An Empirical Analysis of Botswana's Import Demand Function: A Disaggregated Expenditure Component Approach

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A Dissertation submitted to the Department of Economics in the University of Botswana in partial fulfillment of requirements for the award of a Master of Arts Degree in Economics

May 2019

DECLARATION

This dissertation was undertaken from October 2018 to May 2019. I hereby declare that the study has not been done before. The contents of this paper are my original work, except where referenced.

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APPROVAL

This dissertation has been examined and approved as meeting the requirements for the partial fulfilment of the Master of Arts Degree in Economics.

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DEDICATION

This work is dedicated to my beloved parents Mr. Lerumo Betha and Mrs. Kgalalelo Betha.

ACKNOWLEDGEMENTS

Firstly, I give thanks to God Almighty. His grace is forever enough.

I would like to acknowledge my supervisors Prof. I. Mogotsi and Dr. L. Sekwati for their contribution to my academic journey. This work is a result of their patient guidance and support, and I will forever be grateful for their contribution.

I would like to express my heartfelt gratitude to my parents for believing in my dreams and helping me realize those dreams. I am thankful for their financial support as well as their moral support. Also, my sincere gratitude and love goes to Kerapetse for her unending support and encouragement throughout the study period.

Special thanks go to the University of Botswana Foundation Scholarship for their financial support.

I would like to thank all my friends for making time to edit my work and making constructive suggestions. I am very grateful for the time, encouragement and support. Finally, I would like to appreciate all the staff members of the economics department as well as my classmates. The interactions we have had before led to this particular moment in my journey.

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ABBREVIATIONS AND ACRONYMS

AfDB: African Development Bank

ARDL: Autoregressive Distributive Lag

CPI: Consumer Price Index

ECM: Error Correction Model

ECT: Error Correction Term

GDP: Gross Domestic Product

NDP: National Development Plan

REER: Real Effective Exchange rate

SADC: Southern African Development Community

SADC-EC IEPA: Southern Africa Development Community-European Commission Economic Partnership Agreement

SACU: Southern African Customs Union

UNCTAD: United Nations Conference on Trade and Development

WDI: World Development Indicators

WTO: World Trade Organization

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ABSTRACT

This study investigates the relationship between Botswana's imports and expenditure components: private consumption expenditure, government consumption expenditure, investment expenditure and expenditure on exports and real exchange rate, trade liberalization and the impact of the 2008-2009 global financial crisis. The study employs annual data from 1976 to 2017. Furthermore the study adopts the ARDL bounds testing approach to cointegration to examine the existence of long run relationship among the variables. The study finds that there is a long run relationship between aggregate imports, private consumption expenditure, government consumption expenditure, investment expenditure, exports, real exchange rate and trade liberalization. Government spending, private consumption expenditure, investment expenditure as well as trade liberalization are positive and significant both in the short run and long run. The coefficient of exports is negative and statistically insignificant. The real exchange rate has an insignificant positive effect on Botswana's imports. Moreover the results reveal that the 2008-2009 financial crisis have no significant impact on Botswana's aggregate imports. Lastly the results of the CUSUM and CUSUMSQ reveal that Botswana import demand function has been stable over the study period.

CHAPTER ONE

INTRODUCTION

1.1 Background of The Study

Botswana, like other developing countries depends heavily on international trade. Both exports and imports are integral to the economy's growth. Imports serve to supplement, *inter alia* the resources available domestically such as raw materials, technology and capital goods that are required to improve the production capacity of the economy. However, for Botswana, while the economy has grown fast over the years the production capacity remains low and has not fully managed to expand or diversify the production base. Thus, the economy is still dependent on imports of both capital goods, intermediate and consumer goods to meet its domestic demand. The major categories of imports mainly consist of Diamonds, Machinery& Electrical equipment, Food, beverages & Tobacco, Fuel, Vehicles & Transport equipment, Chemicals & Rubber products and other products. Most of these imports come from within the SACU region, with imports from the region accounting for 78.2 % of total imports and within region South Africa is the major source of Botswana's imports as 62.6% of total imports was sourced from South Africa in 2015 (Statistic Botswana, 2015).

In the period 2000-2016 Botswana's import growth averaged 5.7%; imports have increased significantly from just above P 9.8 billion in 2000 to over P 73.2 billion in 2015. The increase in Botswana's imports has been due to robust economic growth that promoted investment in the domestic economy. Botswana's trade data shows that the country recorded trade surpluses for most of the years leading to 2008; however, from 2008 to 2013 the country recorded trade deficits, only becoming a surplus in 2014. Ncube (2013) asserts that the trade deficits came about as a result of a decline in foreign exchange earnings following the global recession as mineral exports declined substantially against growing import demand. The trade deficit between 2007 and 2010 was exacerbated by government's stance to continue with expansionary fiscal policy to finance specific projects that required high value imports in the period of global economic downturn (Ncube, 2013).

There are several studies on the topic of import demand elsewhere; however, few studies have been undertaken on the same topic in Botswana. Thuto (2006), Modisaatsone (2011), Ayodotou and Farayibi (2016) are among those studies. Their studies adopted the traditional import demand equation which relates import demand to domestic income level and relative prices of imports. This model that uses aggregate income implicitly assumes content of final expenditure

components is the same. This approach has been criticized for its failure to account for individual components of final expenditure (Agbola, 2009) which may potentially lead to aggregation bias (Giovannetti, 1989, Abbott & Seddighi, 1996). Abbot & Seddighi (1996) argue that the conventional approach has poor forecasting ability despite having performed well within their corresponding sample periods. Giovannetti (1989) proposed a disaggregated expenditure approach, in which import demand is treated as a function of individual components of final expenditure i.e. consumption expenditure, investment expenditure and expenditure on exports and included relative prices of imports. The researchers, Giovannetti, (1989) and Agbola (2009) find this approach useful in the sense that the impact of changes in individual macro components of final expenditure on import demand can be examined. Following the earlier work of Giovannetti (1989) and Abbott and Seddighi (1996), Tang (2003), Narayan and Narayan (2005) and Constant and Yue (2010) and several other studies have since adopted this approach. This study adopts a similar approach in analysing the import demand function for Botswana. The approach has not been explored before for Botswana either.

Therefore, the findings of this study are important from the policy perspective. The findings of this study will provide policy makers with empirical evidence on Botswana's behaviour and hence inform them on the mix of policies to use in dealing with imports. Emran and Shilpi (2010) contends that informed policy analysis in different policy areas such as exchange rate policy, fiscal implementation of tariffs reductions, calculation of optimal taxes require reliable import elasticities estimates.

1.2 Statement of The Problem

The earlier scholars have demonstrated the benefits of free international trade as they broadly agreed to the fact that free international trade leads to GDP growth. International trade leads to increased specialization, efficient utilization of inputs, generation of foreign exchange, creation of employment and increased income among other things (Nyasulu, 2013). Imports form an important part of international trade and are seen as a source of foreign technology which could be seen embodied in imports of intermediate goods such as machines and knowledge into the domestic economy (Thangavelu & Rajaguru, 2004). However from a macroeconomic point of view, imports can have some adverse impact in the economy, such as depletion of foreign exchange reserves, rising unemployment, discourage backward and forward linkages that enhance economic growth and development of a country, resulting in poor living standards of the people of that country (Agbola, 2009). Hence estimating import demand functions is

important to understand the impact of income, relative prices and other factors on import demand. The understanding of import demand elasticities is crucial for informed imports forecasts, international trade and policy formulation.

Botswana's import demand was supported by steady economic growth, driven mainly by good performance of its mineral exports. Recently the collapse in trade following the 2008-09 global financial crisis and recession saw a sharp decline in exports, by 27 % while imports only declined by 5.4% in 2009. As a consequence, Botswana started recording trade deficits in the year 2008 through to 2013. The decline in foreign exchange earnings subsequently led to balance of payments deficits and deterioration of foreign exchange reserves. While in the short run this has no significant impact on Botswana's import bill owing to the country's foreign exchange reserves, in the long run it is not sustainable. For Botswana, import demand specification is crucial because the choice of a suitable policy measure for imports requires an accurate understanding of the specific import demand function of a country (Harvey & Sedegah, 2011).

Although there exists a large volume of the literature on the topic of import demand elsewhere, a review of empirical literature reveals that there are very few studies in Botswana on the same topic. The few studies that are available use a conventional approach of import demand that uses a single demand variable (aggregate income/real GDP) in the import demand equation. Nevertheless, this approach has received criticism for its failure to account for different components of final expenditure (Agbola, 2009) and may lead to aggregation bias (Giovannetti 1989, Abbot & Seddighi, 1996). As a result, Giovannetti (1989) proposed a model that disentangles final expenditure into its components: private consumption expenditure, government expenditure, investment expenditure and expenditure on exports, and also included relative prices of imports as one of the factors that explain import demand. There has been a strong support of this approach in the recent literature. According to Bussiere at el (2013) disaggregation is important because the use of GDP as a proxy for income in trade equations may be misleading especially in periods where import intensity of some components of final expenditure i.e. investment and exports fluctuate more than others during periods such as the 2008-2009 financial crisis. Narayan & Narayan (2005) have also pointed out that disaggregation reduces the bias and improves model reliability. Models that use disaggregated expenditure components have better fit and forecasting powers.

The question this study aims to address is, is the demand for Botswana's imports driven largely by private consumption expenditure, government consumption expenditure, investment expenditure or expenditure on exports? To address this question this study analyses a model with disaggregated expenditure components of final expenditure. By addressing this question, the study will have different policy implications that are more informative than the ones made from using aggregate final expenditure. The model is augmented by including other variables that are hypothesized to affect import demand such as trade liberalization.

1.3 Objectives

General Objective

The general objective of the study is to analyse Botswana's import demand function for the period 1976-2017.

Specific Objectives

- To examine the long run relationship between aggregate imports and the different macro components of final expenditure.
- To estimate the price elasticity of aggregate import demand
- To examine the impact of trade liberalization on Botswana's imports
- To examine whether the 2008 global financial crisis affected Botswana's imports.
- To draw policy implications from the empirical results.

1.4 Significance of The Study

There are few studies available that focus on import demand in Botswana: Modisaatsone and Motlaleng (2013) focus on the effects of exchange rate volatility on the composition of Botswana's imports; the authors use augmented standard import demand model with GDP and relative prices, exchange rate volatility as explanatory variables. Thuto (2006) using the standard approach estimated Botswana's import demand function for the period 1976-2006, both at aggregate and disaggregate level. This study is different from these previous studies in that instead of using GDP to proxy domestic activity level it uses macro *components* of final expenditure. Namely: final consumption expenditure, investment expenditure and expenditure on exports. Therefore, this study aims to fill the research gap by investigating the validity of the use of disaggregated expenditure component and estimate an import demand function in the case of Botswana. By disaggregating expenditure into its components this study will be able to capture the individual effects of this components on imports. Also, this study will be

able to compare the results of the traditional model and the disaggregated model to establish if indeed the later have a better fit and superior forecasting power in the case of Botswana.

This study is also different from the previous studies by Modisaatsone & Motlaleng (2013) and Thuto (2006) who adopted the Vector Autoregressive and Johansen cointegration techniques respectively. The study utilized the Auto Regressive Distributive Lag (ARDL) bound testing approach and use an updated time series data from 1979 to 2017.

Apart from the macroeconomic variables the study also assesses the impact of trade liberalization, and the 2008/09 global financial crisis on import demand. Trade liberalization is hypothesized to have an indirect outcome on imports which is derived from the response of consumption and production decisions to price changes (Samuel, 2015). Botswana is a member of the Southern African Development Community (SADC) and Southern African Customs Union (SACU). The latter grants free movement of goods, a common external tariff regime, and harmonized rules of origin within the region. All these factors are hypothesized to affect import demand. Finally, our study is important from a policy perspective as the results can be used to estimate how economic growth is expected to affect import demand and which policies to adopt to limit import surge.

1.5 Organisation of the study

The study proceeds as follows: Chapter Two presents the overview of Botswana's economy, import structure, trade policy as well as the exchange rate policy. Chapter Three provides the review of the existing theoretical and empirical literature relevant to this study. Chapter Four gives the methodology used for the analysis. Chapter Five presents the empirical results and analysis. Finally, Chapter Six presents conclusions, policy implications and recommendations and potential areas of further study.

CHAPTER TWO

BACKGROUND OF ECONOMY OF BOTSWANA

2.0 Introduction

This chapter discusses Botswana economic performance, trade pattern, import structure. The chapter also reviews Botswana's trade policy and exchange rate policy.

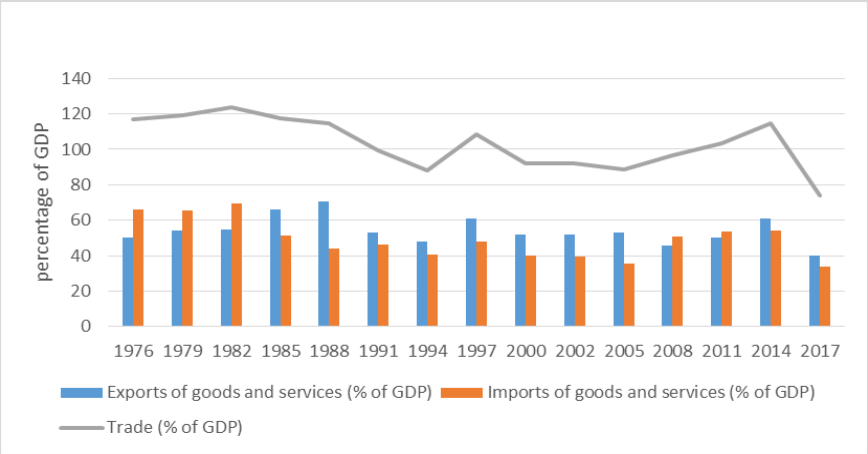
2.1 Performance of The Economy

Botswana has been one of the fastest growing economies in the world since it gained independence; the real GDP growth has averaged 5% per annum over the past decade (World Bank, 2017), which has been attributable to the performance of the mining sector. Whilst the economy has experienced robust economic growth over the years it has exhibited considerable volatility in recent years and Botswana's heavy reliance on exports had made it susceptible to external shocks. However, in the recent years there has been some level of transformation of the economy away from mining sector in favor of the non-mining sectors. In 2006 the mining sector accounted for 46.1% of GDP, and the contribution declined to 34.7% in 2010 and declined further to just below 20% in 2017 (African Development Bank, 2010,2012). Wholesale and retail trade: repair of vehicles, household goods, restaurants and hotels were the largest contributor to GDP in 2017 with a share of 21.6 %, followed by mining and quarrying with 19.9 %, Finance, real estate and business services with 15.3 % and Public administration and defense, security with 15.2 percent. The contribution of agriculture has averaged 2 % over the last decade. The growth in the non-mining sector has been seen as a welcome shift as the government sees the non-mining sector development as the crucial step towards export diversification and employment creation (AfDB, 2003). Both World Bank and African Development Bank highlight that Botswana's medium-term economic prospects will continue to depend on global demand for its major exports and improvement of the private investment, robust performance of the non-mining sector and the recovery of mining sector.

