

TWIN DEFICITS
AN EMPIRICAL ANALYSIS ON THE RELATIONSHIP BETWEEN BUDGET
DEFICITS AND CURRENT ACCOUNT DEFICITS IN MALAWI

Master of Arts (Economics) Thesis

By

TAYAMIKA THANDI KAMWANJA
BSoc.Sc. - University of Malawi

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DECLARATION

I, TAYAMIKA THANDI KAMWANJA, hereby declare that this thesis is my own original work which has not been submitted to any other institution for similar purposes. Where other people's work has been used acknowledgements have been made.

Name

Signature

Date

CERTIFICATE OF APPROVAL

The undersigned certify that this thesis represents the student's own work and effort and has been submitted with our approval.

Signature: _____ Date: _____

Ronald Mangani, PhD (Associate Professor of Economics)

Main Supervisor

Signature: _____ Date: _____

Ben Kaluwa, PhD (Professor of Economics)

Second Supervisor

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DEDICATION

To

My family my Father, sisters and brother, for all the love, support and encouragement.

May God shower you with blessings always!

ACKNOWLEDGEMENTS

First of all I would like to give all the praise, honour and glory to the Lord Almighty for making all this possible for me! Ebenezer, the Lord has brought us thus far.

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ABSTRACT

The twin deficits hypothesis asserts that a reduction in the budget deficit causes a reduction in the current account deficit. The Keynesian hypothesis proposes that the causality runs from budget deficits to current account deficits. However; conflicting theories have been proposed, arguing that possibility exists of reverse causality from current account to budget deficit and indeed that there is no relationship between the two deficits. Proponents of the Ricardian equivalence hypothesis (REH) suggest the absence of any relationship between the current account deficit and the budget deficit.

This study uses the Autoregressive Distributed Lag method (ARDL) of co integration to test the three proposed hypotheses using annual time series data of Malawi over the period 1970 to 2012. Three separate models were constructed to test the theories outlined above. Results from the analysis found a positive significant long run relationship between the budget deficit and the current account deficit. Implying that in the long run budget deficit does influence the current account deficit, asserting that the Keynesian proposition holds in Malawi. GDP and the real exchange rate were found to have a positive long run impact on the current account, with the current account responding much higher to the GDP than real exchange rate. No evidence was found in support of the reverse causality or the Ricardian equivalence hypothesis.

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LIST OF ABBREVIATIONS AND ACRONYMS

AIC:	Akaike Information Criteria
ARDL:	Autoregressive Distributed Lag approach
BG-LM:	Breusch-Godfrey Lagrange Multiplier
BOP:	Balance of Payments
ECM:	Error Correction Model
GDP:	Gross Domestic Product
GoM:	Government of Malawi
HIPC:	Heavily Indebted Poor Countries
HQC:	Hannan-Quinn Criteria
IMF:	International Monetary Fund
NSO:	National Statistical Office
NES:	National Export Strategy
RBM:	Reserve Bank of Malawi
REH:	Ricardian Equivalence Hypothesis
SBC:	Schwarz Bayesian Criteria
UECM:	Unrestricted Error Correction Model
VAR:	Vector Autoregressive Approach

CHAPTER ONE

INTRODUCTION

1.1 Background of the study

As governments and societies grow, it becomes necessary to take on a certain amount of debt to spur further growth in the economy. The problem in doing so lies in maintaining control over these deficits and being able to use them to aid growth instead of letting them become idle liabilities the government must take care of. If the government is expanding, it either has to borrow or export. The two deficits that are the most crucial to understand are the budget and current account deficits.

The twin deficits hypothesis asserts that a reduction in the budget deficit causes a reduction in the current account deficit. In recent years, the Malawi Economy has been characterized by budget deficits and a deteriorating trade balance which has led to current account deficit. Many analysts suspect that these features are closely, and perhaps even causally, related. Indeed, national income accounting identities guarantee that budget deficits must create either an excess of private saving over investment or an excess of imports over exports (Pilbeam, 1998).

Four possible causation linkages may be present between the budget deficit and the current account deficit. The first linkage is the Keynesian (conventional) proposition

often associated with the Mundell-Fleming model. It argues that there exists a positive relationship between the two deficits and that causality is from the budget deficit to the current account deficit (Mundell, 1963; Fleming, 1962). In the context of this model, an increase in budget deficit would cause an increase in domestic interest rate above the world rate, with capital inflows and appreciation of the domestic currency as effects. These effects, in turn, result in an increase in trade (current account) deficit.

We do understand however, that this proposition can only hold under certain assumptions, such as no barriers to entry or barriers to exit. Unfortunately, in the context of most developing countries such as Malawi, these assumptions do not hold. In Malawi we have institutional barriers which restrict the amount of money you can take out of the country in foreign currency and indeed also the availability of foreign currency within the country is strictly monitored. These barriers act as disincentives for foreign investors to want to invest in the country, thus, making capital inflows rather difficult even if the interest rate in the country was above the world interest rate. Secondly, we acknowledge that an appreciation of the domestic currency is highly unlikely, as exchange rate fluctuations are monitored and controlled by the International Monetary Fund (IMF) in a way.

As discussed in Kearney and Monadjemi (1990), reverse causation from current account to budget deficits can come about if there is a change in the expectations of inflation. A decrease in expected inflation would lead to currency appreciation and thus decrease net exports and increase the current account deficit. This in turn will have the usual

multiplier-type decrease in output and consequently in tax revenues. Also, reverse causation from current account to budget deficits can occur if excessive current account deficits plunge an economy into a recession and subsequently lead to a financial or solvency crisis in which a large injection of public funds may be needed to rehabilitate the struggling financial sector or to minimize the severity of a recession (Marinheiro, 2007).

Bidirectional causality may exist between current account and budget deficits. While budget deficits may cause current account deficits, the existence of significant feedback may cause causality between the two variables to run in both directions (Zengin, 1999). In this case, it is not enough to cut the budget deficit in order to eliminate current account deficits. It is necessary as well to complement budget-cut policies with a coherent package focusing on policies for export promotion, productivity improvement and exchange rate, among others.

In contrast, proponents of the Ricardian equivalence hypothesis (REH) suggest the absence of any relationship between the current account deficit and the budget deficit. Proponents of this view point out that, while a tax cut (hence a deficit) has the effect of reducing public revenues and public savings and enlarging the budget deficit, it increases private saving by an amount equal to the expected increase in the tax burden in future years (Barro, 1989). That is, savings will respond positively to the changes in budget deficits, leaving the current account deficit unaltered. Similarly, if government runs a deficit by borrowing, the economic agents expect that government will raise future taxes

to finance the budget deficit and so they increase their savings to meet the future tax burden. In sum, alterations in the composition of public financing (i.e., debt versus taxes) have no impact on real interest rate, aggregate demand, private spending, the exchange rate or current account balance (Saeed and Khan, 2012). In other words, the absence of any causality relationship between the two deficits would support REH.

1.2 Statement of the problem

Malawi's current account balance and fiscal balance have been deteriorating over the past decades, and attempts to improve this situation have not been very successful. We believe that in trying to achieve the government's objective of turning Malawi into an export-led economy and closing the current account deficit, there is need to understand all the facets of the current account deficit, and its linkage to the budget deficit. Because to reduce its fiscal imbalance the government has to generate money through borrowing, grants or exports or play around with the exchange rate.

