sig. (2-tailed)	.000	.000		.077	.875	.000	.000	.055	.002	.000	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC3	Pearson Correlation	.477**	.575**	.312	1	.441*	-.007	.225	-.991**	-.931**	-.536**	.215
	Sig. (2-tailed)	.005	.000	.077		.010	.968	.208	.000	.000	.001	.230
	N	33	33	33	33	33	33	33	33	33	33	33
SITC4	Pearson Correlation	.200	.090	.028	.441*	1	.220	-.113	-.417*	-.452**	-.351*	-.204
	Sig. (2-tailed)	.265	.617	.875	.010		.219	.532	.016	.008	.045	.254
	N	33	33	33	33	33	33	33	33	33	33	33
SITC5	Pearson Correlation	-.760**	-.568**	-.920**	-.007	.220	1	-.868**	.027	.256	.578**	-.894**
	Sig. (2-tailed)	.000	.001	.000	.968	.219		.000	.880	.150	.000	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC6	Pearson Correlation	.770**	.644**	.865**	.225	-.113	-.868**	1	-.254	-.486**	-.733**	.891**
	Sig. (2-tailed)	.000	.000	.000	.208	.532	.000		.155	.004	.000	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC7	Pearson Correlation	-.524**	-.642**	-.337	-.991**	-.417*	.027	-.254	1	.921**	.528**	-.260
	Sig. (2-tailed)	.002	.000	.055	.000	.016	.880	.155		.000	.002	.145
	N	33	33	33	33	33	33	33	33	33	33	33
SITC8	Pearson Correlation	-.673**	-.670**	-.529**	-.931**	-.452**	.256	-.486**	.921**	1	.665**	-.402*
	Sig. (2-tailed)	.000	.000	.002	.000	.008	.150	.004	.000		.000	.020
	N	33	33	33	33	33	33	33	33	33	33	33
SITC9	Pearson Correlation	-.680**	-.572**	-.723**	-.536**	-.351*	.578**	-.733**	.528**	.665**	1	-.665**
	Sig. (2-tailed)	.000	.001	.000	.001	.045	.000	.000	.002	.000		.000
	N	33	33	33	33	33	33	33	33	33	33	33
CIFFOB	Pearson Correlation	.825**	.712**	.870**	.215	-.204	-.894**	.891**	-.260	-.402*	-.665**	1
	Sig. (2-tailed)	.000	.000	.000	.230	.254	.000	.000	.145	.020	.000	
	N	33	33	33	33	33	33	33	33	33	33	33

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified.

Source: Author's calculations and construction of correlation analysis using data sourced from Word Integrated Trade Solution, World Bank, 2015 and Quantec Easy Data, 2013.