Furthermore, Botswana is one of the most open economies in the world as shown by the share of trade as a percentage of GDP. Trade as a percentage of GDP has averaged 96 % over the last two decades. Exports and imports of goods and services as a share of GDP were estimated at 39.8% and 33.9 % respectively in 2017. These figures show that the country has depended

highly on international trade in the past years; though the figures have declined they remain relatively high.

Figure 1: Exports and Imports of goods and service, total trade, percentage of GDP- Selected years 1976-2016

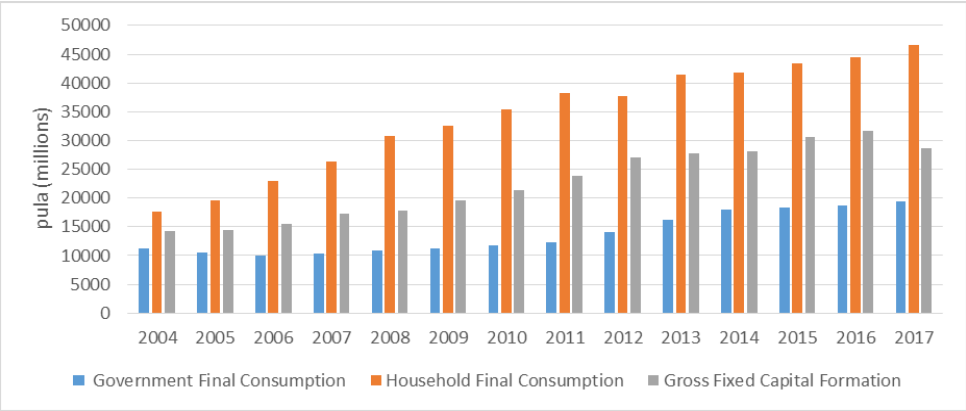


Source: *Figures calculated from World Bank Development Indicators*

2.2 Overview of Expenditure Components

The table below depicts Botswana's gross domestic expenditure by its components for the period 2004-2017.

Figure 2: Components of Gross Domestic Expenditure at constant 2006 prices (P million) 2004-2017



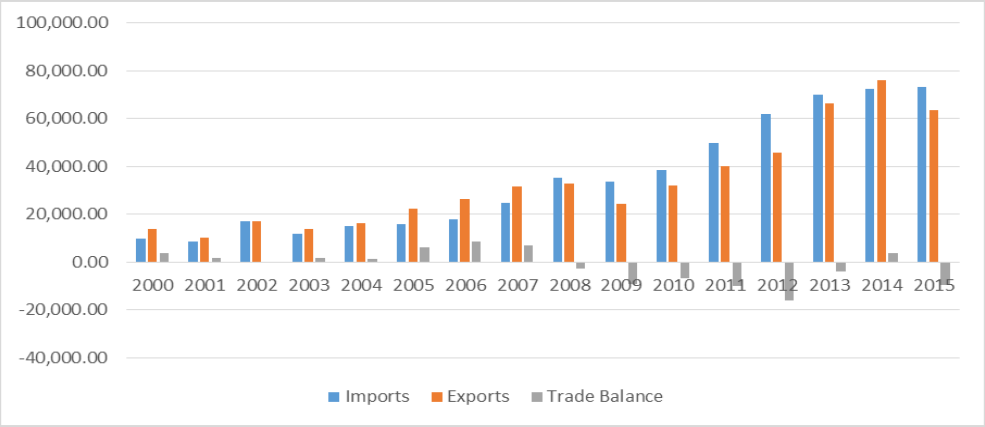
Source: Calculated by the author from Statistics Botswana GDP Data

Figure 2 above shows the components of gross domestic product: government final consumption expenditure, household final consumption expenditure and gross fixed capital formation. According to the data obtained from Statistics Botswana Real Gross Domestic Product by expenditure approach increased from P52, 167.7 million in 2004 to P91, 916.8

million in 2017. The figure above shows that in the same vein Government expenditure has grown from just above P11 billion in 2004 to close to 20 billion in 2017.According to the World Bank report on Botswana's public expenditure review (2010) the pressure on the government to increase its expenditure stems from Botswana's historically strong revenues from the diamond exports and other minerals. This report further highlights that although this public expenditure has never threatened macroeconomic stability it has grown to be one of the largest in Africa; data shows that only Lesotho had a higher ratio of central government spending to GDP than Botswana. Nonetheless the government of Botswana has managed to avoid raising public expenditure to significant levels following revenues from diamonds. As a way of maintaining sustainable fiscal policy, the Minister of Finance and Economic Development through the 2018\19 Budget Speech has highlighted that government will continue to manage government spending prudently to ensure value-for-money for the limited resources. The government stance is aimed at ensuring that the government maintains the fiscal rule as stipulated in the National Development Plan 11 (NDP 11); this fiscal rule caps annual public expenditure as a share of GDP at 30%. The above figure also shows that private consumption is the largest component of gross domestic product; for the period 2004-2017 it has grown substantially from approximately P17 billion in 2004 to over P46 billion in 2017. Furthermore, gross fixed capital formation has increased substantially over the years from estimated value of P14, 215.06 million in 2004 to approximately P28, 704.9 million in 2017.

2.3 Performance of Botswana's Imports

Figure 3: Botswana's Total Trade: Exports, Imports and Trade Balance 2000-2015



Source: Statistics international Merchandise Trade statistics

Figure 3 shows annual total trade from 2000 to 2015.The graph depicts an increase in both exports and imports over the years. Exports increased from P 13 billion million in 2000 to about P 63 billion in 2015, averaging growth rate of about 14% per annum. Imports also increased from about P 10 billion to over P73 billion in 2015.In this period import growth averaged 17 % per annum. This implies that in the last period 2000-2015 imports have grown faster than exports. The graph shows that Botswana recorded positive trade balance from 2000 to 2007; it went on to record negative trade balance in 2008 and subsequent years, only recording another trade surplus in 2014 after a period of trade deficits. The trade deficits in this period are attributable to the poor performance of diamond exports due to a decline in the diamond prices. On the other hand the improvement in the current account in 2014 is attributable to an increase in exports driven exclusively by the growth in diamond exports, and a decline in imports (WTO,2016).

2.4 Botswana's Imports Structure

2.4.1 Principal Import Commodity Groups (2005-2015)

Table 1 below presents Botswana's principal imports for the period 2005-2015.

Table 1: Principal Import commodities, percentage of total imports-2005-2015

	2005	2006	2008	2009	2010	2011	2012	2015
Machinery & Electrical Equipment	16.9	17.1	17.7	17.3	17.5	22.3	14.6	12.6
Food, Beverages & Tobacco	14	13.8	12.1	13.2	12.5	12.1	9.9	9.6
Vehicles & Transport Equipment	12.9	9.7	10.8	12.6	9.6	8.9	9	7.3
Chemicals & Rubber Products	12.3	13.1	10.5	11.2	10.9	9.3	8.8	8.7
Fuel	13.7	17.1	17	13.5	14.8	16.1	16.1	12.5
Diamonds	-	2.3	-	7.8	11.6	12.1	26.6	34.5
Metal and Metal Products	7.7	8.1	7.9	7.1	7.4	7.5	4.7	4
Wood & Paper Products	4.3	4.1	3.4	4	3.4	2.9	2.4	2
Textile & Footwear	4.8	4.9	3.9	4.4	4	3.7	3.1	3
Other goods	8	6.6	13.9	9.10%	8.4	3.25	3.6	2.5
Furniture	1.9	-	-	-	-	1.2		0.9
Salt, ores and related products	3.5	3.3	2.8	-	-	1.3	1.2	2.5

Source: Statistics Botswana trade merchandise data-2005-2015

Table 1 above shows that over the years, Botswana's imports by principal commodities have been mainly dominated by: Machinery & electrical equipment; Food, beverages and tobacco; Chemicals & Rubber Products; Fuel and Vehicles & Transport Equipment. According to Statistics Botswana (2009), imports have a similar pattern throughout the years. However, in the recent years, Diamonds imports have become a significant category in Botswana's principal imports commodities. The share of Diamond imports as share of total imports increased from 2.3% to 34.5% in 2015. According to Bank of Botswana annual reports, (2008, 2011) the increase in the diamonds imports is as a result of the growing local diamond industry, as a result of the relocation of the De Beers' aggregation and sales functions from the United Kingdom to Botswana in 2012 and 2013 (Bank of Botswana, 2017).

2.4.2 Direction of Trade (Imports by Region and Partner)

For many years Botswana's trade partners in terms of import origin was not complicated. South Africa was Botswana's important trading partner as most of the country's imports originated from South Africa. In 2004, 83.2% of Botswana's total imports were sourced from South Africa, however in 2015 imports from South Africa accounted for only 62.6% of Botswana's total imports. Evidently there has been a change in the pattern of trade in the most recent years; the relocation of the diamond trading center from London to Botswana has made countries such as Namibia and Canada to become major sources of Botswana's imports, also Bank of Botswana (2017) attributes the changing pattern to the increased trading relations with other international markets such as China. Imports from Canada and Namibia as a percentage of Botswana's total imports were 0.3 % and 0.4% respectively in 2004 (Statistics Botswana, 2004). These figures however have increased significantly to 7.0% and 15.5% respectively in 2015 (Statistics Botswana, 2015). China has also become one of Botswana's important sources of imports; the share of total imports has increased from 0.6 % in 2004 to 1.5% in 2015, making it the 5th largest import partner after South Africa, Canada, Namibia and Belgium (in that order).

2.5 Botswana's Trade Policy

For the longest time Botswana did not have an independent trade policy, since its trade policy was defined by its membership in various bilateral and multilateral trading agreements (Zizhou, 2009). As such the country did not have a unique policy on tariffs, quotas and excise duties. Botswana is a member of the World Trade organization, the Southern Africa Development Community-European Commission Economic Partnership Agreement (SADC-EC IEPA); the Southern African Customs Union (SACU) and the Southern African Development Community

(SADC). The country has a long standing signed free trade agreements with Malawi and Zimbabwe.

Despite being a signatory to quite a number of bilateral and multilateral trade agreements, Botswana's trade policy has over the years aimed at achieving free trade and dependable markets access for Botswana's industrial goods and services. The policy has also aimed at improving Botswana's access to industrial raw materials that would go towards achieving the country's goal of attaining economic diversification and export diversification.

In 2009 Botswana adopted a new trade policy, the National Trade Policy of 2009. The government of Botswana defines this policy as "a complete framework of laws, regulations, international arrangements and negotiating positions as well as government guidelines and pronouncements on trade which define how the country will conduct its trade with bilateral and multilateral partners." (Ministry of Trade, 2009). The 2009 Trade policy is aimed at addressing trade issues that are paramount in the government agenda such as export diversification, export competitiveness, supply side constraints, employment creation, poverty alleviation as well as diversification of the economy in general (Ministry of Trade and Industry 2009).

The government of Botswana notes that over the years, global trade has become more dynamic, complex and diverse and these have necessitated a well-crafted trade policy that can account for the complexities of both domestic policies and foreign trade policies that have a bearing in the country's trade agenda (UNCTAD, 2009). Hence the national trade policy of 2009 was meant to address these shortfalls in Botswana's export led growth strategy for economic development (Ministry of Trade and Industry, 2009). Thus, Botswana's trade policy outlines how the country will create global market access opportunities for its firms as well as assisting them to exploit the emerging opportunities.

2.6 Botswana's Exchange Rate Policy

The primary objective of any exchange rate regime is realization of a stable exchange rate regardless of the regime currently in place. That is regardless of whether a country adopts a fixed exchange rate regime, a flexible exchange rate regime or an intermediate regime. Initially the exchange rate policy objective in Botswana was to maintain price stability and export competitiveness, however in recent times the primary objective of the exchange rate has been to maintain and enhance the international competitiveness of domestic producers by guarding against misalignment of the pula (Motlaleng, 2009). According to Motshidisi & Masalila

(2003) the exchange rate policy is a reflection of Botswana government emphasis on promoting sustainable economic growth through diversification of the economy and export competitiveness.

Initially Botswana was part of the Rand Monetary Area (RMA) until 1976 when it withdrew from the RMA and introduced its own currency the Pula. At the time the pula was introduced it was pegged to the US dollar at P1=US$1.15 and the rand was also pegged to the US dollar at the same rate, hence given the pula and the rand parity. The pula remained pegged against the US dollar until 1980 when South Africa introduced a managed float of the rand, by mid-1980 the rand appreciated against the dollar while the pula depreciated against the rand, thus raising inflation in Botswana. This volatile relationship between the rand and the pula meant that the government of Botswana had to change its strategy in order to mitigate the effects of pula-rand volatility, as such the pula ceased to be pegged to the US dollar but rather to a basket of currencies consisting of the South African rand and the Special Drawing Rights (SDR). Over the years the pula has been revalued and devalued depending on the economic circumstances at that particular time; the devaluations were previously used to promote the competitiveness of the domestic products while revaluations were used to reduce the inflationary pressure especially from South Africa.