The empirical test of the role of the budget deficits in causing the current account deficits has been a subject of controversy. Do the budget deficits affect the current account deficits? If so, to what extent and through which channels do budget deficits affect the current account deficits? The issues involved have important policy implications. Suppose that the basic reason for rising current account deficits is indeed the escalating budget deficits. In this case, policy makers may focus on curtailing the budget deficits in order to resolve the current account deficit problem. However, if such a view concerning the "causal" role of the budget deficits is incorrect, then, reductions in the budget deficits

may not resolve the current account deficits dilemma and, moreover, attention will be diverted from more relevant and urgently needed policy options.

Despite the possibility of budget deficits causing current account deficits, there is little research analyzing the existence and specific direction of this causal relationship especially in Malawi. We need empirical evidence which gives us strong indication of where it makes economic sense to base our fiscal and current account policies.

1.3 Objectives of the study

The main objective of the study is to empirically examine the existence of a causal relationship between current account and budget deficits in Malawi and to determine whether Malawi follows the Ricardian equivalence hypothesis or not.

The specific objective of this paper is threefold:

- i. The first specific objective is to explore the plausible long-run linkage between the current account deficit and the budget deficit in Malawi.
- ii. The second specific objective is to explore the possibility of reverse causality from current account deficits to budget deficits within the well known co-integration framework.
- iii. The last objective is to determine if the Ricardian equivalence holds in Malawi, that the budget deficit has no impact on the private savings.

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1.4 Hypotheses

The following null hypotheses are to be tested:

- Budget deficit does not have an impact on the current account deficit; the conventional Keynesian causality does not apply in Malawi.
- Current account deficit does not have any impact on the budget deficit in Malawi.
- There is no relationship between the budget deficit and private consumption in Malawi, Ricardian equivalence hypothesis holds in Malawi.

1.5 Significance of the study

Though there is plenty of evidence to support the coexistence of the budget and current account deficits, there is no consensus as to the directionality of the relationship between the two¹¹. Most of the previous investigations into this relationship have focused on developed nations like the United States and its trading countries and have produced a mixed bag of results. Not many have attempted to analyze empirically the deficit relationships in developing countries especially in Africa, where the results of an analysis are more crucial and are more likely to have implications that can affect budgetary policy. Furthermore, analysis of some countries seems to confirm alternative theories, (i.e. Ricardian Equivalence Hypothesis) or even causality in the direction opposite that which Twin Deficits Theory suggests. That is to say, causality runs from current account deficit to budget deficit instead.

¹¹ See studies by Oseni (2012), Saeed and Khan (2012), Pahlavani and Saleh (2009), Nakyambadde (2008), Zengin (1999) and others.

Particularly in recent years, budget and current account deficits seem to have been closely correlated in Malawi, but not actually confirmed by empirical evidence. Of course, a close correlation between any two variables is a necessary but not sufficient condition for causation. The correlation analysis is inadequate and therefore, cannot be used to identify the cause - and effect relationship between two time series. In fact, high correlation between budget and current account deficits is consistent with four alternative causal hypotheses. Namely that, (1) budget deficits cause current account deficits, (2) current account deficits cause budget deficits, (3) the two variables are causally independent, and (4) that the two variables are mutually causal (Zengin, 1999).

An important contribution of this study is that it investigates the relationship between the current account deficit and the budget deficit in the context of new co integration techniques (ARDL). Understanding the direction of causality (i.e. knowing which of these variable causes the other and to what magnitude and direction it occurs), this will improve predictions that can benefit both market participants and policy makers. For instance, knowledge of the primary variable that affects the other in the long run can guide authorities in Malawi in deciding the appropriate exchange rate, export promotion, productivity improvement, fiscal and monetary policies to be implemented in adjusting macroeconomic variables such as the trade balance. Understanding the nature of the causal process for budget/external deficits can also be useful in evaluating the future effects that may occur as a result of policy changes and can provide useful guidance in drawing conclusions regarding any general hypotheses. In sum, this article differs from the existing literature, not only in its data set, but also in its empirical method employed

and its new evidence identifying budget deficit causality to be the key engine governing the speed of budget-current account deficit convergence in Malawi.

1.6 Scope of the study

The study was carried out using annual data on Malawi for the period 1970 to 2012. The data was collected from the Reserve Bank of Malawi, National Statistical Office and the International Monetary Fund (IMF) website, International Financial Statistics, as well as World Bank country data.

1.7 Outline of the paper

The rest of the paper proceeds as follows: The second chapter gives a brief background of the Malawian economy as a way of putting the study into context. Then third chapter explains the theoretical basis for the study and then reviews available empirical literature on the subject. The fourth chapter discusses the data and methodology employed in this study. The empirical results are presented in the fifth chapter, and conclusion and policy recommendations are given in the sixth and final chapter.

CHAPTER TWO

OVERVIEW OF THE MALAWIAN ECONOMY: KEY FEATURES

2.1 Chapter Overview

This chapter gives a brief background of the Malawian economy, its fiscal balance, external balance, as well as their performance over the years. The aim is to provide a clear picture of the context in which this study is being carried out.

2.2 Background of the Malawian economy

Malawi is a small land-locked country located in the Southern part of Africa. The population of Malawi is mainly rural and over 85 per cent of the population depends on subsistence agriculture. Although the agricultural sector's contribution to GDP has been declining over the years (Table 2.1), it still remains the highest contributing sector to the economy, accounting for about 30 per cent of GDP.

Table 2.1: Country characteristics

	1970	1980	1990	2010*	2011*	2012*
GDP per capita	178.47	236.44	185.65	219.15	222.11	219.91
Agriculture (% of GDP)	44.27	55.20	47.69	34.10	29.34	27.33
Population (mn)	4.18	5.67	8.15	13.71	14.14	14.57

Source: World Bank (World Development indicators, 2013). * denotes estimates.

For about a decade and a half after independence in 1964, the Malawian economy displayed rapid growth (Figure 2.1). Real GDP grew at an average rate of 5.5 percent per annum over the 12 year period 1967-79, corresponding to nearly 3.0 percent per capita. This impressive growth, despite limited natural and human resources, was highly attributable to the Government's economic policy, which encouraged among other things: export-oriented agricultural and agro-industrial growth; favorable economic environment which attracted foreign capital and enterprise; low tariffs, and minimal use of quantitative restrictions on imports, and a policy of wage restraint which helped to keep Malawian goods competitive on the international scene (Government of Malawi, 1988, 1989).

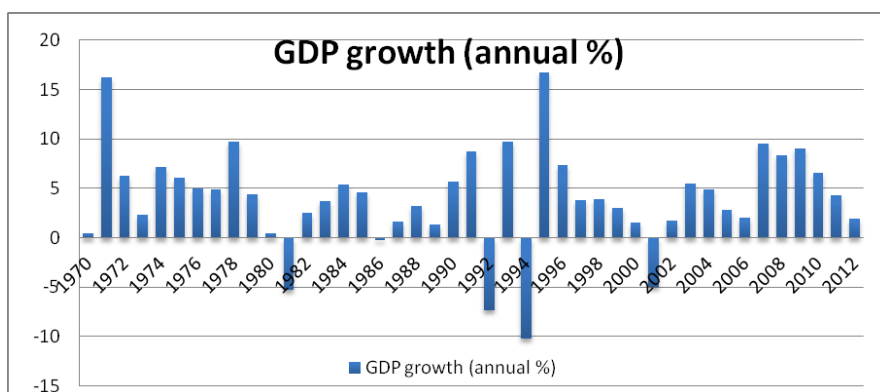


Figure 2.1: GDP annual growth

Source: World Bank (World Development indicators, 2013).

This relatively healthy economic situation was interrupted in the late 1970's due to a combination of; droughts and deteriorating terms of trade, plus the global oil crisis.