TABLE A7 GERMANY'S CIF/FOB RATIOS AND SITC CORRELATION ANALYSIS RESULTS AS A PERCENTAGE OF TOTAL IMPORTS, 1980-1998

		SITC0	SITC1	SITC2	SITC3	SITC4	SITC5	SITC6	SITC7	SITC8	SITC9	CIFFOB
SITC0	Pearson Correlation	1	,453	.883**	.748**	.619**	-,279	,298	-.852**	-.651**	-.625**	,390
	Sig. (2-tailed)		,052	,000	,000	,005	,248	,215	,000	,003	,004	,099
	N	19	19	19	19	19	19	19	19	19	19	19
SITC1	Pearson Correlation	,453	1	,133	,213	-,086	-,165	-,127	-,210	-,030	-,295	,052
	Sig. (2-tailed)	,052		,588	,382	,726	,500	,604	,389	,903	,221	,832
	N	19	19	19	19	19	19	19	19	19	19	19
SITC2	Pearson Correlation	.883**	,133	1	.815**	.735**	-,309	,388	-.903**	-.790**	-.602**	.458*
	Sig. (2-tailed)	,000	,588		,000	,000	,197	,101	,000	,000	,006	,049
	N	19	19	19	19	19	19	19	19	19	19	19
SITC3	Pearson Correlation	.748**	,213	.815**	1	.823**	-.661**	-,156	-.950**	-.924**	-,400	.788**
	Sig. (2-tailed)	,000	,382	,000		,000	,002	,523	,000	,000	,090	,000
	N	19	19	19	19	19	19	19	19	19	19	19
SITC4	Pearson Correlation	.619**	-,086	.735**	.823**	1	-,274	-,140	-.807**	-.860**	-,319	.657**
	Sig. (2-tailed)	,005	,726	,000	,000		,256	,568	,000	,000	,183	,002
	N	19	19	19	19	19	19	19	19	19	19	19
SITC5	Pearson Correlation	-,279	-,165	-,309	-.661**	-,274	1	,259	.536*	,426	,159	-.625**
	Sig. (2-tailed)	,248	,500	,197	,002	,256		,285	,018	,069	,516	,004
	N	19	19	19	19	19	19	19	19	19	19	19
SITC6	Pearson Correlation	,298	-,127	,388	-,156	-,140	,259	1	-,027	,156	-.534*	-.472*
	Sig. (2-tailed)	,215	,604	,101	,523	,568	,285		,914	,525	,018	,041
	N	19	19	19	19	19	19	19	19	19	19	19
SITC7	Pearson Correlation	-.852**	-,210	-.903**	-.950**	-.807**	.536*	-,027	1	.894**	,391	-.730**
	Sig. (2-tailed)	,000	,389	,000	,000	,000	,018	,914		,000	,098	,000
	N	19	19	19	19	19	19	19	19	19	19	19
SITC8	Pearson Correlation	-.651**	-,030	-.790**	-.924**	-.860**	,426	,156	.894**	1	,248	-.781**
	Sig. (2-tailed)	,003	,903	,000	,000	,000	,069	,525	,000		,305	,000
	N	19	19	19	19	19	19	19	19	19	19	19
SITC9	Pearson Correlation	-.625**	-,295	-.602**	-,400	-,319	,159	-.534*	,391	,248	1	,037
	Sig. (2-tailed)	,004	,221	,006	,090	,183	,516	,018	,098	,305		,880
	N	19	19	19	19	19	19	19	19	19	19	19
CIFFOB	Pearson Correlation	,390	,052	.458*	.788**	.657**	-.625**	-.472*	-.730**	-.781**	,037	1
	Sig. (2-tailed)	,099	,832	,049	,000	,002	,004	,041	,000	,000	,880	
	N	19	19	19	19	19	19	19	19	19	19	19

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified.

Source: Author's calculations and construction of correlation analysis using data sourced from World Bank, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013.