Motshidisi & Masalila (2003) contend that Botswana's choice of an intermediate exchange rate regime which allows it to benefit from the advantages of the two extreme exchange rate regimes was its attempt to mitigate against a volatile flexible exchange rate system and the restrictions of a fixed exchange rate system. Furthermore, a fixed peg system was considered appropriate for a relatively small and undiversified economy like Botswana that was unlikely to sustain an independent float. With increased diamond revenue inflow, a flexible exchange rate was likely to lead to an appreciation of the exchange rate to levels that would render the non-diamond industry unprofitable; a situation that economists termed the "Dutch Disease" (Motshidisi & Masalila, 2003, Bank of Botswana, 2009). Hence a fixed peg allowed for the adjustment of the exchange rate to enhance competitiveness of local produces and maintain price stability.

In May 2005 Botswana devalued the pula by 12% in a move to reverse the previous appreciation of the real effective exchange rate (REER) which was considered unfavorable to export competitiveness, and adopted a crawling peg mechanism where the rate of crawl is based on the differential between the Bank of Botswana's inflation objective and forecast inflation in trading partner countries. The crawling peg was introduced to enable an automatic nominal

adjustment of the pula exchange rate to maintain real effective exchange rate stability and to avoid the need for discrete devaluations as in previous years (Bank of Botswana, 2005).Therefore the rate of crawl is determined using a forward-looking approach which is revised on regular basis and from time to time the authorities determine the rate of crawl for the future period, such as the next 12 months (Ntwaepelo & Motsumi, 2019). The objective of the policy is to ensure the REER stability, in order to improve the competitiveness of the non-traditional exports and other tradable goods and services and also serve as part of the economic diversification strategy Bank of Botswana. 2007).

Chronology of Botswana Exchange Rate Policy for 1976-2016

Table 2: Chronology of Botswana's exchange rate policy 1976-2016

DATE	ACTION	COMMENTS
1966–1976	Member of the RMA	No independent exchange rate or monetary policy.
August 1976	Pula introduced and pegged to the USD, at P1=USD1.	The rand is also pegged to the US dollar at the same rate; hence P1=R1.
April 1977	5 percent revaluation of the Pula; P1=USD1.2075=R1.05	Anti-inflationary measure in response to imported inflation.
January 1979	Introduction of a floating rand exchange rate in South Africa.	The rand appreciates against the US dollar as gold price rises; this led to an appreciation of the rand against the Pula.
June 1980	The Pula basket is introduced, consisting of the SDR and rand in equal weights.	This was aimed at reducing the volatility of the Pula/rand exchange rate.
November 1980	5 percent revaluation of the Pula	Anti-inflation measure.
January 1981	Gold price in the world market drops.	There is a rapid depreciation of the rand as South Africa's export earnings collapse.
May 1982	10 percent devaluation of the Pula.	Stabilization measures in response to balance of payments crisis.
February 1984	Foreign debt standstill for South Africa and run on the rand.	There is a rapid depreciation of the Pula against the dollar as the rand continues to deteriorate, and similarly rapid appreciation of the pula against the rand.
July 1984	5 percent devaluation of Pula	Competitiveness measures due to the continued appreciation of the Pula against the rand.
August 1984	Rand weight is restored at 50 percent; after it had fallen to 37 percent by the end of July 1984.	To reduce the drift of the Pula from the rand.
January 1985	15 percent Pula devaluation	Competitiveness measure.

January 1986	New Pula basket is introduced with the rand weight increased to 65 percent.	This was due to the continued depreciation of the rand against the dollar, which in turn meant that Pula was appreciating against the rand.
June 1989	5 percent Pula revaluation	Anti-inflation measure.
August 1990	5 percent Pula devaluation	Competitiveness measure.
August 1991	5 percent Pula devaluation	Competitiveness measure.
June 1994	Technical adjustment and removal of Zimbabwe dollar from the basket.	To reflect changes in trade patterns, and aimed at maintaining competitiveness through real exchange rate stability
February 2004	7.5 percent Pula devaluation	Competitiveness measure.
May 2005	12 percent Pula devaluation	Competitiveness measure.
May 2005	Adoption of the crawling band mechanism	To avoid discrete adjustments of the exchange rate while maintaining stability in the real effective exchange rate.
May 2005	Increase of the Bank of Botswana's trading margins from +/-0.125 percent around the center rate to +/-0.5 percent.	To encourage increased inter-bank trading in the foreign exchange market.
March 2009	Reduce the margins from +/-0.5 percent around the center rate to +/-0.125 percent.	To reduce the cost of foreign exchange transactions to customers.
July 2012	Pula basket weights changed to 55 percent ZAR and 45 percent SDR	A gradual move towards aligning to the country's trade data (imports and exports)
January 2015	Pula basket weights changed to 50 percent ZAR and 50 percent SDR	A gradual approach to change in basket weights towards trade pattern proportions
January 2017	Pula basket weights changed to 45 percent ZAR and 55 percent SDR	Aligning the policy with the trade patterns

Source: Bank of Botswana website

CHAPTER THREE

LITERATURE REVIEW

3.0 Introduction

This chapter highlights the theoretical and empirical literature that explains the determinants of import demand. The theoretical section of the literature review gives a brief overview of the theoretical underpinnings of import demand. The empirical literature review will present the empirical evidence from the previous studies carried on the topic, the period of study, the methods and techniques used in testing theories. The interest is more on those studies that used the disaggregated expenditure components in import analysis in their respective countries.

3.1 Theoretical Literature

The Neoclassical Trade Theory

One of the theories that explains trade between countries is the theory of comparative advantage based on the Heckscher-Ohlin (H-O) framework. According to the H-O theory the volume and direction of international trade are affected by relative prices which are explained by differences in factor endowments between the two countries (Tang, 2003). The model departs from the Ricardian theory in assuming that production technology is the same between the two countries and the difference in comparative advantage comes from differences in factor abundance and factor intensities. Unlike the Ricardian model, under the H-O theory a country tends to produce both goods in free trade rather than complete specialization, and exports those goods whose production require the intensive use of the relatively abundant resource and imports the goods that require the intensive use of the relatively scarce resource. In the presence of trade, consumers take advantage of the differences in prices between the two countries; a lower relative price in another country serves as an incentive to import from that country. The Neoclassical trade theory ignores the effects of changes in income on trade. The model is still applicable with trade restrictions (Markusen et al, 1995).

Keynesian Import Theory

The Keynesian theory of import demand is based on macroeconomic multiplier analysis. In this approach imports demand is a function of income and price. Within this framework it is assumed that prices are constant while employment is variable in each nation and international capital movements are taken to adjust passively as required by the trade balance. Furthermore, the theory assumes perfect substitutability between domestically produced goods and foreign

produced goods, a distinguishing factor from the neoclassical trade theory of comparative advantage which assumes imperfect substitution. This implies that a country open to trade would only be an exporter or importer of tradable goods but not both. The theory views the trade flows of both imports and exports as determined by the level of income in the short run at the aggregate level. Thus, according to this theory trade flows demand functions can be explained by four ratios: marginal propensity to export or import, domestic income elasticity and foreign income elasticity (Myeni, 2017). The theory ignores the impact of relative prices.

The New Trade Theory

The New trade theory or the imperfect competition theory of trade is focused on intra-industry trade. It explains the effects of economies of scale, product differentiation and monopolistic competition on international trade. The concept of intra-industry trade is not well explained by the theory of comparative advantage. Lindqvist (2006) argued that conclusions made about specialization are not correct as countries tend to import and export goods of the same sector.

Expenditure Component of Final Demand Approach

The expenditure component of final demand approach proposes using the major components of final expenditure instead of the single demand variable in estimating import demand function. This body of literature suggests a model that links import demand and the macro-components of final expenditure by separating income/GDP into its expenditure components: exports, investments and final consumption expenditure (private and government). According to this approach, import demand is well explained by the model that includes expenditure components of final demand as well as relative prices.

3.2 Empirical Literature

Tang (2003) estimated an import demand function for China covering the period 1970-1999. The study adopted the bound testing approach, based on UECM to test for the long run relationship between the import demand and the explanatory variables. In addition, he estimated the import demand function using the traditional approach, the GDP less exports approach attributable to Senhaji (1998), National cash flow variable (Xu 2002) and the disaggregated expenditure component (Abbot & Seddighi, 1996, Giovannetti, 1989). The results showed the existence of long run relationship between import demand and the explanatory variables across all the models. The results further showed that import demand in China is income inelastic and price inelastic. The coefficient of trade reforms was statistically

significant and positive. The results were robust as compared to the previous studies due to improved sample size and use of more robust ARDL technique.

Narayan and Narayan (2005) estimated Fiji's Import demand function using the disaggregated expenditure component approach for the period 1970 to 2000. The study adopted the bound testing approach (Pesaran and Shin (2001). The results showed existence of a long run relationship between import demand and the explanatory variables. In the long run import demand was seen to be determined by final consumption expenditure, investment expenditure, exports expenditure and relative prices. The long run elasticities for the income were found to be positive but inelastic and were significant at 1% level. Since the expenditure components were seen to exert different magnitude of impact on import demand, this shows the importance of using disaggregated form of expenditures in estimating the import demand function.

Constant and Yue (2010) closely followed the same approach as Narayan and Narayan (2005) in estimating Cote d'Ivoire's import demand function for the period 1970-2007. Cote d'Ivoire's import demand function, using the disaggregate form showed that imports were mainly determined by the consumption activities and exports with long run elasticities of 0.65 and 0.49 respectively. Investment expenditure had a small impact of 0.10 on import demand. Chani et al (2010) adopted a similar approach in estimating Pakistan's import demand function. The study adopted the Johannsen co-integration test to establish the existence of a long run relationship. The results showed that consumption expenditure had the highest elasticity of 2.6734 , followed by investment expenditure at 0.5860 and exports of goods and services at 0. 2685.The coefficient of relative prices had the correct negative sign but statistically insignificant. Their results are consistent with other previous studies conducted in Pakistan that showed that relative prices have no impact on import demand.

Yin and Hamori (2010) also estimated the import demand function for China for the period 1978-2009.The empirical results from ARDL bound testing approach and Johansen's method of co-integration provided strong evidence of the existence of a long-run stable relationship among the variables included both in the traditional model and the disaggregated expenditure model of import demand. The results from both the ARDL approach and DOLS showed that China's imports are determined by exports, investment expenditure and relative prices. Both expenditure components had the expected signs. The ARDL estimate showed that China's imports were highly investment elastic (1.25) and these elasticities were higher than those reported by the DOLS estimates.

Fukumoto (2012) estimated the disaggregated import demand functions for three basic classes of goods: capital goods, intermediate inputs and final consumption goods for China with the aim of improving on the results of previous studies by Moazammi and Wong (1988), Senhaji and Tang (2003). The objective was to elucidate the effects of economic growth on the current account. The author considered different macroeconomic variables such as GDP, disposable income, investment expenditure, exports in view of the prospect that different variables would have varying impacts on different categories of goods. Consumption goods were expected to respond more to disposable income, while capital goods to respond more to investment. Furthermore, the author established the existence of long run relationship between disaggregate import demand and the explanatory variables. Capital goods import were determined by GDP and investment, intermediate goods imports by exports while consumption goods imports were determined by GDP and disposable income. The long run income elasticities were found to be elastic for all the imports categories.

To establish the factors that explain the trade collapse that has been happening since the 2000s and also occurred following the 2008-09 financial crisis, Bussiere et al (2013) developed an original model that took into account the import content of expenditure components of final expenditure. They developed a new model of trade flows that was based on what they termed Import Intensity Adjusted Measure of aggregate demand. To achieve their objectives the authors computed weights of different expenditure components of GDP for 28 OECD countries using OECD input-output tables and demonstrated that they all have different import intensities. In addition, using OECD input-output tables they found investment and exports to be more import intensive, followed by private consumption expenditure which is more import intensive than government spending. Moreover, the authors argue that considering the individual impact of investment, exports, government spending and private consumption, expenditure approach improves the goodness of fit of the model especially when considering the financial crisis in which different components of aggregate demand behaved differently and drastically. Their model is intuitively appealing but is likely to be limited by data availability if one attempts to employ it in developing countries like Botswana.

Giansoldati and Gregori (2017) using a dynamic panel approach estimated an import demand function using a sample size of 33 countries both developed and developing countries covering the period 1995: Q1-2016: Q3. The authors decomposed final consumption expenditure into private consumption expenditure and government expenditure, and their results showed that import demand is driven mainly by private consumption with the highest elasticity of 0.600.

All the variables bear the expected signs. The authors also included the dummies to capture the economic slowdown in 2000 and 2009.

Using panel approach Ayodotou and Farayibi (2016) with the objective of establishing determinants of import demand in Sub Saharan Africa used time series data over the period of 18 years, from 1995-2012. The study covered 30 Sub Saharan countries including Botswana. Their study adopted both random effect and fixed effect estimation technique. The results of their study showed that import demand is significantly driven by domestic income, relative prices, foreign exchange reserves and degree of openness. All the coefficients carried the expected signs except the coefficient of relative prices which was positive. The authors infer that their results could be meaningful in developing countries as high production costs make importation of manufacturing products inevitable even when imports prices are rising.

Thuto (2006) worked on a study that estimated Botswana's import demand function at aggregate and disaggregated level using time series data from 1976 to 2004.The study used Johansen and Juselius (1990) co-integration analysis and error correction mechanism. In the long run at aggregate level Botswana's imports were seen to be determined by domestic income, foreign exchange reserves, exchange control liberalization, previous period imports as well as relative prices.

A study by Modisaatsone (2011) analyzed the impact of Rand\Pula exchange rate volatility on the composition of Botswana's imports. The GARCH and MASD measures both established that the Rand\Pula exchange rate is highly volatile. The author employed impulse analysis and variance composition. The impact of exchange rate volatility on import demand was marginal, however it was found to be statistically significant and more so in the long run and it varied across different categories of goods. There was also a long run relationship between disaggregated imports and relative prices and gross domestic product. In reporting the results, the study accounted for the problem of aggregation bias when using aggregate imports as a dependent variable. The co-integration test also failed to establish the existence of long run relationship between the variables at an aggregate level hence their analysis was only limited to disaggregate imports.