Malawi's GDP growth fell from an average of 6.59 percent in the mid 1970's² to -5.2 percent by 1981 (Government of Malawi, 1991, 1992).

Between 1989 and 2004, the nation underwent several structural changes as the one party rule of government was abolished and multiparty rule came in. Various reforms were made, mainly liberalizing of the different sectors from the state's control to a market led structure. In the Agricultural sector the constraints imposed on smallholder farmers were abolished making it legal for smallholder farmers to grow export crops (Government of Malawi, 1995). In the financial sector, the exchange rate was liberalized in the early 90's but coupled with lack of fiscal discipline it spiraled into depreciation (Lea and Hanmer, 2009). Excessive government borrowing financed by domestic treasury bills resulted in a soar of real interest rates which crowded out private investment and damaged growth (Lea and Hanmer, 2009).

Things changed in the early 2000's, when despite continued falls in the terms of trade, growth and exports began to recover in 2003, and by 2007 GDP per capita had regained its level achieved in 1979 (Whitworth, 2005). The remarkable growth of the early 2000's was interrupted in 2010, as GDP growth fell from 8.7 percent in 2008 to 6.3 in 2010 and 1.8 percent by 2012. This was due to several external factors mainly; a decrease in tobacco and agricultural production due to unreliable and erratic rainfall and souring of relations between the government and its donor partners which led to the withholding of aid and budgetary support from the development partners and the International Monetary

² The country experienced strong economic growth between 1974 to 1978, before the first round effects of the first world oil crisis

Fund (IMF) and World Bank (Ministry of Finance, 2012). This led to a general shortage of foreign exchange which affected importation of raw materials as well as essential services and commodities such as medical drugs and fuel. The country also suffered from intermittent power supply which affected manufacturing and production of goods and services.

However, with the change in government in 2012, the local currency was devalued, and a floating exchange rate adopted, which was key to mending relations with the IMF, and donor support was resumed. This eased the shortage of foreign exchange and led to the availability of fuel, which is paramount to productivity. Economic growth was projected to rise to 5.0 percent in the year 2013 (Government of Malawi, 2013).

2.3 Trends in budget deficit

Figure 2.2 shows the graphical trend of the budget balance for Malawi. As can be seen, in all the years except one since gaining independence in 1964, the economy has been running a negative budget balance. In the 1970's the overall budget deficit³ was averaging K-41.28 million, this grew to an average of K-159.06 million in the 1980's, K-2,128.96 million in the 1990's, and an average of K-55, 631.3 million in the early 2000's (Reserve Bank of Malawi, 2010, 2000, 1990, 1980).

³ See Appendix 1 for full figures of national budget balance.

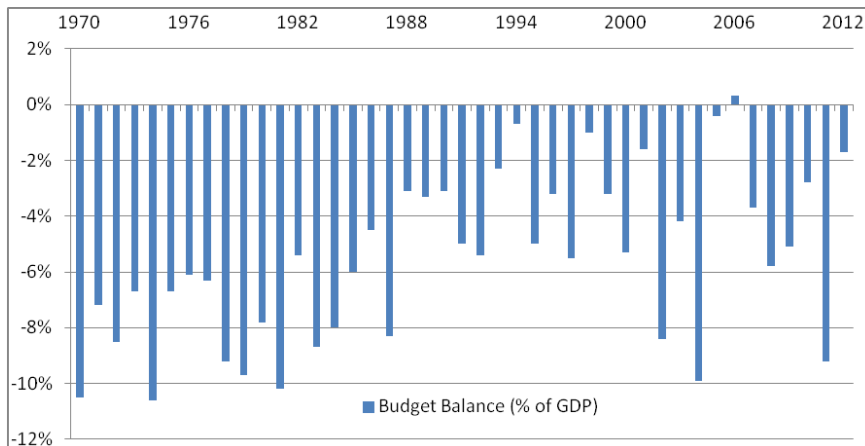


Figure 2.2: Evolution of budget balance in Malawi (% of GDP)

Source: World Bank (*World Development indicators*, 2013).

During the 1970's the economy was adversely affected by external shocks, which led to a widening budget deficit. The country started out the decade with an overall budget balance of K-25.51 million (10.5% of GDP) in 1970, which almost doubled to K-48.72 million by 1974 and reached K-84.2 million (9.7% of GDP) by 1979. This was due to the first round of sharp increases in the price of crude oil following the global oil crisis experienced during the mid and late 1970's. The contribution of grants from developing partners decreased from 20 percent of the total national budget in 1970 to 4.5 percent by 1974, and increased gradually to 15 percent by 1979, (as can be seen in figure 2.3 below).

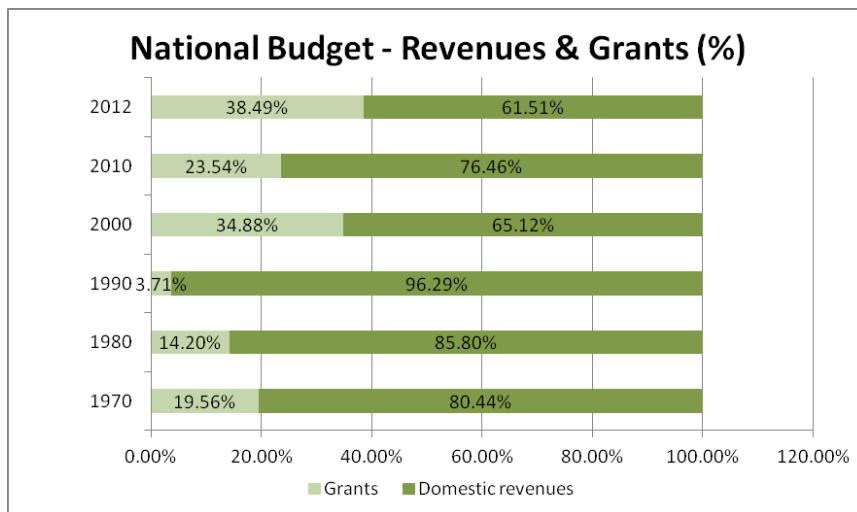


Figure 2.3: National Budget Revenues and grants over the decades

Source: RBM (Financial and economic reports).

We get a clear picture of the contributions of grants to the total budget in Figure 2.3 above, which gives a breakdown of the total national revenues over the decades. The economy depends on substantial inflows of economic assistance from the IMF, the World Bank, and individual donor nations. Foreign grants made up an average of 10.19 per cent of the national budget (1970-79), 11.69 percent in the 80's, 15.71 percent (2000-10), and reached a peak of about 40 percent in 2012. This makes the economy very vulnerable to external shocks.

The beginning of the 1980's was dominated by the second wave of increases in the oil prices, which led to a sharp reduction in external loan receipts from the development partners as the second world oil crisis hit the globe in the late 70's (Government of

Malawi, 1991). The flow of resources from Grants and Reimbursements fell very sharply, the total contribution of grants to the total national budget fell from 14.2 percent in 1980 to 8.2 percent in 1983 and then to 6.4 percent by 1984. However, the grants improved significantly during the post-crisis period, as total contribution of grants to the national budget gradually picked up again to 7 percent in 1987 (From 14.2 percent in 1980) and closed the decade at 14.7 percent in 1989 (nominal terms; K42.03 million; K171.6 million).