TABLE A8 SOUTH AFRICA'S CIF/FOB RATIOS AND SITC CORRELATION ANALYSIS RESULTS AS A PERCENTAGE OF TOTAL IMPORTS, 1980-2012

		SITC0	SITC1	SITC2	SITC3	SITC4	SITC5	SITC6	SITC7	SITC8	SITC9	CIFFOB
SITC0	Pearson Correlation	1	-.763**	.823**	-.501**	-.623**	-.500**	.747**	-.784**	-.654**	.430*	-.320
	Sig. (2-tailed)		.000	.000	.003	.000	.003	.000	.000	.000	.013	.069
	N	33	33	33	33	33	33	33	33	33	33	33
SITC1	Pearson Correlation	-.763**	1	-.848**	.826**	.939**	.806**	-.719**	.842**	.923**	-.735**	.612**
	Sig. (2-tailed)	.000		.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC2	Pearson Correlation	.823**	-.848**	1	-.584**	-.792**	-.609**	.887**	-.786**	-.764**	.438*	-.494**
	Sig. (2-tailed)	.000	.000		.000	.000	.000	.000	.000	.000	.011	.004
	N	33	33	33	33	33	33	33	33	33	33	33
SITC3	Pearson Correlation	-.501**	.826**	-.584**	1	.871**	.759**	-.430*	.609**	.833**	-.781**	.678**
	Sig. (2-tailed)	.003	.000	.000		.000	.000	.013	.000	.000	.000	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC4	Pearson Correlation	-.623**	.939**	-.792**	.871**	1	.806**	-.673**	.723**	.896**	-.700**	.703**
	Sig. (2-tailed)	.000	.000	.000	.000		.000	.000	.000	.000	.000	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC5	Pearson Correlation	-.500**	.806**	-.609**	.759**	.806**	1	-.433*	.792**	.950**	-.904**	.712**
	Sig. (2-tailed)	.003	.000	.000	.000	.000		.012	.000	.000	.000	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC6	Pearson Correlation	.747**	-.719**	.887**	-.430*	-.673**	-.433*	1	-.680**	-.603**	.235	-.282
	Sig. (2-tailed)	.000	.000	.000	.013	.000	.012		.000	.000	.187	.112
	N	33	33	33	33	33	33	33	33	33	33	33
SITC7	Pearson Correlation	-.784**	.842**	-.786**	.609**	.723**	.792**	-.680**	1	.877**	-.797**	.485**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000		.000	.000	.004
	N	33	33	33	33	33	33	33	33	33	33	33
SITC8	Pearson Correlation	-.654**	.923**	-.764**	.833**	.896**	.950**	-.603**	.877**	1	-.881**	.717**
	Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.000	.000		.000	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC9	Pearson Correlation	.430*	-.735**	.438*	-.781**	-.700**	-.904**	.235	-.797**	-.881**	1	-.638**
	Sig. (2-tailed)	.013	.000	.011	.000	.000	.000	.187	.000	.000		.000
	N	33	33	33	33	33	33	33	33	33	33	33
CIFFOB	Pearson Correlation	-.320	.612**	-.494**	.678**	.703**	.712**	-.282	.485**	.717**	-.638**	1
	Sig. (2-tailed)	.069	.000	.004	.000	.000	.000	.112	.004	.000	.000	
	N	33	33	33	33	33	33	33	33	33	33	33

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified.

Source: Author's calculations and construction of correlation analysis using data sourced from World Bank, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013