3.3 CONCLUSION

From the review of both theoretical and empirical literature it is evident that most of the studies are confined within the imperfect substitute model. The vast amount of import demand literature finds its theoretical basis on the traditional/conventional import demand framework. The studies that followed this framework found import demand to be determined by real income and relative prices. They have also examined the impact of variables such as foreign exchange reserves, foreign exchange earnings and trade liberalization among others. However, among the reviewed literature there is another framework which most recent studies have followed. This is the disaggregated expenditure approach which split final expenditure into its macro components and also considers the impact of relative price of imports. According to this approach import demand is a function of private consumption expenditure, government consumption expenditure, investment expenditure and expenditure on exports and relative price of imports. The previous studies in Botswana follow the traditional approach. Hence, this study identified a gap to be filled and adopts the disaggregated expenditure component approach and some other variables used by other studies. According to Narayan and Narayan (2005) this approach has better forecasting ability; Giovannetti (1989) also argues that it is useful in the sense that it allows us to estimate the flow of aggregate imports to different macro components of final expenditure. This study is therefore expected to shed light on Botswana's import demand function.

CHAPTER FOUR

METHODOLOGY

4.0 Introduction

This chapter describes the methods and procedures adopted to address the research question. Section 4.1 presents the theoretical framework of the model, while section 4.2 covers the empirical model specification, variables and data. Section 4.3 of this chapter explain the techniques of estimation, and ARDL bound testing approach, test for stationarity as well as the optimal lag length selection criteria.

4.1 Theoretical Framework

The import demand theory suggests two models of import demand: the perfect substitute model and the imperfect substitute model. The perfect substitute model assumes perfect substitutability between goods produced locally and goods produced outside the country. In this model a nation can either be an exporter of a good or an importer of a good, but not both. However, in the world where complete specialization is impossible this model has attracted little attention in empirical literature. In a real world a country can be an importer and exporter of a good. Hence models of imperfect substitution. The imperfect substitute model thus assumes that imports and exports are not perfect substitutes for domestic goods i.e. there is coexistence of imports and domestic goods and bilateral trade. Therefore the traditional import demand model is based on the imperfect substitutes model. According to Goldstein & Khan (1985) the imperfect substitute model is rooted in the micro economic consumer theory, in the conventional demand theory. The conventional demand theory postulates that the objective of an economic agent is to maximize utility subject to a constraint. Thus the import demand function relates the quantity of imports demanded by the domestic economy to the level of domestic income, prices of imports and prices of domestic substitutes (Khan, 1974, Goldstein & Khan, 1985).The model assumes that in the case of aggregate imports and exports, inferior goods and domestic complements are ruled out, hence positive income elasticities and negative cross price elasticities are expected or assumed. Hence in the long run, import demand is a positive function of domestic income and a negative function of relative prices expressed as a ratio of prices of imports to prices of domestic substitutes. Khan (1974) originally specified the import demand model commonly known as the traditional/conventional import demand model as follows:

:

$$IMt = f\left(Yn_t, P_t^d, P_t^m\right) \quad (1)$$

Where, IMt is the real import demand, Yn is nominal income or the domestic activity level, P_t^d is prices of domestic goods, and P_t^m is prices of imports. The traditional import demand model assumes that standard microeconomic demand functions are homogenous of degree zero in prices and money income (Deaton and Muellbauer, 1980), implying the absence of money illusion (Harvey & Sedegah, 2011). The right-hand side of equation (1) can be divided with domestic prices (P_t^d) without affecting the import demand level (Narayan and (Narayan, 2005). From equation 1 the import demand function is expressed as;

$$IMt = f(Y_t, RP_t) \quad (2)$$

Where Y_t , is real domestic income and RP_t is relative prices.

When specifying the import demand function, economic theory is of little help as to the choice of the functional form, nonetheless, the log-linear form of the import demand equation is preferable to the linear formulation (Sarmad, 1988). Khan (1974) highlighted two reasons for estimating the above equation in double log form: it allows imports to react in proportion to a rise and fall in independent variables; assuming constant elasticities avoid the problem of drastic falls in the elasticity as imports rise. The log-linear form of equation 2 is expressed as follows;

$$lnMt = a_0 + a_1 lnY_t + a_2 lnRP_t + e_t \quad (3)$$

$lnMt$, represents the natural log of real imports while lnY_t is the natural log of real GDP, $lnRP_t$ is the natural log of relative prices. e_t, is a normally distributed error term.

Following studies by Giovannetti (1989), Tang (2002, 2003), Narayan and Narayan (2005) among others, GDP which captures domestic activity level is split into components of final expenditure. The preference for an import demand model with disaggregated expenditure components not only eliminates aggregation bias but also can test out the impact on imports from different components of GDP. The model has superior forecasting performance over the

traditional import demand model (Narayan & Narayan, 2005) Therefore import demand model with components of final expenditure is expressed as:

$$lnMt = a + B_1 lnPCE_t + B_2 lnGCE_t + B_3 lnINV_t + B_4 lnEXP_t + B_5 lnRP_t + e_t \quad (4)$$

Where $lnMt$ is the natural log of real imports of goods and services, $lnPCE_t$ is the natural log of private consumption,$lnGCE_t$, is the natural log of real government consumption expenditure, $lnINV_t$ is the log of real investment expenditure on goods including gross capital formation and change in stock, $lnEXP_t$ is the expenditure on total exports of goods and services which captures the domestic economy's capacity to produce its own goods and services. $lnRP_t$ Is the natural log of import price index to domestic price index (relative prices) and e_t is the error term.

4.2 Model Specification, Variables and Data

4.2.1 Model Specification

The study closely follows Tang (2003), Narayan and Narayan (2005) and Agbola (2009). Furthermore, for comparison purposes and to check if indeed the use of expenditure components performs better than the traditional model i.e. it has a better fit, the traditional model of import demand is also estimated. The baseline models are specified by equation 5 and 6. Equation 5 is the traditional model that uses a single variable GDP, equation 6 is the main model of the study that disaggregates income into macro components of final expenditure.

$$lnM_t = b_0 + b_1 lnGDP_t + b_2 lnRP_t + e_t \quad (5)$$

$$lnMt = a + B_1 lnPCE_t + B_2 lnGCE_t + B_3 lnINV_t + B_4 lnEXP_t + B_5 lnRP_t + e_t \quad (6)$$

All the variables are as defined above and are expressed in real terms.

Models of import demand are usually limited by the unavailability of relevant data therefore we use proxies, usually income and relative prices are proxied by real GDP and real exchange rate (Sarker, 2018). In the case of Botswana, the data on import price index is unavailable therefore, going forward we use real exchange rate to proxy relative prices. The use of real exchange rate is justified because the real exchange rate gives the ratio of the foreign price level to domestic price level, with the foreign price converted into the local currency. Several

studies have used real exchange rate to proxy relative prices, (Alam, 2012, Sarker, 2012 among others).

There is possibility of misspecification that might occur if equation 5 and 6 are specified without considering some of the variables that affect import flows; there is also a possibility of obtaining biased and inconsistent elasticities (Khan, 1974). In the case of Botswana, we augment our model by including the variables that will capture the impact of trade liberalization and the 2008/09 global economic crisis.

According to Harvey and Sedegah (2011) import demand may be affected by political shocks as well as structural changes such as trade liberalization. Botswana as a founding member of WTO is committed to liberalizing trade of both goods and services. On average, Botswana has low customs tariff regime averaging 7.6 % in 2006 which is governed by SACU. In 2008 SADC launched its free trade area which Botswana is a member of, therefore imports from SADC countries are duty free under the SADC free trade area. Trade liberalization is expected to result in an increased flow of imports into the country. Studies such as Ayodotun & Farayibi (2016) found the impact of trade liberalization to be significantly positive in Sub Saharan Africa and their sample included Botswana. To examine the impact of the trade liberalization on import in Botswana, equation 5 and 6 are augmented by including a variable that capture trade liberalization. Thus, our model is specified as:

$$lnM_t = b_0 + b_1 lnGDP_t + b_2 RER_t + b_3 TRADE_t + u_t \qquad (7)$$

$$lnMt = a + B_1 lnPC_t + B_2 lnCG_t + B_3 lnI_t + B_4 lnX_t + B_5 lnRER_t + B_6 lnTRADE_t + e_t \qquad (8)$$

Where, RER_t is the real exchange rate, $trade_t$ represents trade liberalization.

Botswana experienced a sharp decline in both exports and imports following the 2008/09 global financial crisis and recession. The financial crisis had an adverse impact on the domestic economy particularly the diamond exports. Prices of diamonds declined by 14% between November 2008 and April 2009 (Moody's Investor Services, 2012). In the face of the global financial crisis exports declined substantially due to falling commodity prices and the subdued global demand in the first world countries. Consequently, Botswana experienced a decline in

GDP growth, closure of businesses and loss of jobs as businesses shut down. The loss of income leads to a decline in aggregate demand as consumers reduce consumption of domestic and consumer goods. The financial crisis is expected to have negative influence on imports. To capture its effect this study includes a dummy variable to examine if the financial crisis had a negative impact on Botswana's imports. Thus, our final models are specified as in equation 9: the augmented traditional import demand model and equation 10 is the disaggregated expenditure model.

$$lnM_t = b_0 + b_1 lnGDP_t + b_2 RER_t + b_3 TRADE_t + b_4 Dum_t + e_t \quad (9)$$

$$b_1 b_2, b_3 > 0; b_4 < 0$$

$$lnMt = a + B_1 lnPCE_t + B_2 lnGCE_t + B_3 lnINV_t + B_4 lnEXP_t + B_5 RER_t + B_6 TRADE_t + b_7 Dum_t + e_t$$

$$B_1, B_2, B_3, B_4, B_5, B_6 > 0; \ B_7 < 0 \quad (10)$$

Where Dum is dummy variable included to capture the impact of the recent global financial crisis. Moreover, it is hypothesized to have negative effect on import demand. The other variables are already defined.

The models presented above are presented as being their long run equilibrium. However, Goldstein and Khan (1985) postulates that in the real world there are adjustment costs and information asymmetry hence imports do not adjust instantaneously to their long run equilibrium following a change in one of its determinants. There are time lags in response of imports to their long run equilibrium. To capture the speed of adjustment the error correction model. Is specified in equation 13 and 16.

4.2.2Definition and Justification of Variables

DEPENDENT VARIABLE

REAL IMPORTS (IM)

This variable is measured as imports of goods and services deflated by the consumer price index in 2010 prices.

INDEPENDENT VARIABLES

GROSS DOMESTIC PRODUCT (GDP)

The gross domestic product taken at constant prices captures domestic income. Theoretically an increase in income is expected to increase imports. Therefore, it is expected that a rise in GDP will have a positive impact on Botswana's import.

PRIVATE CONSUMPTION EXPENDITURE (PCE)

Private consumption expenditure is measured by the value of goods and services acquired and consumed by households in a particular period. Empirical literature use household final consumption expenditure; Narayan & Narayan (2005) found this component of final expenditure to be positively related to import demand. Tang, Alias & Othman (2001) also found it to be positive and statistically significant.

GOVERNMENT CONSUMPTION EXPENDITURE (GCE)

This variable is measured using general government expenditure. This consist of government spending on goods and services. Some of the government spending goes to workers and suppliers as wages and salaries as well as payment for the goods supplied. Therefore, government spending boosts aggregate demand hence consumption of domestic goods and imports. Agbola (2009) found government expenditure to have a positive impact on import demand only in the long run.

INVESTMENT EXPENDITURE (INV)

Investment expenditures are made by the business sector on goods and services or gross domestic product, especially the purchase of productive capital goods. Studies used fixed capital formation to measure investment expenditure. Tang (2003) used nominal fixed capital formation and deflated it using GDP deflator.

EXPENDITURE ON EXPORTS (EXP)

Exports measure the country's capacity to produce and supply goods (Hor et al, 2017). Marbuah (2013), Tang (2003) found exports to be positively related to import demand and the results were significant.

According to Narayan & Narayan (2005) the imperfect substitution theory rules out the importation of inferior goods and complementary goods therefore the expenditure components are expected to be positive. Consistent with this we expect positive signs for expenditure component in the case of Botswana. All the expenditure components are deflated using consumer price index at 2010 prices.

REAL EXCHANGE RATE (RER)

Due to the unavailability of data on relative price index we use real exchange rate to proxy relative prices. The real exchange rate is defined as the ratio of foreign price level to the domestic price level, where the foreign price level is converted into domestic currency units via the current nominal exchange rate.

$$Real\ exchange\ rate\ =\ Nominal\ exchange\ rate\ (Rand\ per\ Pula) * \frac{CPI_{bw}}{CPI_{SA}}$$

Because of how the real exchange rate is defined we expect the real exchange rate to have a positive impact on aggregate imports. An increase in the real exchange rate implies an appreciation of the domestic currency i.e. Pula, as such when the pula appreciates relative to the Rand, we expect foreign goods to be relatively cheaper compared to domestic goods. Consequently, domestic consumers will substitute the relatively expensive domestic good with the relatively cheaper foreign goods hence an increase in imports. This study uses the bilateral real exchange rate between South Africa and Botswana because a bulk of Botswana's merchandise imports come from South Africa.

TRADE LIBERALIZATION (TRADE)

Trade liberalization or openness is measured as total trade as percentage of GDP. Previous studies such as Harvey & Sedegah (2011) and Ayodotun & Farayibi (2016) used this measure in their studies. They found it to be positive and significant. According to Santos-Paulino (2002) trade reforms prove to be important determinants of import demand.

DUMMY

Ncube (2013) reviewed the performance of Botswana's external sector for the period 2007-2010, a period he considered to be the period in which world economies were hit by the credit crunch, which was followed by the global recession. The global financial crisis affected Botswana through its impact on diamond exports that plummeted during this period. The effects of which were felt by different sectors of the economy. There was a change in behavior of business as some of them retrenched their workers in the face of the recession and financial crisis. Consequently, unemployment increased, and consumer incomes declined (Mosweu et al, 2016). A decline in consumer incomes is expected to lead to a decline in aggregate demand thus a decline in imports. This study uses a dummy variable to capture the impact of the financial crisis on Botswana's imports through its effect on exports; the dummy takes the value 1 for the period 2008-2009 and 0 otherwise.