The mid 90's were characterized by lack of fiscal discipline. As a result of the rapid increase in government expenditures between 1995 and 2004, financed by larger inflows of donor assistance, aimed at expanding basic social services, the budget deficit widened, as the growth in expenditure outstripped the growth in domestic revenue collections. This growing fiscal deficit was also as a result of the deterioration of the national government's revenue effort; weak and inefficient tax collection system (Lea and Hanmer, 2009). As can be seen in Figure 2.3 the grants contribution to national budget increased from a mere 3.71% in 1990 to 34.88% in the year 2000.

The economic performance during the 2004/05 fiscal year was generally impressive showing signs of economic recovery from the last fiscal year when the performance of the economy was affected by the uncertainty of the outcome of the general elections and continued withholding of donor support. The change of government in 2004 saw a turnaround in economic performance, and for the first time since 1994, in 2006 the government stayed within the budget approved by parliament (Whitworth 2005). This

was due to several factors such as; increase in food production which outpaced domestic consumption; reduction in interest rates, relative high tobacco prices and most importantly, debt relief. In 2006, Malawi became the 20th country to attain the Heavily Indebted Poor Country (HIPC) Completion Point status, which led the international community to cancel a large part of the country's external debt, reducing it from approximately US\$3.0 billion to just under US\$500 million⁴ (Ministry of Finance, 2007). This freed up about K15.5 billion which the government would have spent on servicing the debt each year, as a result government expenditure stabilized and the fiscal deficit improved dramatically.

However things changed around 2010, in 2010/11, the Budget was formulated against a backdrop of fears of a second wave of global economic recession arising from the financial crisis in the Euro Zone. The country was facing economic challenges led by scarcity of foreign exchange, fuels and donor withdrawal of budget support. The Budget was also formulated under the assumption that Government would meet all Recurrent Expenditures from locally generated resources while donor resources would complement Development Expenditure. It was assumed domestic revenues would perform well to cover the Recurrent Expenditure and part of the Development Expenditure. But due to lack of donor budgetary support, the government failed to meet its target (Ministry of Finance, 2010).

⁴ Actual figures for per capita government debt can be seen in Appendix 1.

2.4 Trends in current account

A country's current account balance over any time period is the increase in foreign residents' claims on domestic income and/or capital. The current account balance (Table 2.2) is a record of trade in goods and services, net income payments and net unrequited transfers.

The merchandise trade balance which is the biggest component of the current account consists of merchandise exports net of merchandise imports, with the difference between merchandise exports and imports known as the trade balance. Service items such as freight, royalty payments and insurance, with the balance between services provided by Malawian residents and services provided by the rest of the world, are recorded under 'net services' in the current account. Receipts and payments between Malawian residents and the rest of the world for items such as interest and dividends are recorded in the current account under 'net income'. Net unrequited transfers' consist of transfer payments between Malawian residents and the rest of the world. The total of the items produces the current account balance (Brittle, 2009). Table 2.2 below shows Malawi's most recent current account balance figures, we can see that the trade balance plays a major role in the outcome of the current account balance.

Table 2.2: Malawi Current Account Balance

	2008	2009	2010	2011*	2012*
Trade Balance	-122.04	-104.46	-172.85	-163.81	-239.98
Net services and unrequited personal transfers	-38.13	-39.82	-48.33	-37.58	-46.28
Current transfers	61.43	66.15	84.96	95.75	96.23
Current Account Balance	-98.74	-78.13	-136.21	-105.64	-190.03
Merchandise trade (% of GDP)	72.08	63.80	60.00	68.55	85.60

Source: Reserve Bank of Malawi, *Financial and Economic Review* 45, 1, 2013.

2.4.1. The Trade Balance

Malawi is predominantly a primary goods net exporter and most of these primary exports are agricultural in nature. Tobacco, tea and horticultural products are the dominant commodity exports. Mining and quarrying have also become an important source of foreign exchange even though the contribution to foreign exchange earnings is very small, with the country exporting raw products with no value addition (National Statistical Office, 2010). Figure 2.4 shows the recent trends in the trade and current account balances. We can see that from 2008 imports have been steadily increasing and outdoing exports which have been inconsistent in their performance. The openness of the economy and the heavy reliance on a few primary products implies that the country is highly vulnerable to exogenous shocks that influence its earnings in international markets.

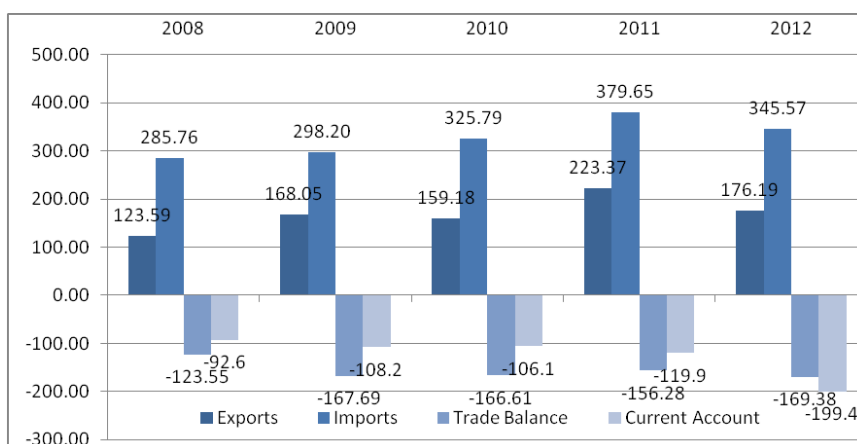


Figure 2.4: Recent Trade balance and Current Account Balance

Source: National Statistical Office (*Annual Trade Statistics Report, 2010*), Reserve Bank of Malawi, *Financial and Economic Review 45, 1, 2013*.

The evolution of the trade and current account balances from 1970 to 2012 is plotted in Figure 2.5 below. The figure reveals that the country experienced trade and current account deficits in all the years except one during the period 1970 to 2012.

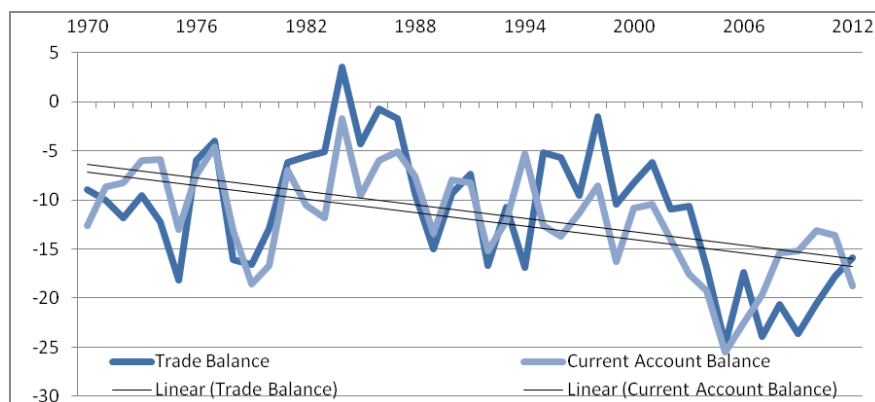


Figure 2.5: Evolution of Trade balance and Current Account Balance
Source: National Statistical Office (Annual Trade Statistics Report, 2010), Reserve Bank of Malawi, Financial and Economic Review Vol. 45 No. 1, 2013.

The deterioration of the external account position in the early years of the 70's reflected the first round of the oil shock of 1973/74. In 1976 and 1977 however, terms of trade improved following the sharp increase in the prices of coffee and tea in the World Market. This progress was interrupted in the late 70's due to the second round of sharp increases in the price of crude oil in 1979 (Reserve Bank of Malawi, 1982).