TABLE A9 SOUTH AFRICA'S CIF/FOB RATIOS AND SITC CORRELATION ANALYSIS RESULTS AS A PERCENTAGE OF TOTAL IMPORTS, 1995-2012

		SITC0	SITC1	SITC2	SITC3	SITC4	SITC5	SITC6	SITC7	SITC8	SITC9	CIFFOB
SITC0	Pearson Correlation	1	-.732**	.915**	-.374	-.506*	-.125	.768**	-.840**	-.618**	.559*	.094
	Sig. (2-tailed)		.001	.000	.126	.032	.622	.000	.000	.006	.016	.711
	N	18	18	18	18	18	18	18	18	18	18	18
SITC1	Pearson Correlation	-.732**	1	-.925**	.733**	.875**	.535*	-.839**	.580*	.904**	-.765**	.197
	Sig. (2-tailed)	.001		.000	.001	.000	.022	.000	.012	.000	.000	.433
	N	18	18	18	18	18	18	18	18	18	18	18
SITC2	Pearson Correlation	.915**	-.925**	1	-.654**	-.781**	-.382	.880**	-.745**	-.851**	.753**	-.147
	Sig. (2-tailed)	.000	.000		.003	.000	.118	.000	.000	.000	.000	.560
	N	18	18	18	18	18	18	18	18	18	18	18
SITC3	Pearson Correlation	-.374	.733**	-.654**	1	.864**	.410	-.597**	.102	.740**	-.578*	.405
	Sig. (2-tailed)	.126	.001	.003		.000	.091	.009	.687	.000	.012	.095
	N	18	18	18	18	18	18	18	18	18	18	18
SITC4	Pearson Correlation	-.506*	.875**	-.781**	.864**	1	.642**	-.707**	.287	.865**	-.668**	.423
	Sig. (2-tailed)	.032	.000	.000	.000		.004	.001	.249	.000	.002	.080
	N	18	18	18	18	18	18	18	18	18	18	18
SITC5	Pearson Correlation	-.125	.535*	-.382	.410	.642**	1	-.388	.017	.702**	-.386	.285
	Sig. (2-tailed)	.622	.022	.118	.091	.004		.111	.946	.001	.114	.253
	N	18	18	18	18	18	18	18	18	18	18	18
SITC6	Pearson Correlation	.768**	-.839**	.880**	-.597**	-.707**	-.388	1	-.797**	-.816**	.815**	.023
	Sig. (2-tailed)	.000	.000	.000	.009	.001	.111		.000	.000	.000	.927
	N	18	18	18	18	18	18	18	18	18	18	18
SITC7	Pearson Correlation	-.840**	.580*	-.745**	.102	.287	.017	-.797**	1	.477*	-.687**	-.269
	Sig. (2-tailed)	.000	.012	.000	.687	.249	.946	.000		.045	.002	.280
	N	18	18	18	18	18	18	18	18	18	18	18
SITC8	Pearson Correlation	-.618**	.904**	-.851**	.740**	.865**	.702**	-.816**	.477*	1	-.775**	.314
	Sig. (2-tailed)	.006	.000	.000	.000	.000	.001	.000	.045		.000	.204
	N	18	18	18	18	18	18	18	18	18	18	18
SITC9	Pearson Correlation	.559*	-.765**	.753**	-.578*	-.668**	-.386	.815**	-.687**	-.775**	1	-.116
	Sig. (2-tailed)	.016	.000	.000	.012	.002	.114	.000	.002	.000		.647
	N	18	18	18	18	18	18	18	18	18	18	18
CIFFOB	Pearson Correlation	.094	.197	-.147	.405	.423	.285	.023	-.269	.314	-.116	1
	Sig. (2-tailed)	.711	.433	.560	.095	.080	.253	.927	.280	.204	.647	
	N	18	18	18	18	18	18	18	18	18	18	18

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified.

Source: Author's calculations and construction of correlation analysis using data sourced from World Bank, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013