4.2.3 Hypothesis and Expected Signs

Table 3: Hypotheses And Expected Signs Summary

Variable Name	Hypotheses	Expected Sign
Real GDP	Ho: Real GDP has a positive impact on import demand. H1: Real GDP has no positive impact on import demand.	+
Private consumption expenditure	Ho: Real private consumption expenditure has a positive impact on import demand. H1: Private consumption expenditure has no positive impact on import demand.	+
Real general government expenditure	Ho: Real government consumption expenditure has a positive impact on import demand. H1: Real government consumption expenditure has no positive impact on import demand.	+
Investment Expenditure	Ho: Real investment expenditure has a positive impact on import demand. H1: Real investment expenditure has no positive impact on import demand.	+

Real Exports	Ho: Real exports a positive impact on import demand. H1: Real exports investment expenditure has no positive impact on import demand	
Real exchange rate	Ho: The real exchange rate has a positive impact on import demand. H1: The real exchange rate has no positive impact on import demand	+
Trade liberalization	Ho: Trade has a positive impact on import demand. H1: Trade liberalization has no positive impact on import demand	+
Dum	Ho: The global financial crisis has a negative effect on imports H1: The global financial crisis has a positive effect on imports	-

4.2.4 Data Sources

This study uses annual data for the period 1976-2016. The data for the variables of consumption expenditure, total investment expenditure, expenditure on total exports of goods and services and imports of goods and service is taken from World Development Indicators (WDI) online database by World Bank (2016). Some of the data is obtained from Statistics Botswana publications and its website (www.statsbots.co.bw) and Bank of Botswana publications.

4.3 Estimation Techniques

The study employs Autoregressive Distributive Lag (ARDL) method of estimation due to Pesaran and Shin (2001) to study the short run and long run relationship between aggregate imports and; private consumption expenditure, government expenditure, investment expenditure, exports. The study also examines the relationship between imports and; real gross domestic product, real exchange rate and trade liberalization.

The ARDL model has several advantages over other estimation techniques. Taye (2013) noted that ARDL performs better as it can be used regardless of whether explanatory variables are of I (0) or I (1) unlike Engel-Granger and Johansen cointegration approaches. According to Nkoro

and Uko (2016) a major advantage of ARDL approach is its ability to identify the cointegrating vectors where there are multiple cointegrating vectors.

From equation (9) the ARDL regression model of the conventional import demand function is expressed as follows:

$$\Delta lnIMt = a_o + \sum_{i=1}^{n} a_{1i}\, \Delta lnIM_{t-i} + \sum_{i=0}^{n} a_{2i}\, \Delta lnGDP_{t-i} + \sum_{i=0}^{n} a_{3i}\, \Delta lnRER_{t-i} + \sum_{i=0}^{n} a_{4i}\, \Delta lnTRADE_{t-i} + b_1 lnGDP_{t-i} + b_2 RER_{t-i} + b_3 TRADE_{t-i} + b_4 Dum_t + e_t \quad (11)$$

WhereΔ, is the first difference operator and e, is the error term. The other variables are as defined before.

The bounds cointegration test according to Pesaran et al (2001) based on an F-statistic whose asymptotic distribution is non-standard under the null hypothesis that there is no cointegration and the alternative that there is cointegration among the variables under study. The Bound test for cointegration test the null hypothesis of no cointegration using the joint significance test as specified below

$H_0: b_1 = b_2 = b_3 = b_4 = 0$

$H_1: b_1 \neq 0, b_2 \neq 0, b_3 \neq 0, b_4 \neq 0$

Pesaran et al (2001) provide asymptotic critical values that consist of two set of critical values, the lower bound and the upper bound. The lower bound assumes that the regressors are integrated of order 0 i.e. I (0) while the upper bound assumes that the regressors are integrated of order 1, i.e. I (1). When testing for cointegration using the Bound test the computed F statistic can either be lower than the lower critical bound value, lie between the lower and upper bound critical values or be higher than the upper bound critical value. If the computed F-statistic is lower than the lower bound critical value the null hypothesis of no cointegration among the variables cannot be rejected, however if the computed F statistic is higher than the upper bound critical value the null hypothesis of no cointegration is rejected and an inference can be made that there is level relationship between the dependent variable and the independent variables. In the case that the calculated F statistic falls between the lower and upper bound critical values the results are inconclusive and no inference can be made without knowing the order of integration of the variables studied. Therefore, as much as the ARDL approach does not require

unit root pretesting the unit root tests results are useful when the bound test results are inconclusive.

Therefore, once cointegration is ascertained, hence long run relationship from equation (11), the long run elasticities based on the ARDL model is presented below,

$$\Delta lnIMt = b_o + \sum_{i=1}^{n} b_1\, lnIM_{t-i} + \sum_{i=0}^{n} b_2\, lnGDP_{t-i} + \sum_{i=0}^{n} b_3\, lnRER_{t-i} + \sum_{i=0}^{n} b_4\, \Delta lnTRADE_{t-i} + b_5 Dum_t + e_t \quad (12)$$

The error correction model of the long run model presented above is expressed as follows to capture the speed of adjustment.

$$\Delta lnIMt = b_o + \sum_{i=1}^{n} b_1\, \Delta lnIM_{t-i} + \sum_{i=0}^{n} b_2\, \Delta lnGDP_{t-i} + \sum_{i=0}^{n} b_3\, \Delta lnRER_{t-i} + \sum_{i=0}^{n} b_4\, \Delta lnTRADE_{t-i} + b_4 Dum_t + b_5 ECT_{t-i} + e_t \quad (13)$$

Where $\boldsymbol{ECT_{t-i}}$the error correction term and the other variables are as defined before.

The primary objective of this study is to estimate the impact of different expenditure components on Botswana's aggregate imports. Therefore, the ARDL expression of equation (10) can be expressed to measure the impact of disaggregated expenditure components on import demand as follows:

$$\Delta lnIMt = a_o + \sum_{i=1}^{n} a_{1i}\, \Delta lnIM_{t-i} + \sum_{i=0}^{n} a_{2i}\, \Delta lnPCE_{t-i} + \sum_{i=0}^{n} a_{3i}\, \Delta lnGCE_{t-i} + \sum_{i=0}^{n} a_{4i}\, \Delta lnINV_{t-i} + \sum_{i=0}^{n} a_{5i}\, \Delta lnEXP_{t-i} + \sum_{i=0}^{n} a_{6i}\, \Delta lnRER_{t-i} + \sum_{i=0}^{n} a_{7i}\, \Delta lnTRADE_{t-i} + b_1 lnIM_{t-1} + b_2 lnPCE_{t-1} + b_3 lnGCE_{t-1} + b_4 lnINV_{t-1} + b_5 lnEXP_{t-1} + b_6 lnRER_{t-1} + b_7 lnTRADE_{t-1} + b_8 Dum_t + e_t \quad (14)$$

Where Δ is the first difference operator and e, is the error term. The other variables are as defined before.

$H_0: b_1 = b_2 = b_3 = b_4 = b_5 = b_6 = b_7 = 0$

$H_1: b_1 \neq 0, b_2 \neq 0, b_3 \neq 0, b_4 \neq 0, b_5 \neq 0, b_6 \neq 0, or\ b_7 \neq 0$

Therefore, once cointegration is ascertained, hence long run relationship from equation (11), the long run elasticities based on the ARDL model is presented below:

$$\Delta lnM_t = b_0 + \sum_{i=1}^{n} b_1\, lnIM_{t-i} + \sum_{i=0}^{n} b_2\, lnPCE_{t-i} + \sum_{i=0}^{n} b_3\, lnGCE_{t-i} + \sum_{i=0}^{n} b_4\, INV_{t-i} + \sum_{i=0}^{n} b_5\, lnEXP_{t-i} + \sum_{i=0}^{n} b_6\, RER_{t-i} + \sum_{i=0}^{n} b_7\, TRADE_{t-i} + b_8 Dum_t + e_t \quad (15)$$

The error correction model of the long run model presented above is expressed as follows to capture the speed of adjustment:

$$\Delta lnM_t = b_0 + \sum_{i=1}^{n} b_1\, \Delta lnIM_{t-i} + \sum_{i=0}^{n} b_2\, \Delta lnPCE_{t-i} + \sum_{i=0}^{n} b_3\, \Delta lnGCE_{t-i} + \sum_{i=0}^{n} b_4\, \Delta INV_{t-i} + \sum_{i=0}^{n} b_5\, \Delta lnEXP_{t-i} + \sum_{i=0}^{n} b_6\, \Delta RER_{t-i} + \sum_{i=0}^{n} b_7\, \Delta TRADE_{t-i} + b_8 Dum_t + b_9 ECT_{t-i} + e_t \quad (16)$$

Where $\boldsymbol{ECT_{t-i}}$ the error correction term, and the other variables is are as defined before.

4.4 Test for Stationarity

Econometric analysis mainly uses time series data which is limited by the problem of non-stationarity. Hence in order to proceed with other econometric estimations the first step is to test for the stationarity of the variables. Testing for stationarity determines the order of integration of the variables i.e., whether the times series is integrated of order zero I (0), order one I (1) or order two, I (2).

To determine the order of integration of the variables, the study used the Augmented Dickey Fuller and Phillips-Peron unit root tests. The null hypothesis of ADF unit root test is that there is a unit root while the alternative is that there is no unit root. Using non-stationarity time-series variables in regression analysis may be misleading in the sense that the results may show

significant relationship between unrelated variables. This is known as spurious regression (Granger and Newbold, 1974).

4.5 Lag Length Selection Criteria

Finding an appropriate lag length for each of the underlying variables in ARDL is important because we need to have Gaussian error terms that is standard normal error terms that do not suffer from non-normality, auto correlation and heteroscedasticity among others (Nkoro & Uko, 2016). Including too many lags increases the standard errors of estimated coefficients hence increasing forecasting errors. Similarly, estimation bias may result if lags that should be included in the model are excluded (Hanck et al, 2019). Thus, in selecting an appropriate model of the underlying ARDL equation it is necessary to determine the optimum lag length (k) by using proper model selection criterion. The optimal lag length can be selected by using the Akaike Info Criterion (AIC), Schwarz Bayesian Criterion (SBC) or Hanna-Quinn Criterion (HQC).

CHAPTER FIVE

EMPIRICAL ANALYSIS AND RESULTS

5.1 Introduction

This chapter presents the empirical results and analysis. Section 5.2 provides a summary of variables used in the study and section 5.3 provides the unit test results and their analysis. The regression results and analysis are presented in section 5.4; 5.4.1 presents the results of the traditional import demand function i.e. bound test cointegration results, short run and long run results and provides their analysis. Lastly section 5.4.2 presents the disaggregated expenditure component model results as well as their interpretation.

5.2 Descriptive Statistics Analysis

The table below presents a summary of the variables used in the empirical estimation of Botswana's import demand function.

Table 4: Descriptive Analysis summary

	TRADE	REX	INV	IM	GDP	GCE	EXP	PCE
Mean	103.5109	1.019789	12100	19100	41900	8320	21500	18200
Minimum	73.75534	0.820203	1520	4050	6280	1110	3530	3990
Maximum	124.6491	1.410751	31800	49000	91900	19300	52200	46600
Std. Dev.	14.10019	0.145593	9110	13200	26000	5160	12700	13300
Skewness	-0.00113	0.716349	0.64	1.03	0.39	0.38	0.67	0.84
Kurtosis	1.721558	2.683763	2.13	3.11	2.03	2.45	2.88	2.4
Jarque-Bera	2.860232	3.7671	4.19	7.46	2.69	1.57	3.17	5.63
Probability	0.239281	0.152049	0.122896	0.023936	0.26007	0.456156	0.204659	0.059958
Obs	42	42	42	42	42	42	42	42

Note: Trade is in percentages, RER is a ratio and all other variables are in millions of pula.

The table provide the mean, minimum, maximum, standard deviation, Skewness and kurtosis statistics of the variables used. Imports averaged P19100 million over the study period with a minimum of P4050 million and a maximum of P49000 million. GDP grew from a minimum of P6280 million in 1976 to a maximum of P91900 million in 2017, averaging P41900 over the entire period of the study. The expenditure components; government expenditure, private consumption expenditure, investment expenditure and exports averaged 8300, 18200, 12100 and 21500 respectively (all figures are in millions of Pulas).The average of trade openness variable (103.5 %) indicates that Botswana is highly open to international trade.

The Skewness is a measure of the asymmetry of the distribution around the mean. The Skewness of normal distribution is expected is expected to be 0. The results presented in the table above shows that all the variables are positively skewed except for trade openness index variable which is negatively skewed. Kurtosis measures the peakedness of the distribution. Normal distribution of Kurtosis is 3. The results show that all variables are positive and all them less than 3 except imports.

The Jarque-Bera statistic which test whether the residuals are normally distributed is presented in the table along with its respective probabilities. The probability of the Jarque-Bera statistics with respect to each variable shows that all the variables' residuals are normally distributed except real imports and real private consumption expenditure. Normal distribution means that the data is well behaved and proper inferences can be made based on the t, and F statistic.

5.3 Unit Root Test Results

Testing for stationarity is done to determine the order of integration of the data. ARDL bound testing approach require that variables be integrated of order 0 or 1 and no variable should be integrated of order 2. Therefore, unit root test is needed to ensure that no variable is integrated of order two, I (2). The results of ADF and Phillips Peron unit root tests are presented in the table below.