The current account deficit gap contracted again during the early 80s due to an improvement in the trade balance which registered the first ever trade surplus of 3.5 percent of GDP in 1984. Export performance was good, with merchandise export receipts

growing by about 152 percent per annum in 1984 (Reserve Bank of Malawi, 1988). In the following years, import expenditures however began to rise much faster to meet the needs of investment projects and established industry. The resulting deficit on current account was mostly manageable lying within the single digit range, apart from 1989 when it rose to 13.4 percent of GDP due to a rise in the trade deficit to 15 percent of GDP.

The nation was hit by bad weather conditions⁵ in the 90's, which resulted in the deterioration of the external balances performance (Deraniyagala & Kaluwa, 2011). Droughts caused an increase in imports (c.i.f), as a result of the importation of food items, as well as a shortfall in smallholder agricultural production. Figure 2.5 also shows that the external imbalances started to improve after 1994 following the floatation of the Kwacha in February 1994, which improved terms of trade.

However, things worsened in the early 2000's, such that although total exports were growing, but the value of total imports rose at a faster rate, as a result in 2005 the trade and current account balances hit an all time low of -24.7 and -25.5 percent of GDP respectively (National Statistical Office, 2010). The country has since been struggling to improve its external balance, through export diversification.

The major challenges for Malawian commodity trade have been price competitiveness, quality and production levels. Quality has always been very critical both requiring physical appearance of commodities and in some cases, chemical content of

⁵ Severe floods in 1992, 1994, and 1997, and heavy rains which caused floods in most communities in 1998.

commodities. Quality has to start from production and continue through to market. There is also poor flow of market information to small exporters particularly those in rural areas.

In 2010, Malawi launched the National Export Strategy (NES) whose goal is to match long-term export and import trends. The strategy targets to raise exports as a share of imports from 51.5 per cent in 2010 to 75.7 percent in 2017 and 93.4 percent in 2022. The NES is aimed at providing a clearly prioritized road map for building Malawi's productive base to generate sufficient exports to match the upward pressure on Malawi's imports (Government of Malawi, 2010).

2.5 Conclusion

Fiscal and external deficits have been a common feature of the Malawian economy, and a possible reinforcement on each other. It is evident that export diversification and graduation from primary commodities is needed to limit the effects of external shocks on the country's top export products and curb the deterioration of the external balance. As for the internal balance, the strain of external debt on the national budget cannot be overemphasized. Thus, the need for research and recommendations on how to improve our internal and external balances is of great importance.

CHAPTER THREE

LITERATURE REVIEW

3.1 Introduction

The twin deficits hypothesis argues that an increase in the budget deficit could lead to an increase in current account deficits. Studies by Fleming (1962), Mundell (1963) and Kearney and Monadjemi (1990), have argued that government deficits cause trade deficits through different channels. For example, in a Mundell-Fleming framework, an increase in the budget deficit (due to either increased government spending or tax cuts) could induce upward pressure on interest rates, thus causing capital inflows. This leads to an appreciation of the exchange rate, leading to an increase in the current account deficit as it would make exports less competitive (Hillier, 1991). The Keynesian absorption theory argues that an increase in the budget deficit could induce domestic absorption through increased government spending or tax cuts which would lead to higher disposable income and hence, import expansion, causing a current account deficit (Pilbeam, 1998).

However, in the economic literature there is another view that is the Ricardian Equivalence Hypothesis (REH) which proposes that shifts between taxes and budget deficits, does not impact the real interest rate, the quantity of investment, or the current

account balance (Barro, 1989; Pilbeam, 1998). This means that, REH denies any relationship between the two deficits.

In addition to the above views about the issue of twin deficits, there is another view with supporting empirical studies, which supports a unidirectional causality that runs from current account to budget deficit. This perhaps could be a result of the deterioration in current account leading to lower economic growth and this could increase the budget deficit as it would lead to a lower tax base, but also government spending would increase due to lower private investment (Kearney & Monadjemi, 1990; Marinheiro, 2007; Neaime, 2008).

3.2 Theoretical Literature review

The twin deficit phenomenon is defined from national accounts as an observed co-occurrence between the current account and government budget deficits. According to the twin deficits notion, movements in the government deficit precede similar changes in the current account deficit, implying that past government deficits would explain a substantial portion of the movements in subsequent current account deficits (Zengin, 1999).

The hypothesis that increases in the government's budget deficit leads to an increase in the current account deficit follows directly from the Mundell-Fleming model (Fleming, 1962; Mundell, 1963). It is worth noting here that the Mundell-Fleming model is an open economy extension of the internal balance (IS-LM) model. As such, it is not fully

“rational”; the assumptions made regarding expectations formation are static (Pilbeam, 1998). In the Mundell- Fleming framework, an increase in the government’s budget deficit can generate an accompanying increase in the current account deficit, partly through increased consumer spending due to increased disposable income, but mainly through the government itself as it is the biggest consumer in the economy especially on imports. In the case of Malawi this would lead to increased imports of fuel, medical supplies and fertilizer. To the extent that increased demand for foreign goods leads to depreciation in exchange rate, the effect on net exports mitigated.

3.2.1. Keynesian approach

This approach is based on the work of John Keynes and it is derived from the behavior of the real variables and on the basic theory of current account balance adjustment. There are two theories under this approach namely: elasticity approach and Absorption approach theories of balance of payments. Both the elasticity and absorption approach concentrate on the current account as the main determinant of balance of payments. (Nakyambadde, 2008).

3.2.1.1. The Elasticity Approach

This approach views balance of payments (BOP) problems as resulting from the disequilibrium in physical trade flows in the case of exports and imports of goods and services. The approach also stipulates that adjustment of the current account is mainly through changes in the exchange rate which relies mainly on its effect on the relative

price of domestic and foreign goods on trade flows with the rest of the world (Nakyambadde, 2008).

3.2.1.2. The Absorption Approach

This approach asserts that BOP problems facing a given country arise from the disequilibrium between real domestic income and expenditures. The absorptive capacity of an economy is determined by its total expenditure on both domestically and foreign produced goods and services. This implies that the absorptive capacity of the economy is not only determined by the economy's spending on what is produced within the economy but also on the foreign goods and services. This approach assumes that changes in import and export volumes due to fluctuations in the exchange rate have implications on national income. From the national income identity, the absorption approach presents the twin deficit identity which refers to a country's government budget deficit and a simultaneous current account deficit. In other words, an increase in the budget deficit results into deterioration of the current account or has a negative impact on the current account (Nakyambadde, 2008).

A positive association between the government budget and current account balance can be shown in the context of a simple Keynesian open economy model. In an open economy,

$$Y = C + I + G + (X - M) \quad (3.1)$$

Where; Y is the national income; C is private consumption; I is investment; G is government expenditures on final goods and services; (X-M) is net exports of goods and services;

We may also express income as the sum of the means of its disposal:

$$Y = C + S + T + F \quad (3.2)$$

Where; S is national savings (private sector savings, Y-C); T is government tax revenues and F is net factor income payments to foreigners.

After substituting, equation (3.1) becomes

$$S + (T - G) = I + (X - M - F) \quad (3.3)$$

$$(X - M - F) = (S - I) + (T - G) \quad (3.4)$$

$$CAD = SI + BD \quad (3.5)$$

In this case, net exports and net factor incomes (CAD) simply equal the private saving-investment gap (SI) plus the budget balance (BD). Thus, assuming a stable saving - investment gap, an increase in public sector deficit will directly increase the current account deficit (Pilbeam, 1998). While the identity does not provide any behavioral or temporary relationships between the deficits, or even the direction of causality, it provides a basis for expecting a positive long-run equilibrium relationship between the two deficits (Oseni, 2012).