TABLE A10 AUSTRALIA'S CIF/FOB RATIOS AND SITC CORRELATION ANALYSIS RESULTS AS A PERCENTAGE OF TOTAL IMPORTS, 1980-2012

		SITC0	SITC1	SITC2	SITC3	SITC4	SITC5	SITC6	SITC7	SITC8	SITC9	CIFFOB
SITC0	Pearson Correlation	1	.506**	.117	-.066	.158	.014	.197	-.204	.290	-.085	.128
	Sig. (2-tailed)		.003	.517	.714	.381	.937	.272	.255	.101	.638	.476
	N	33	33	33	33	33	33	33	33	33	33	33
SITC1	Pearson Correlation	.506**	1	.495**	.340	.186	-.526**	.443**	-.581**	-.167	-.139	.412*
	Sig. (2-tailed)	.003		.003	.053	.299	.002	.010	.000	.353	.442	.017
	N	33	33	33	33	33	33	33	33	33	33	33
SITC2	Pearson Correlation	.117	.495**	1	-.273	.579**	-.557**	.964**	-.124	.079	-.386*	.861**
	Sig. (2-tailed)	.517	.003		.124	.000	.001	.000	.492	.664	.027	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC3	Pearson Correlation	-.066	.340	-.273	1	.049	-.295	-.376*	-.658**	-.743**	.115	-.164
	Sig. (2-tailed)	.714	.053	.124		.786	.096	.031	.000	.000	.523	.361
	N	33	33	33	33	33	33	33	33	33	33	33
SITC4	Pearson Correlation	.158	.186	.579**	.049	1	-.368*	.554**	-.148	-.033	-.365*	.681**
	Sig. (2-tailed)	.381	.299	.000	.786		.035	.001	.411	.857	.037	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC5	Pearson Correlation	.014	-.526**	-.557**	-.295	-.368*	1	-.488**	.631**	.497**	-.206	-.704**
	Sig. (2-tailed)	.937	.002	.001	.096	.035		.004	.000	.003	.251	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC6	Pearson Correlation	.197	.443**	.964**	-.376*	.554**	-.488**	1	.005	.219	-.473**	.880**
	Sig. (2-tailed)	.272	.010	.000	.031	.001	.004		.976	.221	.005	.000
	N	33	33	33	33	33	33	33	33	33	33	33
SITC7	Pearson Correlation	-.204	-.581**	-.124	-.658**	-.148	.631**	.005	1	.681**	-.523**	-.162
	Sig. (2-tailed)	.255	.000	.492	.000	.411	.000	.976		.000	.002	.366
	N	33	33	33	33	33	33	33	33	33	33	33
SITC8	Pearson Correlation	.290	-.167	.079	-.743**	-.033	.497**	.219	.681**	1	-.437*	-.015
	Sig. (2-tailed)	.101	.353	.664	.000	.857	.003	.221	.000		.011	.932
	N	33	33	33	33	33	33	33	33	33	33	33
SITC9	Pearson Correlation	-.085	-.139	-.386*	.115	-.365*	-.206	-.473**	-.523**	-.437*	1	-.309
	Sig. (2-tailed)	.638	.442	.027	.523	.037	.251	.005	.002	.011		.081
	N	33	33	33	33	33	33	33	33	33	33	33
CIFFOB	Pearson Correlation	.128	.412*	.861**	-.164	.681**	-.704**	.880**	-.162	-.015	-.309	1
	Sig. (2-tailed)	.476	.017	.000	.361	.000	.000	.000	.366	.932	.081	
	N	33	33	33	33	33	33	33	33	33	33	33

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified.

Source: Author's calculations and construction of correlation analysis using data sourced from World Bank, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013.