Table 5: ADF Unit Root Test Results

	AUGMENTED DICKEY-FULLER UNIT ROOT TEST				
	LEVELS		1ST DIFFERENCE		
VARIABLE	CONSTANT	CONSTRANT, LINEAR TREND	CONSTANT	CONSTRANT, LINEAR TREND	ORDER
LNIM	-1.51397	-3.509508*	-4.069625***	-4.112899**	I (0)
LNGCE	-1.933068	-1.598633	-3.194856**	-3.529264**	I (1)
LNPCE	-0.488428	-3.567813**	-3.751076***	-3.700958**	I (1)
LNINV	-1.562498	-2.829188	-6.792897***	-6.935862***	I (1)
LNEXP	-2.2897	-2.703798	-5.738252***	-5.021156***	I (1)
LNGDP	-4.958695***	-2.11604	-4.165633***	-5.580167***	I (0)
TRADE	-1.140277	-1.834472	-4.686556***	-4.634927***	I (1)
REX	-1.691089	-2.766568	-7.438104***	-7.410411***	I (1)

Table 6: Descriptive Analysis summary

	PHILLIPS-PERRON UNIT ROOT TEST				
	LEVELS		1ST DIFFERENCE		
VARIABLE	CONSTANT	CONSTANT, LINEAR TREND	CONSTANT	CONSTANT, LINEAR TREND	ORDER
LNIM	-1.4650	-2.7077	-3.8522***	-3.9195**	I (1)
LNGCE	-2.8081*	-1.4796	-3.1178**	-3.4345*	I (0)
LNPCE	-0.4797	-1.8891	-3.2817**	-3.2044*	I (1)
LNINV	-1.6528	-2.8648	-6.799***	-6.9492***	I (1)
LNEXP	-2.3572	-2.4555	-5.7346***	-5.9188***	I (1)
LNGDP	-5.1813***	-2.2323	-4.1569***	-5.5827***	I (0)
TRADE	-1.4524	-2.1966	-4.719***	-4.6739***	I (1)
RER	-1.6911	-2.7666***	-8.274***	-8.732***	I (1)

****, **, * represent significant at 10%, 5% and 1% respectively*

The results of the ADF unit root test show that natural log of GDP (LNGDP) is stationary with levels, with a constant and no trend, whilst natural log of government expenditure (LNGCE) is stationary at levels, with a constant and trend, the other variables are non-stationary at level but they become stationary after differencing. The Phillips Peron unit root test results show that LNGCE and LNGDP are stationary at levels with an intercept and no trend, real exchange rate (REX) is stationarity at level with an intercept and trend. All the other variables are stationary at first difference i.e. I (1). Since all our variables are either I (0) or I (1) ARDL bound test to co-integration can be applied.

5.4 Lag Selection Criterion

The optimal lag lengths were obtained by estimating Vector Autoregressive model and using its lag length selection criteria. For the first model the optimal lag length selected by most lag length selection criteria is 2. In the second model an optimal lag length of one is selected.

Table 7: Var Lag Order Selection Criteria Model 1

Lag	LogL	LR	FPE	AIC	SC	HQ
0	36.21012	NA	0.011345	-1.642638	-1.427166	-1.565975
1	49.09514	21.70108*	0.006076	-2.268165	-2.009599	-2.176169
2	51.15891	3.367208	0.005754*	-2.324153*	-2.022493*	-2.216825*
3	51.29038	0.207586	0.006037	-2.278441	-1.933686	-2.15578
4	51.76847	0.729717	0.006222	-2.250972	-1.863123	-2.112978

Table 8: Var Lag Order Selection Criteria Model 2

Lag	LogL	LR	FPE	AIC	SC	HQ
0	62.34276	NA	0.003374	-2.860145	-2.51539	-2.737484
1	68.76869	9.808001*	0.002543*	-3.145720*	-2.757871*	-3.007727*
2	69.74722	1.442050	0.002555	-3.144591	-2.713647	-2.991264
3	69.75844	0.015946	0.002703	-3.09255	-2.618511	-2.92389
4	69.89928	0.192720	0.002843	-3.04733	-2.530198	-2.863339

5.5 Regression Results and Analysis

5.5.1 The Traditional Import Demand Model: Model 1

The results of the Traditional Import demand Model ARDL model are presented in a table below.

Table 9: Selected ARDL Model 1 (2,0,0,1)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
LNIM(-1)	0.922743	0.15831	5.828724	0.000
LNIM(-2)	-0.341782	0.140499	-2.432626	0.0208
LNGDP	0.413727	0.105972	3.904131	0.0005
RER	0.153272	0.129444	1.184075	0.2451
TRADE	0.008537	0.001803	4.734847	0.000
TRADE(-1)	-0.004201	0.002193	-1.915689	0.0644
DUMMY	-0.043521	0.059644	-0.72968	0.4709
C	-0.787344	0.816391	-0.96442	0.3421
R-squared	0.99026	D-W stat	1.77606	
Adjusted R-squared	0.988129			
S.E. of regression	0.072353			
Sum of squared residual	0.16752			
F-statistic	464.7777			
Prob(F-statistic)	0.000			
DIAGNOSTIC TESTS				
B-G Serial Correlation Test	Prob. Chi square	0.3235		
Heteroscedasticity Test	Prob. Chi square	0.0789		

Before proceeding further with the analysis, some diagnostic checks were carried out to test the robustness and appropriateness of the model. The results rule out the presence of serial correlation. The results of the Breusch-Godfrey serial correlation LM test rule out the presence of serial correlation with chi-square probability of 0.3235. The residuals were found to be heteroscedasticity. The results of Breusch-Pagan-Godfrey test show a chi-square probability of

0.0789. Furthermore, the Jarque-Bera probability of 0.47 shows that residuals are normally distributed. The CUSUM and CUSUM of squares show that the model is stable. The results are presented in the Appendix.

Cointegration Test Model 1

After running the ARDL model we test for the presence of a level or long run relationship between imports and the explanatory variable using the Bound test to cointegration. Narayan (2005) posits that the critical values provided by Pesaran et al (2001) cannot be used for small sizes as they are based on large sample sizes. Narayan recalculated the critical values for smaller sample sizes of 30 to 80 observations. Given that this study covers a period of 42 years the study adopts the critical values provided by Narayan (2005) The Bound test results are presented below:

Table 10: Bound Cointegration Test for Model 1

			LOWER BOUND	UPPER BOUND
F statistic	4.349267	10%	2.496	3.346
K		5%	2.962	3.910
		1%	4.068	5.250

Note: The critical bounds are taken from Narayan & Narayan (2004) since they are suitable for small sample sizes.

The table shows the result of the Bound Test for cointegration in the case of the traditional Model of import demand. The cointegration results shows that the F statistic is greater than 95% critical value upper bound. This indicates that the variables are cointegrated at 5% significance level, implying that there is a level relationship between the dependent variable and the independent variables.

LONG RUN MODEL

Since we have established the existence of a long run relationship between imports and its explanatory variable, the long run equation can be estimated. The long run coefficients are presented in table 11.

Table 11: Long Run Coefficient For Model 1

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNGDP	0.987324	0.077317	12.7698	0.000
RER	0.36577	0.279312	1.309538	0.1997
TRADE	0.010346	0.003844	2.691858	0.0112

LNIM =0.9873LNGDP + 0.3658RER + 0.0103TRADE

The results of the conventional import demand model show that in the long run Botswana's imports are determined by real gross domestic product and trade openness. The real exchange rate is however not statistically significant in the long run.

The results show that in the long run real GDP has a positive impact on imports and is statistically significant. This means that a rise in real gross domestic product will lead to an increase in imports. A percentage increase in real GDP will results in 0.99 percentage increase in imports. The results are consistent with economic theory and findings by other scholars. Arize & Nippani (2010) studying the behavior of import demand in three African countries: South Africa, Kenya and Nigeria respectively found the impact of real income to be positive and significant for all the three countries with long run elasticities of 1.84, 0.53 and 0.81 respectively. According to Arize & Nappani (2010) the income elasticity varies from 0.43 to 2.17, averaging 1.31.

In the long run imports also depend on the extent of trade openness. The results imply that the more open the country is the more it imports. The results are significant and consistent with economic theory. The results are consistent with the findings by Gaalya et al (2007) who found the trade ratio GDP to have a positive and significant impact on imports of East African countries. However, the size of the trade openness coefficient is very small which means that in the long run further liberalization of trade will not have the adverse impact on Botswana's balance of payments.

The long run coefficient of real exchange rate (RER) is positive as expected, but statistically insignificant. Though insignificant the results are consistent with economic theory. In our case we expect an appreciation of the pula against the South African rand to result in more imports. An appreciation of the pula relative to the rand makes goods from South Africa relatively cheaper than domestic goods and thus promotes greater importation.

SHORT RUN MODEL

Table 12 below presents the short run dynamics the ARDL model

Table 12: ECM Representation Of Selected Model 1 (2,0,0,1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.787344	0.816391	-0.96442	0.3421
LNIM(-1)	-0.419039	0.108294	-3.869467	0.0005
LNGDP	0.413727	0.105972	3.904131	0.0005
RER	0.153272	0.129444	1.184075	0.2451
TRADE(-1)	0.004336	0.001612	2.689995	0.0113
D(LNIM(-1))	0.341782	0.140499	2.432626	0.0208
D(TRADE)	0.008537	0.001803	4.734847	0.000
DUMMY	-0.043521	0.059644	-0.72968	0.4709
ECT(-1)	-0.419039	0.096063	-4.362115	0.0001
R-squared	0.682878	D-W stat	1.77606	
Adjusted R-squared	0.646636			
S.E. of regression	0.069183			
F-statistic	18.84192			
Prob(F-statistic)	0.000			

The results show that in the short run Botswana's imports are determined by lagged imports, real GDP and trade liberalization. As in the long run the real exchange rate has insignificant impact in the short run.). The error correction term is negative and highly significant at 1% level. The ECT shows a speed of adjustment to equilibrium of 0.41 which is a moderate/ partial adjustment in a given period. The adjusted R squared of 0.65 shows that the model is a good fit. The F-statistic of 14.1 which is highly significant at 1% also shows that overall the model fit the data well.

The dummy variable included in the model to capture the effect of any structural break due to 2008/09 financial crisis is negative albeit being non-significant. The financial crisis affected foreign trade and aggregate demand negatively. The financial crisis caused a distress in consumers income hence they cut consumption of both domestic and imported goods. The 2008/2009 global economic crisis affected commodity prices subsequently having adverse impact on exports of goods and services. Botswana's major exports diamonds were negatively affected in the recession period. However, the non-significant impact of the recession can be attributable to the fact that Botswana's economy was able to recover from the recession as early as 2010. According to the World Bank brief the diamond export recovered rapidly more than it was anticipated. Furthermore, the recovery might have been aided by the government's

deliberate choice continuing with development projects despite the economic situation at the time (Ncube, 2013).

5.5.2 The Disaggregated Expenditure Component Approach Model: Model 2

Table 13: Model 2 Selected ARDL Model (1, 1, 0, 0, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.361564	0.483473	0.747846	0.4602
LNIM(-1)	0.270966	0.076367	3.54819	0.0013
LNPCE	0.473759	0.123032	3.850703	0.0006
LNPCE(-1)	-0.309128	0.126614	-2.441504	0.0205
LNGCE	0.272683	0.079994	3.408791	0.0018
LNINV	0.26487	0.048652	5.44413	0.000
LNEXP	-0.014726	0.06945	-0.212035	0.8335
REX	0.126456	0.088532	1.428363	0.1632
TRADE	0.008495	0.000916	9.278398	0.000
DUMMY	-0.003796	0.03675	-0.103301	0.9184
R-squared	0.996459	D-W stat	1.876438	
Adjusted R-squared	0.995431			
S.E. of regression	0.046353			
F-statistic	969.2895			
Prob(F-statistic)	0.000			
DIAGNOSTIC TESTS				
B-G Serial Correlation Test	Prob. Chi square	0.6572		
Heteroscedasticity Test	Prob. Chi square	0.2298		

The results of the UECM are presented by table 13 above, after running the ARDL model it was tested for serial correlation, heteroscedasticity, normality and overall stability. The results of the Breusch-Godfrey Serial Correlation LM Test rule out the presence of serial correlation, with the probability of chi square of 0.6572we reject the null hypothesis of serial correlated residuals. The residuals were also found to be homoscedastic as the results of the Breusch-Pagan-Godfrey Heteroscedasticity test show an insignificant probability of Chi square (0.2298).

The results of the normality test which presented in the appendix show that the model passes the normality test, with Jarque-Bera probability of 0.79, therefore we accept the null hypothesis of normal distribution. From the diagnostic test it shows that the model does not suffer from any major problem, therefore we proceed with the test for cointegration.

Cointegration Test Model 2

Table 14: Bound Cointegration Test For Model 2

			LOWER BOUND	UPPER BOUND
F statistic	24.46441	10%	2.496	3.346
K	6	5%	2.962	3.910
t statistic	-9.546418	1%	4.068	5.250

Note: The critical bounds are taken from Narayan & Narayan (2004) since they are suitable for small sample sizes

The cointegration test results show that the computed F-statistic is greater than the 99%, 95%, and 90% critical value upper bounds. Therefore, the null hypothesis of no cointegration among the variables is rejected and conclude that the variables are cointegrated and there exists a long run relationship between the dependent variable and explanatory variables.

The Long-run Elasticities of Model 2

Since the existence of cointegration among the variables is established, the long run dynamics of the disaggregated expenditure are presented in the table below.

Table 15: Long Run Coefficient For Model 2

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPCE	0.225822	0.073703	3.063937	0.0045
LNGCE	0.374033	0.109184	3.425716	0.0017
LNINV	0.363317	0.068786	5.281879	0.000
LNEXP	-0.020199	0.095555	-0.211388	0.834
RER	0.173457	0.117389	1.47763	0.1496
TRADE	0.011652	0.001581	7.371645	0.000

LNIM =0.2258LNPCE + 0.3740LNGCE + 0.3633LNINV -0.0202LNEXP + 0.1735RER + 0.0117TRADE

The long run results of the disaggregated model show that Botswana's aggregate imports depend on domestic private consumption expenditure, government expenditure, private investment, and trade openness. Exports and real exchange rate have insignificant impact.

Private consumption expenditure has positive significant influence on Botswana's imports. This may be attributable to the fact that Botswana continues to import consumer goods to meet her domestic demand as the current domestic production is low. The results show that a 1 percent increase in private consumption expenditure leads to a rise in aggregate imports by

0.23 percent. This means that in the long run private consumption expenditure has a positive impact on aggregate imports and it is highly significant at 1 % significance level. Moreover, the findings further reveal the inelasticity of Botswana's imports to changes in private consumption. The results are consistent with the findings by Bartholomew (2011).