3.2.2. The Ricardian Equivalence Hypothesis

The Ricardian Equivalence Hypothesis (REH) proposed by Barro (1989) on the other hand argues that if the government runs a budget deficit by decreasing taxes, it does so at the expense of incurring debt to maintain its public expenditure. Thus, individuals will take this as sign of higher taxes in the future in order for the government to be able to repay its debt. The consumers respond to the tax cuts by saving the enhancements in disposable income rather than increasing consumption expenditure. This increase in private saving may be used in purchasing the newly issued government bonds thereby enabling the households to pay for the expected increased taxes in future (Saeed and Khan, 2012). As such, individuals would increase their private savings to cushion them in future when the tax rate is increased.

Similarly, if the government increases the tax rate now, individuals expect that the government will decrease the tax rate in the future, thus they tend to save less, decreasing private savings. In the same line of reasoning, the current budget deficits financed through borrowing (rather than taxation) will have no effect on current account balance since the resultant increase in private saving will be sufficient to avoid the need for external borrowing. When the agents are forward looking fully aware of the government's inter-temporal budget constraint, they will anticipate that tax cuts today or government resorting to borrowing will result in higher taxes being imposed on their future generation. Hence the agents are not likely to increase their present consumption based on increased disposable income (Barro, 1974).

Thus, proponents of the REH argue that any changes in the budget balance will be neutralized by the savings-investment gap, and will therefore have no effect on the current account balance (Pilbeam, 1998). If private savings increase by the same proportion as does the budget deficit, the net national savings remain unaffected and this in turn leaves the interest rate unaltered.

Recent studies have centered their attention on the reaction of private consumption to government financing decisions (Marinheiro, 2007; Saeed and Khan, 2012). Such studies usually estimate reduced-form consumption functions or Euler equations to investigate the Ricardian equivalence hypothesis. The first consumption equation comes from Bernheim (1987):

$$C = \beta_1 Y_t + \beta_2 (TX_t - G_t - r_t GB_{t-1}) + \beta_3 G_t + \beta_4 GB_t + \beta_5 W_t + X_t \beta + \varepsilon_t \quad (3.6)$$

Where C denotes real consumption per capita, TX are tax revenues, G public consumption, GB is end of period government debt, W is private wealth, X is a vector of other exogenous variables and r is the interest rate (Marinheiro, 2007). As $TX - G - r_t GB_{t-1}$ is the government budget surplus, equation (3.6) could be rewritten as:

$$C = \beta_1 Y_t + \beta_2 BDEF_t + \beta_3 G_t + \beta_4 GB_t + \beta_5 W_t + X_t \beta + \varepsilon_t \quad (3.7)$$

Where; $BDEF_t$ is the government budget deficit.

The advantage of this specification over other possibilities is the fact that it requires less information relatively to the public accounts: it just requires the value of the budget deficit and public consumption. Other specifications require the knowledge of direct tax revenues and public transfers (Marinheiro, 2007). The pure Keynesian view implies $\beta_2 = -\beta_1$, while the Ricardian view implies $\beta_2 = 0$. Which implies that β_2 measures the effect on current consumption of a K1 tax-for-debt-swap. By testing those restrictions it is possible to accept (or reject) these two competitive theories.

Another simple specification is the one proposed by Perelman and Pestieau (1993). The authors estimate the following consumption function:

$$C = \alpha_0 + \alpha_1 (Y - TX)_t + \alpha_2 BDEF_t + \alpha_3 W_t + \alpha_4 GB_t + \varepsilon_t \quad (3.8)$$

Where, as before; C is consumption, $Y - TX$ is disposable income, $BDEF$ is the government budget deficit, W is private wealth and GB is government debt. In this formulation, the sum $(\alpha_1 + \alpha_2)$ gives the effect on current consumption of a tax-for-deficit substitution, holding public expenditure unaltered. Hence, the Ricardian equivalence hypothesis is interpreted as implying $\alpha_1 + \alpha_2 = 0$ and $\alpha_4 = 0$, meaning that a K1 tax for debt swap has no effect on current consumption. On the contrary, the pure Keynesian view implies that $\alpha_2 = 0$, i.e. that a tax-for-deficit swap has a strong impact on consumption (Saeed and Khan, 2012).

3.2.2.1. Assumptions of the REH

According to Barro (1974, 1989), some theoretical assumptions are necessary for Ricardian equivalence to hold, given as below:

- No borrowing constraints are faced by consumers as capital markets are perfectly competitive.
- The same planning period applies to both private and public sectors.
- All taxes are in the nature of lump sum. Future income flows and future tax burdens are certain.
- The individuals fully anticipate the future tax liabilities that are implicit in the debt/bonds issue.
- Economic agents are rational, forward-looking and planning over infinite horizon.

If the REH is invalidated on the basis of the non-fulfillment of the very assumptions, then increasing government deficit financed by issuing bonds as a substitute for extra taxation will tend to increase private consumption owing to the wealth effect. In other words, termination of the RE theorem may imply crowding out of private expenditures. All these assumptions are very strong and restrictive for developing countries.

3.3 Empirical literature review

There are a few studies that have explored the twin deficits case in Africa. Those studies that have been done are on relatively larger open economies (Nigeria, Tunisia and the East African region) that cannot be compared to the small open economy case of Malawi. For instance, being a small open economy, Malawi is predominantly a price taker, it has

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no price influence on the international market; there is export and import concentration and heavy dependence on aid flows (Deraniyagala & Kaluwa, 2011). As a result the literature is very sparse when it comes to this kind of studies in Africa. Some studies however have been done in developing countries from other continents and these together with the few studies done in Africa and a study done in Malawi on related areas has been reviewed below. The empirical literature review also includes some studies done in developed countries, due to lack of literature on developing countries.

The most closely related papers in this analysis of the twin deficits have been done in Nigeria and the East African region, countries that reside in the same Sub Saharan African region as Malawi.

Nkuna (2013) in her analysis of the sustainability of the Malawian current account deficit over the period 1980 to 2012 which employed the bounds test approach found that factors such as external debt, terms of trade, openness and real exchange rate, among others, have a significant effect on the current account. In addition her study concluded that even after the highly indebted poor countries (HIPC) relief, the current account was still unsustainable.

Sunday (2013) employed Granger-Causality and Vector Auto-Regression (VAR) technique to assess the effects of deficit financing on trade balance in Nigeria from 1980 to 2008. The short-run dynamic result indicated a positive relationship between Deficit

financing and Trade balance (surplus). While the long-term result posits that an increase in deficit financing diminishes trade deficit in Nigeria.

The empirical analysis of Nigeria's twin deficits from 1970 to 2008 by Oseni (2012), framed around the Granger Causality test, determined causality between trade deficits and budget deficits was bi-directional. He found that in Nigeria causation runs from the trade deficit to the budget deficit and vice versa.

Nakyambadde (2008) examined the empirical impact of fiscal deficits on macroeconomic performance, specifically on the Current Account Balance in East Africa for the period 1980 to 2003. She reviewed theories that explain the link between the fiscal deficit and the current account balance in East Africa using panel data estimation techniques. The main finding of her study concluded that fiscal deficits have a negative impact on the current account balance in the East Africa region as a whole, and that the impact is significant, indicating that the twin deficit hypothesis does hold in the case of East Africa. The results also indicated that the Ricardian equivalence hypothesis does not hold in the case of East Africa for the period under study.