TABLE A11 VENEZUELA'S CIF/FOB RATIOS AND SITC CORRELATION ANALYSIS RESULTS AS A PERCENTAGE OF TOTAL IMPORTS, 1982-2012

		SITC0	SITC1	SITC2	SITC3	SITC4	SITC5	SITC6	SITC7	SITC8	SITC9	CIFFOB
SITC0	Pearson Correlation	1	-.087	-.103	.001	.300	.463**	.259	-.651**	.299	-.353	-.224
	Sig. (2-tailed)		.642	.580	.994	.102	.009	.159	.000	.102	.051	.225
	N	31	31	31	31	31	31	31	31	31	31	31
SITC1	Pearson Correlation	-.087	1	.167	.330	.478**	-.051	.147	.172	.023	-.369*	.412*
	Sig. (2-tailed)	.642		.369	.070	.006	.785	.430	.355	.902	.041	.021
	N	31	31	31	31	31	31	31	31	31	31	31
SITC2	Pearson Correlation	-.103	.167	1	.177	.429*	.106	.080	.173	-.732**	-.368*	.658**
	Sig. (2-tailed)	.580	.369		.341	.016	.570	.670	.351	.000	.041	.000
	N	31	31	31	31	31	31	31	31	31	31	31
SITC3	Pearson Correlation	.001	.330	.177	1	.137	.140	.169	-.039	.068	-.405*	.445*
	Sig. (2-tailed)	.994	.070	.341		.464	.452	.364	.835	.718	.024	.012
	N	31	31	31	31	31	31	31	31	31	31	31
SITC4	Pearson Correlation	.300	.478**	.429*	.137	1	.483**	-.116	-.296	-.179	-.344	.276
	Sig. (2-tailed)	.102	.006	.016	.464		.006	.534	.106	.336	.058	.133
	N	31	31	31	31	31	31	31	31	31	31	31
SITC5	Pearson Correlation	.463**	-.051	.106	.140	.483**	1	-.176	-.466**	.038	-.390*	-.134
	Sig. (2-tailed)	.009	.785	.570	.452	.006		.344	.008	.838	.030	.472
	N	31	31	31	31	31	31	31	31	31	31	31
SITC6	Pearson Correlation	.259	.147	.080	.169	-.116	-.176	1	.002	.188	-.525**	.315
	Sig. (2-tailed)	.159	.430	.670	.364	.534	.344		.993	.310	.002	.084
	N	31	31	31	31	31	31	31	31	31	31	31
SITC7	Pearson Correlation	-.651**	.172	.173	-.039	-.296	-.466**	.002	1	-.288	-.208	.379*
	Sig. (2-tailed)	.000	.355	.351	.835	.106	.008	.993		.116	.261	.035
	N	31	31	31	31	31	31	31	31	31	31	31
SITC8	Pearson Correlation	.299	.023	-.732**	.068	-.179	.038	.188	-.288	1	-.066	-.399*
	Sig. (2-tailed)	.102	.902	.000	.718	.336	.838	.310	.116		.725	.026
	N	31	31	31	31	31	31	31	31	31	31	31
SITC9	Pearson Correlation	-.353	-.369*	-.368*	-.405*	-.344	-.390*	-.525**	-.208	-.066	1	-.486**
	Sig. (2-tailed)	.051	.041	.041	.024	.058	.030	.002	.261	.725		.006
	N	31	31	31	31	31	31	31	31	31	31	31
CIFFOB	Pearson Correlation	-.224	.412*	.658**	.445*	.276	-.134	.315	.379*	-.399*	-.486**	1
	Sig. (2-tailed)	.225	.021	.000	.012	.133	.472	.084	.035	.026	.006	
	N	31	31	31	31	31	31	31	31	31	31	31

Notes: SITC Codes: 0 – Food and live animals; 1 – Beverages and tobacco; 2 – Crude materials, inedible, except fuels; 3 – Mineral fuels, lubricants and related materials; 4 – Animal and vegetable oils, fats and waxes; 5 – Chemicals and related products; 6 – Manufactured goods classified chiefly by material; 7 – Machinery and transport equipment; 8 – Miscellaneous manufactured articles; 9 – Commodities and transactions not elsewhere classified.

Source: Author's calculations and construction of correlation analysis using data sourced from World Bank, 2015 (Word Integrated Trade Solution) and Quantec Easy Data, 2013.

Appendix B Ethical Clearance Certificate

UNIVERSITY OF KWAZULU-NATAL
INYUVESI YAKWAZULU-NATALI

14 December 2015

Mr Antohony Francis Tochukwu Anieto (208511193)
Graduate School of Business & Leadership
Westville Campus

Dear Mr Anieto,

Protocol reference number: HSS/1809/015M
Project title: A comparative study on the use of country import cif/fob ratios to measure international transport costs

Full Approval – No Risk / Exempt Application

In response to your application received on 04 December 2015, the Humanities & Social Sciences Research Ethics Committee has considered the abovementioned application and the protocol has been granted **FULL APPROVAL.**

Any alteration/s to the approved research protocol i.e. Questionnaire/Interview Schedule, Informed Consent Form, Title of the Project, Location of the Study, Research Approach and Methods must be reviewed and approved through the amendment /modification prior to its implementation. In case you have further queries, please quote the above reference number.

PLEASE NOTE: Research data should be securely stored in the discipline/department for a period of 5 years.

The ethical clearance certificate is only valid for a period of 3 years from the date of issue. Thereafter Recertification must be applied for on an annual basis.

I take this opportunity of wishing you everything of the best with your study.

Yours faithfully

.....

pp **Dr Shenuka Singh (Chair)**

/ms

Cc Supervisor: Dr Mihalis Chasomeris
Cc Academic Leader Research: Dr Muhammad Hoque
Cc School Administrator: Ms Zarina Bullyraj

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