Government consumption expenditure also has a positive and significant impact on aggregate imports in the long run. The results show a long run elasticity of 0.37, implying that a percentage rise in government expenditure will results in an increase in imports by 0.37 percent. These results are consistent with theoretical and empirical literature. The findings depict the significant role that the government of Botswana plays in the economic development of the country. Over the years the government has invested in infrastructure development which might have sparked imports of raw materials used in construction. The findings are consistent with the findings by Agbola (2009) for Philippines and Constance and Yue (2010) for Cote D' Ivoire.

Furthermore, the results show that in the long run Botswana's aggregate imports are positively affected by private investment, implying that an increase in economic activity hence investment will lead to more imports. As firms invest in capital goods i.e. machinery buildings and factories current demand increases. Since most of capital goods are imported as foreign technology it is expected that investment expenditure will drive imports upwards. Similarly, the investment elasticity of Botswana's imports is inelastic. The results are highly significant and are supported by economic theory and empirical evidence. Modeste (2010) also found the coefficient of investment to be positive and significant in three CARICOM countries (Guyana, Jamaica, and Trinidad and Tobago). The findings Opoku-Agyemang (2017) for Ghana also supports the findings of this study.

Contrary to economic theory and findings by many researchers this study finds exports to have a negative and insignificant impact on imports. According to Liu et al (2001) a rise in imports is associated with a rise in exports and conclude that it is exports that influence imports not vice versa. A small economy like Botswana is expected to be a net importer of capital goods and intermediate goods that go into production and manufacturing, hence when the export sector expands imports are expected to rise. The results of this study are in consonance with the findings by Ziramba & Bbuku (2012) for Namibia, and they argue that the findings such as this one should not limit the study considering that the results are insignificant.

Trade openness variable which is included in the model to proxy trade liberalization reveals that in the long run Botswana's imports are positively influenced by the extent of the openness of the economy to international trade. The coefficient of trade liberalization however shows a marginal impact of liberalizing of trade on imports but is highly significant. The marginal impact of trade liberalization on Botswana's imports can be explained by the fact that the country remains one of the most open countries, trade openness as measured by the trade as a percentage of GDP shows that the country is highly open to trade as trade to GDP ratio averaged over 90% over the study period. Botswana has over the years had larger import needs and naturally South Africa had been her major trading partner in terms of imports therefore by virtue of being a member of SACU, sourcing imports from South Africa has remained cheaper than alternatives as such further opening of the economy might have had marginal impact on imports. The findings are supported by economic theory and findings by Harvey & Sadegah (2011) and Ayodotun & Farayibi (2016). For Sub-Saharan Africa Ayodotun & Farayibi (2016) also found the impact of trade liberalization to be quite low with a coefficient of 0.06.

Moreover, the results show that the real exchange rate has an insignificant positive impact on import demand. An appreciation in the pula is expected to lead to an increase in demand for foreign products as they become relatively cheaper compared to the domestic products. The elasticity of 0.45 implies that Botswana's imports are price inelastic. The findings suggest that Botswana cannot rely on using exchange rate policy to correct the balance of trade problem. The explanation given by Chani et al (2013) in the case of Pakistan is that aggregates imports are less responsive to prices because a large proportion of a country's imports are essential commodities with inelastic demand.

SHORT RUN MODEL

The table below reports the short run coefficients estimates obtained from the error correction model (ECM) version of the ARDL model.

Table 16: ECM Representation Of Selected Model 2 (1, 1, 0, 0, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.361564	0.483473	0.747846	0.4602
LNIM(-1)	-0.729034	0.076367	-9.546418	0.000
LNPCE(-1)	0.164632	0.061244	2.688107	0.0115
LNGCE	0.272683	0.079994	3.408791	0.0018
LNINV	0.26487	0.048652	5.44413	0.000
LNEXP	-0.014726	0.06945	-0.212035	0.8335
RER	0.126456	0.088532	1.428363	0.1632
TRADE	0.008495	0.000916	9.278398	0.000
D(LNPCE)	0.473759	0.123032	3.850703	0.0006
DUMMY	-0.003796	0.03675	-0.103301	0.9184
ECT(-1)	-0.729034	0.050993	-14.29672	0.000
R-squared	0.874311	D-W stat	1.876438	
Adjusted R-squared	0.86412			
S.E. of regression	0.042429			
F-statistic	85.79264			
Prob(F-statistic)	0.000			

The results show that in the short run Botswana's imports are influenced by the imports from the previous period. Private consumption, government spending, investment, trade government expenditure, private consumption expenditure, domestic investment and trade liberalization all have a positive and significant impact on aggregate imports. The dummy variable which is included to capture the impact of the 2008/2009 financial crisis is negative and insignificant.

The results the error correction term (ECT) is found to be negative and statistically significant at 1% level. The results reveal a rapid adjustment to equilibrium at an adjustment speed of 0.73 in a year implying that 73% percent of any deviation is corrected within the period. The adjusted R squared value of 0.86 implies that the ECM fits the data reasonably well. The overall F-statistic is highly significant implying that overall the model explains the relationship between imports and the explanatory variables perfectly.

The CUSUM test and CUSUM of square test are used to test the stability of the model. The results presented in the appendix indicate that the model is stable over the study period.

This study has also found the expenditure components to have different sizes and unique influences on import demand. The long run elasticities of the expenditure components: private consumption expenditure, government expenditure, investment and exports are 0.23, 0.37, 0.36 and -0.2 respectively. All the expenditure components variables except exports have the expected sign and are statistically significant. Chani et al (2011) argue that the variability in the size of the coefficients of different expenditure components support the use of different components of final expenditure separately in import demand equation. By comparing the Adjusted R squared of the ECM in the traditional model and the final expenditure component model this study finds the latter to have better fit than the former.

Model 2 with an interaction variable (Dummy_lnexp)

The results presented in table 15 and 16 reveal that exports have an unexpected negative and insignificant influence on exports. To find possible explanation of this an interaction term between exports and the dummy variable was included to examine if there will be any significant impact on imports. The results of which are presented in Figure A7 and A8 in the appendix. The interactive term is positive and statistically insignificant. The results also reveal that include the interaction term did not improve the results from the previous model, the signs and significance of the variables remain unchanged.

CHAPTER SIX

CONCLUSION AND POLICY IMPLICATIONS AND RECOMMENDATIONS

6.0 Introduction

This study examined the relationship between import demand and its explanatory variables in Botswana by employing two approaches: the traditional import demand approach as proposed by Khan (1974) and further modified by other scholars, and the disaggregated expenditure components approach as originally proposed by Giovanneti (1989). An ARDL bound testing approach was used to determine the short run and long run dynamics in both approaches. The study uses annual time series data covering the period 1976-2017.Finally to ensure the robustness of the model diagnostic tests were carried out.

6.1 Summary and Conclusion

The primary objective of this study has been to estimate Botswana's import demand function by employing the disaggregated expenditure component approach. Therefore, the objective has been to explore the impact of private consumption expenditure, government expenditure, investment expenditure, exports, and relative prices, trade liberalization and the impact of 2008-2009 global financial crisis on Botswana's aggregate imports.

The study found the existence of a cointegrating relationship between imports and the independent variables in both the traditional approach and the disaggregated expenditure approach. In the long run there is a long run relationship between imports and real domestic product, private consumption expenditure, government expenditure, investment and trade liberalization.

In the Traditional approach, this study found imports to be determined by real domestic product and trade liberalization in the long run. The impact of this is positive and statistically significant as expected. The real exchange rate although positive it was found to be statistically insignificant. The error correction model revealed that in the short run Botswana's aggregate imports depend on imports from the previous period, real domestic product and the measure of trade liberalization. The impact of the financial crisis albeit being negative was insignificant. The error correction term was found to be negative and highly significant implying that there is a convergence to equilibrium in the long run. The findings on the impact of real income on

aggregate demand have strong support from works of other studies on the import demand behavior in developing countries.

In the disaggregated expenditure component approach, the main findings are that Botswana's aggregate imports are positively influenced by private consumption expenditure, government expenditure, investment expenditure and trade liberalization. Despite having the expected positive sign, the real exchange rate has insignificant influence on Botswana's imports. Exports have negative and insignificant effect. Giovannetti (1989), Tang (2003), Narayan and Narayan (2005), Agbola (2009) and Bartholomew (2011) among others found expenditure components to have a positive influence on imports in the long run. The implication being that as economic activity increases expenditures are expected to increase, therefore imports will increase as economic agents continue to spend. In the short run all the expenditure components except exports have positive effect and are statistically significant. The real exchange rate has an insignificant influence on Botswana's aggregate imports in the short run implying that real exchange rate movements will not change Botswana's import demand significantly. The impact of financial crisis is also insignificant as shown by a negative and insignificant dummy variable. The error correction had a negative sign and was highly significant implying convergence to the long run relationship.

Finally, comparing the results of the two models estimated, the findings of this study are supported by other previous literature that concluded that the disaggregated expenditure component approach model of import demand is more superior to the traditional import demand function. The study has also shown that indeed different components of expenditure exert different effect on import demand, meaning that private expenditure, government expenditure and investment expenditure all have a unique influence on imports. Since most of the results are consistent with economic theory and statistically significant, important policy implications can be derived.

6.2 Policy Implications and Recommendations

The results of this study have profound policy implications for Botswana. In the long run Botswana imports are driven by private consumption expenditure, public expenditure and investment expenditure which means that in the long run, as the economy grows, imports also grow. The elasticity of government is the largest in the long run. Though imports are inelastic with respect to government expenditure in the long run, the results indicate that government spending has a negative impact on the trade balance. The policy implication here is that the

government of Botswana needs to improve on the implementation of policies such as the economic diversification drive and encourage local procurement in order to cut on the import bill. Considering the long run coefficient, which is positive and significant, there is also a need for policy that could encourage domestic production and consumption of consumer goods and intermediate goods. Emphasis should be given to strengthening the local manufacturing sector and agricultural sector.

One key finding of this study is that though insignificant the real exchange rate has an inelastic impact on Botswana's imports. This means that real exchange rate has no significant influence in Botswana's import. The implication here is that government of Botswana cannot use the exchange rate policy to reduce the imports. Finally the results of this study reveal that expenditure changing policies will be more effective than expenditure switching policies in the case of Botswana. This implies that currency manipulations will not make domestic consumers switch from consuming imports in favor of local goods. Rather in order for authorities to reduce imports they should use the mix of monetary and fiscal policies that promote consumption of local goods.

6.3 Limitations of the Study and Areas for Further Research

This study is limited by data unavailability therefore proxies were used to measure trade liberalization and relative prices.

The study got some unexpected results; according to economic theory and empirical literature exports are expected to have a positive and significant impact on imports. Therefore, further investigation can be carried out to establish if there would not be any change of behavior if a different technique or set of data is used. As an area of further research on a similar topic in Botswana, researchers can try to examine if the change in Botswana's exchange rate policy of 2005 has affected imports in anyway. In addition, future studies can investigate if the findings of this study are sensitive to estimation technique used by employing different methods.

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APPENDIX

Figure A 1: Model 1 Selected ARDL Model (2, 0, 0, 1)

Selected Model: ARDL(2, 0, 0, 1)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNIM(-1)	0.922743	0.158310	5.828724	0.0000
LNIM(-2)	-0.341782	0.140499	-2.432626	0.0208
LNGDP	0.413727	0.105972	3.904131	0.0005
REX	0.153272	0.129444	1.184075	0.2451
TRADE	0.008537	0.001803	4.734847	0.0000
TRADE(-1)	-0.004201	0.002193	-1.915689	0.0644
DUMMY	-0.043521	0.059644	-0.729680	0.4709
C	-0.787344	0.816391	-0.964420	0.3421

R-squared	0.990260	Mean dependent var	23.50187
Adjusted R-squared	0.988129	S.D. dependent var	0.664084
S.E. of regression	0.072353	Akaike info criterion	-2.237656
Sum squared resid	0.167520	Schwarz criterion	-1.899880
Log likelihood	52.75312	Hannan-Quinn criter.	-2.115527
F-statistic	464.7777	Durbin-Watson stat	1.776060
Prob(F-statistic)	0.000000		