Arize and Malindretos (2008) studied the long-run relationship between trade and budget deficits in ten African countries over the quarterly period 1973:2 to 2005:4. They used cointegration analyses based on four approaches: Harris-Inder, Shin, Geweke and Porter-Hudak and Sowell. Their analysis revealed that there is a positive long-run relationship between the trade deficit and the budget deficit; however, in the short run, they found

weak evidence that these deficits are closely linked and that the budget deficit causes the trade deficit. The analysis found that bidirectional long-run causality between deficits receives strong empirical support. Unidirectional causality and no causality characterize the short run, so bidirectional causality was found to be largely unimportant.

Marinheiro (2007) evaluated the impact of Egypt's public deficit on current account imbalances, examining the validity of the twin deficit hypothesis for Egypt. He found the presence of a (weak) long-run relationship between the budget deficit and the current account deficit. Yet, he rejected the twin-deficit hypothesis: he found evidence in favor of a reverse Granger-causality running from the external deficit to the budget deficit. Further, he concluded against the validity of full Ricardian equivalence in Egypt.

Mudassar et al (2013) investigated the relationship between budget deficit and trade deficit in Pakistan using time series data for the period of 1980 to 2011. The empirical analysis was conducted using the ARDL co-integration methodology. The empirical results suggested that trade deficit can determine the budget deficit in the case of Pakistan. The statistical value of the long run estimate was very high about the trade deficit was found to explain 97 percent of variations in the budget deficit were found to be explained by the trade deficit. This empirical study confirmed the validity of twin deficits hypothesis in case of Pakistan and concluded that trade deficit is one of the determinants of budget deficit and can cause it.

Saeed and Khan (2012) attempted to empirically test the validity of Ricardian equivalence hypothesis for Pakistan using annual time series data for the period 1972 to 2008. With the use of co integration analysis, no evidence was found validating the RE hypothesis in Pakistan.

Brian (2011) in his analysis of Argentina's quarterly data from 1976 to 2010 found that there was no causal relationship between budget deficit and trade deficit in Argentina. His results showed that the relationship between the two deficits were not Granger-causal in either direction, denoting one value could not be used as a predictor for the other. His concluded that the twin deficit idea had little or no value at all for Argentina in this time period.

Pahlavani and Saleh (2009) tested the validity of the Keynesian proposition and the Ricardian equivalence hypothesis with respect to the direction of causality between budget deficits and current account deficits in the case of the Philippines, using annual time series data from 1970 to 2005. Using co-integration regression and an error correction model they determined that there was a bi-directional causality between budget deficits and current account deficits. The results suggested that policy measures to reduce the budget deficit could play an important role in reducing the current account imbalances and vice-versa.

Brittle (2009) provided an assessment of the potential efficacy of the fiscal policy in Australia as a countercyclical policy tool, using the ARDL approach on time series data

of 1959 to 2006. He found that while there was not a full Ricardian response to changes in the fiscal stance, there was some offsetting behavior, implying that fiscal policy does elicit some impact on the real economy.

Neaime (2008) examined the relationship between current account and budget deficits in Lebanon using time series data for the period 1970-2006. The empirical results supported the existence of a purely Keynesian uni-directional causal relationship in the short run between the budget and current account deficits in Lebanon.

Saleh and Chowdhury (2007) used the autoregressive distributed lag (ARDL) approach to examine the long-run and short-run relationships between the current account deficit, budget deficit, savings and investment gap and trade openness in Sri Lanka. The empirical analysis supported the Keynesian view that a link exists between the current account, budget deficit and savings and investment gap. They found that trade openness has a positive effect on the current account deficit, but is statistically insignificant, and offer some strategies to stabilise the budget deficit and current account deficits in Sri Lanka.

Chang (2004) used unit root tests, co-integration tests, Granger causality tests and the VAR model to test the Keynesian proposition, using three time frames; the whole period under study (1967:1-2003:2), two periods (1967:1-1986:4 and 1987:1- 2003:2) separated by the exchange rates regime and the latest period (1989:1-2003:2) starting with a deterioration of the budget deficit. He used one time zone 1967-2002 to test the Ricardian

equivalence, due to the data of private savings only available by per annum. The investigation was twofold; firstly analyzing the relationship between the budget balances and the excess of investment over private savings, which is directly justified by the national income accounting identities; secondly, investigating the relationship between the budget balances and the private savings alone. His main findings were that Keynesian proposition is supported by the model using data of the whole period but was not supported by other models using data from different sub-periods. There was no support for the Ricardian equivalence for the case of Taiwan, i.e. Taiwanese do not regard the current budget deficits as their future tax responsibility. The data showed that the public in Taiwan do not obey the life cycle hypothesis.

Zengin (1999) studied the relationship between budget deficits and trade deficits in the case of Turkey. He used quarterly time series data covering the period 1987-1998 and estimated an eight variable variance autoregressive model to test the existence and the direction of causality. He concluded a direct causal relation exists from budget deficits to trade deficits as expected in conventional theory.

Evans (1988) estimated an empirical model that is specified in first - difference form and that includes a real (inflation-adjusted) interest rate, real government debt as explanatory variables. The empirical results using data from Canada, France, West Germany, Italy, Japan, the United Kingdom, and the United States suggest that Ricardian equivalence is a reasonable abstraction in the real world.

Analysis of some countries seems to confirm alternative theories, (i.e. Ricardian Equivalence Hypothesis) or even causality in the direction opposite that which Twin Deficits Theory suggests.

3.4 Critique of the existing literature

Most, if not all, of the literature reviewed has made it abundantly clear that it is difficult to fully confirm or disprove the Twin Deficit Theory. If one thing is certain, it is the fact that in order to further our understanding of how these two deficits relate to each other, it must be done on a case by case basis, taking into account how the policies enacted in each nation could skew the results. Two main criticisms can be directed at previous studies.

First, most studies⁶ investigating the twin deficit hypothesis have simplifications made in their empirical application concerning the definition of the current account. The authors identified $X-M$ as being the current account. Although the trade balance ($X-M$) is the main component of the current account, the latter also includes net transfers. Hence, the proposed simplification is equivalent to assume that net transfers are nil, which is a strong assumption (Brittle, 2009).

Second, we noted that there was a wide difference in the time series data and co integration methods that were used in the studies. Econometric techniques to study the twin deficits hypothesis varied markedly with the development of new estimation

⁶ Brian (2011), Chang (2004) & Zengin (1999).

methods. Most of the previous research⁷ has assumed endogeneity of all variables in the Vector Autoregressive regressions, which is not always the case, as the variables included in the analytical models are not always enough to explain the variation in each other.

This thesis seeks to make an original contribution to the literature by addressing this. Hence, in our empirical application we have used data for the current account and not for the trade balance. Besides being more adequate, the use of the current account also enables us not to estimate an identity. And also we have used a more recent co integration technique (ARDL) which is more conducive for small data sets and also relaxes the assumption of endogeneity of the variables.

⁷Examples of studies that used VAR are Sunday (2013), Pahlavani & Saleh (2009), Neaime (2008) and Chang (2004).

CHAPTER FOUR

METHODOLOGY

4.1. Introduction

The central objective of this study is to empirically examine the existence of a causal relationship between current account balance and budget deficits in Malawi; and to determine whether Malawi follows the Ricardian equivalence hypothesis or not.

This study adopts the conventional Keynesian model which has been reviewed in the previous chapter, which shows the implicit relationship between the budget deficit and the current account deficit, which is the basis for attempting to understand the relationship between these twin deficits and how they may affect each other (Islam, 1998). Based on previous literature, estimations are carried out using the autoregressive distributed lag (ARDL) modeling approach (see Pesaran et al., 1998; Pesaran et al., 2001).