Figure A 2: Normality Test for Model 1

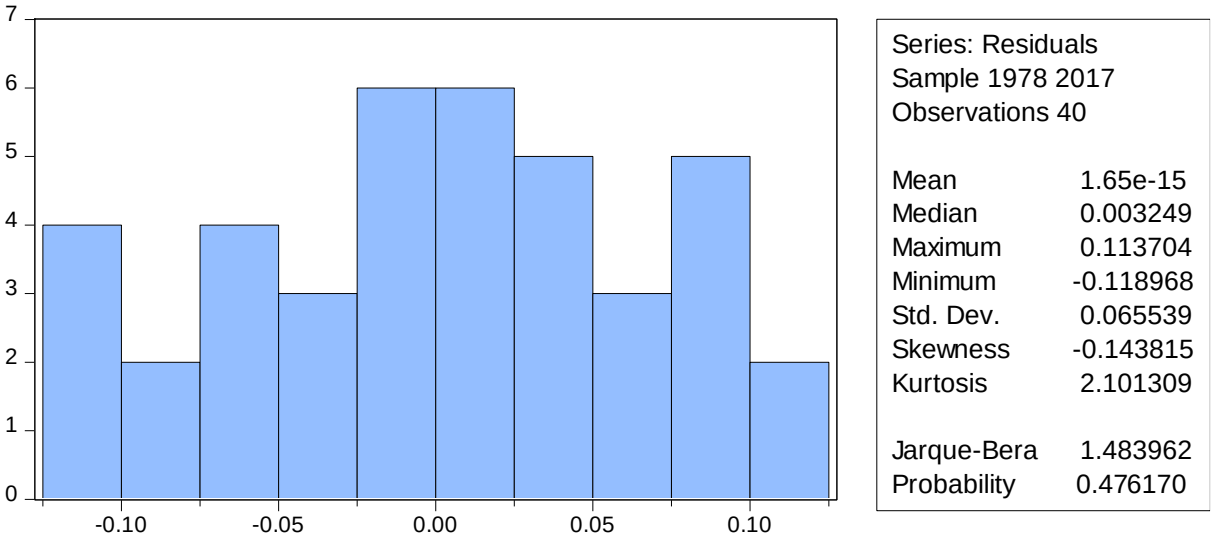
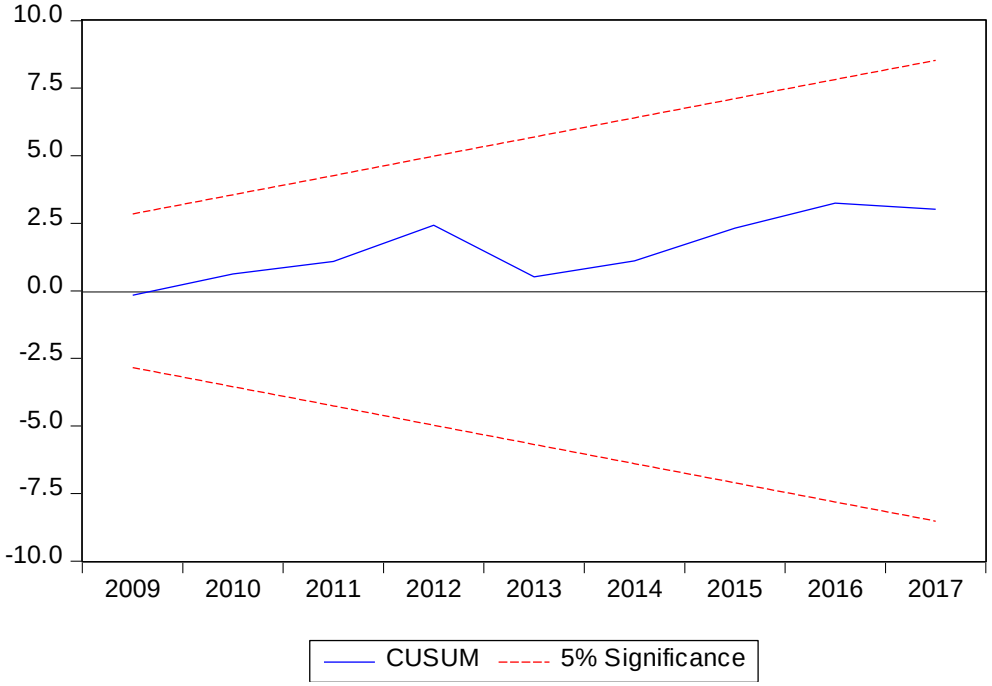


Figure A 3: Stability test for Model 1 (CUSUM AND CUSUMSQ Test)



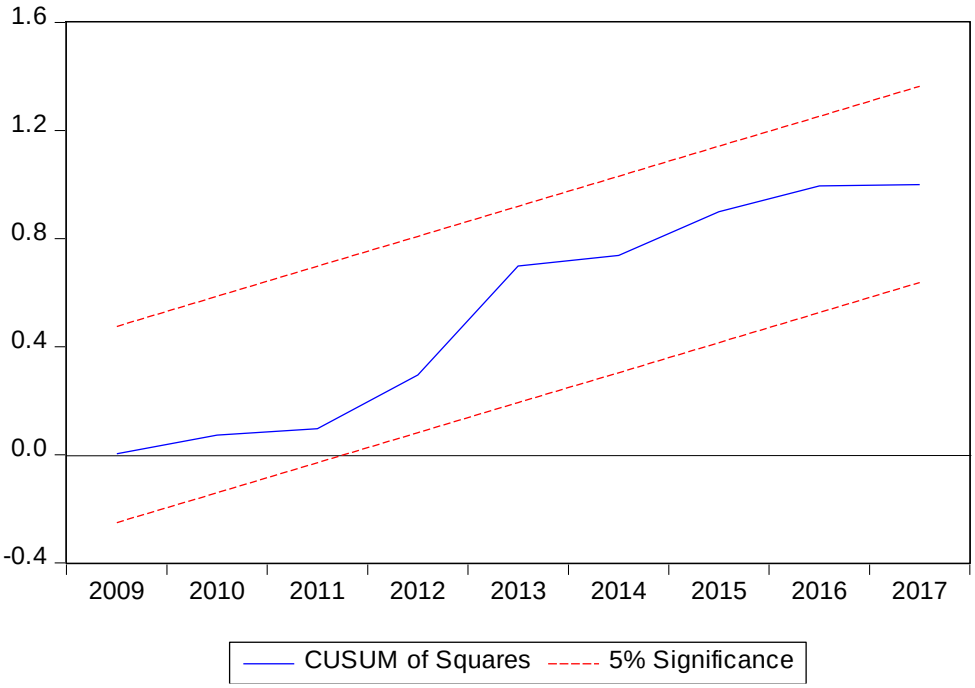


Figure A 4: Model 2 Selected ARDL Model ((1, 1, 0, 0, 0, 0, 0)

Selected Model: ARDL(1, 1, 0, 0, 0, 0, 0)

Variable	Coefficient	Std. Error	t-Statistic	Prob.*
LNIM(-1)	0.270966	0.076367	3.548190	0.0013
LNPCE	0.473759	0.123032	3.850703	0.0006
LNPCE(-1)	-0.309128	0.126614	-2.441504	0.0205
LNGCE	0.272683	0.079994	3.408791	0.0018
LNINV	0.264870	0.048652	5.444130	0.0000
LNEXP	-0.014726	0.069450	-0.212035	0.8335
REX	0.126456	0.088532	1.428363	0.1632
TRADE	0.008495	0.000916	9.278398	0.0000
DUMMY	-0.003796	0.036750	-0.103301	0.9184
C	0.361564	0.483473	0.747846	0.4602

R-squared	0.996459	Mean dependent var	23.47053
Adjusted R-squared	0.995431	S.D. dependent var	0.685751
S.E. of regression	0.046353	Akaike info criterion	-3.096841
Sum squared resid	0.066607	Schwarz criterion	-2.678897
Log likelihood	73.48525	Hannan-Quinn criter.	-2.944649
F-statistic	969.2895	Durbin-Watson stat	1.876438
Prob(F-statistic)	0.000000		

Figure A 5: Normality Test for Model 2

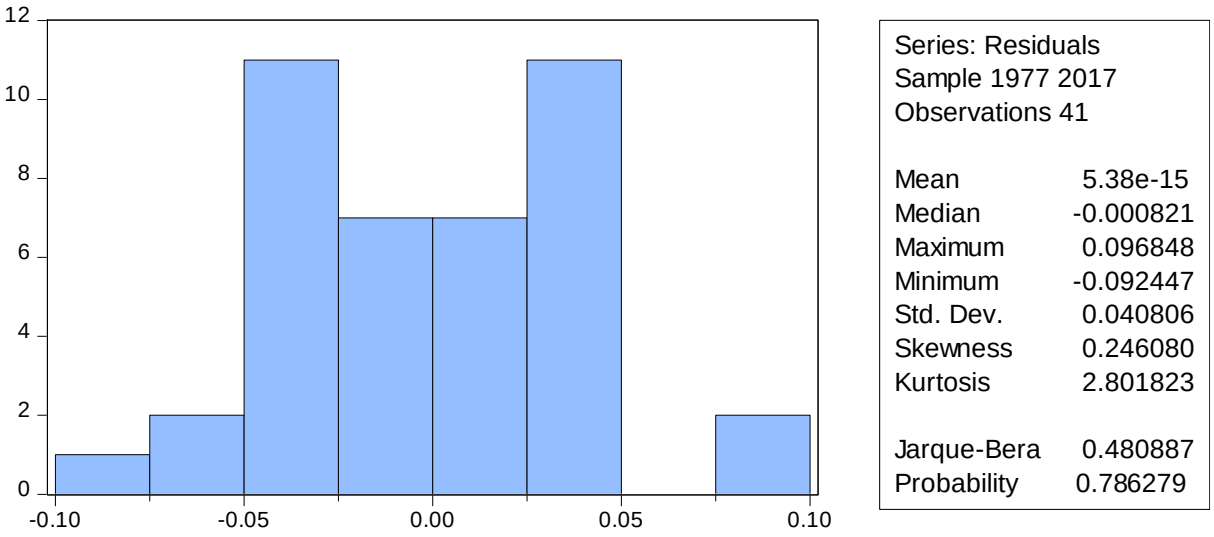
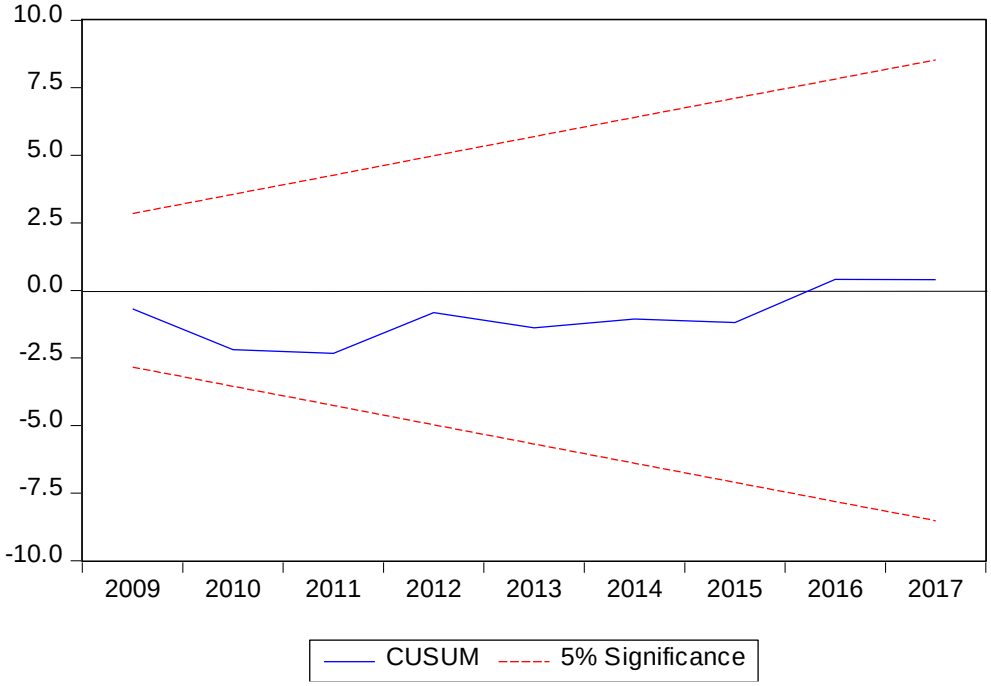


Figure A 6: Stability Test for Model 2 (CUSUM AND CUSUMSQ Test)



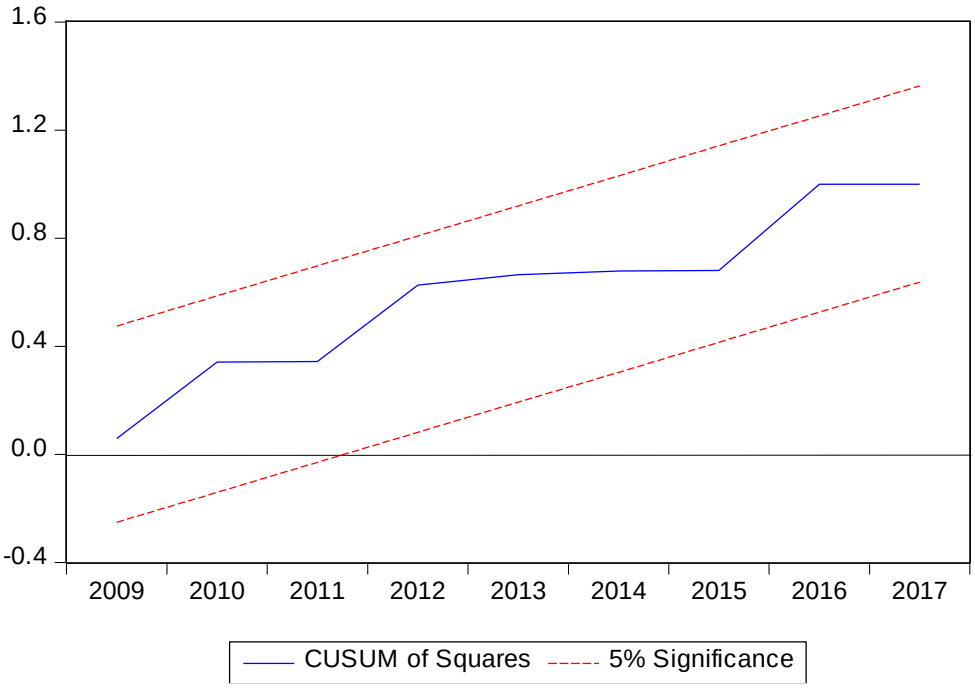


Figure A 7: The Long Run coefficient of Model 2 with interaction variable Dummy_lnexp

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNPCE	0.226153	0.075698	2.987564	0.0056
LNGCE	0.403418	0.117277	3.439879	0.0017
LNINV	0.365578	0.070781	5.164895	0.0000
LNEXP	-0.054059	0.105571	-0.512063	0.6124
REX	0.165757	0.121007	1.369820	0.1809
TRADE	0.012016	0.001697	7.082624	0.0000

Figure A 8: ECM Representation of Model 2 with interaction variable Dummy_lnexp

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.386313	0.485253	0.796107	0.4322
LNIM(-1)*	-0.71127	0.078879	-9.01717	0.000
LNPCE(-1)	0.160855	0.061512	2.615045	0.0138
LNGCE**	0.286938	0.081619	3.515594	0.0014
LNINV**	0.260024	0.049036	5.302754	0.000
LNEXP**	-0.03845	0.074125	-0.51873	0.6078
REX**	0.117898	0.0892	1.321721	0.1963
TRADE**	0.008547	0.000919	9.297782	0.000
D(LNPCE)	0.470743	0.123342	3.816575	0.0006
DUMMY	-3.49923	3.756915	-0.93141	0.3591
DUM_EXP	0.14575	0.156645	0.930445	0.3596
ECT(-1)*	-0.71127	0.051097	-13.92	0.000