We will use an approach more similar to the one employed by Mudassar et al. (2013) and Marinheiro (2007) in their studies on the validation of the twin deficit hypothesis in

Pakistan and Egypt respectively, since they used a similar model unlike most studies⁸ that we reviewed. Research into the twin deficits story requires explicit examination of the entire set of variables that may relate meaningfully to current account and government deficits behavior (Rosenweig and Tallman, 1991). However, since we will use annual data, which makes our sample size smaller, we are restricted to a limited number of explanatory variables, so as not to reduce our degrees of freedom (Gujarati, 1995).

4.2. The autoregressive distributed lag approach

Commonly used methods for cointegration testing include the residual based Engle-Granger (1987) test, the Johansen (1991, 1988), and the Johansen-Juselius (1990) maximum likelihood-based testing procedures. While the Johansen procedure is the most popular of these three approaches, it is not without limitations- notably low power in small samples, and the requirement that all variables entering the regression be integrated of the same order $I(m)$.

The ARDL modeling procedure enables the estimation of both long and short-run (error correction) coefficients within one equation, regardless of the order of integration of the variables being considered. The inclusion of the error correction mechanism in the single-equation specification integrates the short run dynamics with the long-run equilibrium relationship. Second, ARDL allows a mixture of $I(1)$ and $I(0)$ variables as regressors, that is, the order of integration of appropriate variables may not necessarily be the same as is required with the Johansen procedure. Therefore, the ARDL technique has the advantage

⁸ See Oseni (2012), Neaime (2008), Pahlavani & Saleh (2009), Zengin (1999), Brian (2011) and Chang (2004).

of not requiring a specific identification of the order of the underlying data. Third, this technique is suitable for small or finite sample size (Pesaran et al., 2001). Another advantage of this technique is the inclusion of the lagged variables to capture the data generating process- which is undertaken through a general-to-specific framework.

The primary test statistic in the ARDL procedure for determining the existence of cointegration is the Wald or F-statistic in a generalized Dickey-Fuller regression. This F-statistic is used to test the significance of lagged levels of the variables in a conditional unrestricted equilibrium error correction model. The ARDL approach involves estimating the conditional error correction version of the ARDL model.

The inclusion of the error correction term with the cointegrating variables implies that changes in the dependent variable are a function of both the level of disequilibrium in the cointegrating relationship and the changes in other explanatory variables. This is consistent with the Granger Representation Theorem, which establishes that any cointegrated series has an equivalent error correction representation.

Following Pesaran et al. (2001) the ARDL technique involves two steps for estimating the cointegrating relationship. Under the first step, the existence of a long run cointegrating relationship is tested. If a long-run cointegrating relationship is found, the second step involves estimating both the long and short-run coefficients. For the models in this study, an intercept and trend term will be added to the model- particularly as a visual inspection of the current account deficit and budget deficit indicate a considerable

trend in the data series. Therefore, the ARDL model is a general ECM with unrestricted intercept and trend term.

$$\Delta y_t = \beta_0 + \beta_1 t + \beta_2 y_{t-1} + \beta_3 x_{t-1} + \sum_{i=1}^n \beta_4 \Delta z_{t-i} + u_t \dots\dots\dots(4.1)$$

Where y_t is the dependent variable, x_t is the explanatory variable, z_t is a vector of the lagged values of the first difference terms of y_t and x_t and u_t is the white noise error term. As noted above, the first step of the ARDL procedure involves testing for a cointegrating relationship. This step tests for the absence of any level relation between y_t and x_t via the exclusion of the lagged level variables y_{t-1} and x_{t-1} in equation (4.1). Pesaran et al. (2001) define the F-statistic tests for the null hypothesis as $H_0: \beta_2 = \beta_3 = 0$, and the alternative hypothesis as $H_1: \beta_2 \neq \beta_3 \neq 0$.

The asymptotic distribution of the F-statistic is non-standard under the null hypothesis of no cointegrating relationship between the variables, regardless of the order of integration of the variables being considered. The calculated F-statistic is compared with the critical values provided in Pesaran et al. (2001). The null hypothesis of no cointegration is rejected if the calculated F-statistic is greater than the upper bound critical value. If the calculated F-statistic falls below the lower bound, then the null hypothesis of no cointegration cannot be rejected. The result is inconclusive if the calculated F-statistic lies between the upper and lower bound critical values. In this situation, cointegration may be established by applying the Error correction Model (ECM) version of the ARDL model.

4.3. Cointegration and error correction modeling

This section shows how the ARDL procedure will be applied in this study. This study will estimate three separate models; the first to test the Keynesian proposition to see if the current account deficit is affected by the budget deficit; another to test for reverse causality between the budget balance deficit and current account deficit; and the final to test for the Ricardian equivalence.

After testing for the presence of cointegration, both the long and short-run parameter values will be estimated. Ideally, the cointegration and error correction modeling should be undertaken with the data as logarithms. As a number of the time series used in this study contained negative values, we added a constant to do away with the negative signs and took logarithms of those values.

4.3.1. Test for Keynesian Proposition

To test for the Keynesian proposition that suggests that causality flows from the budget deficit to the current account deficit; we will use the single equation shown in the previous chapter from the national identity:

$$CAD = SI + BD \quad (4.2)$$

Where: CAD is the current account deficit, SI is the savings-investment gap and BD is the budget deficit.

To derive our model, we followed the postulations made by Pesaran et al. (2001) in Case IV, that is, unrestricted intercept and unconstrained trend. The Keynesian hypothesis function can be stated as the following ARDL model:

$$\Delta(CAB)_t = \beta_0 + \beta_1 t + \beta_2 (CAB)_{t-1} + \beta_3 (BB)_{t-1} + \beta_4 (GDP)_{t-1} + \beta_5 (RER)_{t-1} + \sum_{i=1}^p \beta_6 \Delta(CAD)_{t-i} + \sum_{i=1}^{q1} \beta_7 \Delta(BB)_{t-i} + \sum_{i=0}^{q2} \beta_8 \Delta(GDP)_{t-i} + \sum_{i=0}^{q3} \beta_9 \Delta(RER)_{t-i} + ut \dots \dots \dots (4.3)$$

Where Δ is the first-difference operator, t is a time or trend variable and u_t is a white-noise disturbance term.

CAB = Real Per capita Current Account Balance;

BB = Real Per capita Budget Balance;

GDP = Real Per capita Gross Domestic Product (Malawi Kwacha millions);

RER = Per capita real exchange rate.

Equation (4.3) can be viewed as an ARDL of order (p, q₁, q₂, q₃). The Current Account Balance (CAB) is set as the dependent variable as the Keynesian hypothesis suggests that Budget deficits cause current account deficits.

Gross domestic product (GDP) and the exchange rate were added as explanatory variables, as Oseni (2012) had suggested that the inclusion of lagged values of these variables is intended to eliminate estimation bias associated with simultaneity and serial correlation. The variables for the Keynesian proposition of the twin deficits were estimated in their natural logarithms. As Zengin (1999) had found that empirical studies suggest that the particular data transformation significantly color the results of inquiry

into the twin deficits phenomenon; the choice of data transformation influences whether evidence supports or contradicts the twin deficits story (Rosenweig and Tallman, 1991).

4.3.2. Reverse Causality

To determine whether reverse causation does in fact exist, a separate model ARDL was estimated with budget balance deficit as the dependent variable, with a time trend as follows:

$$\Delta(BB)_t = \beta_0 + \beta_1 t + \beta_2 (BB)_{t-1} + \beta_3 (CAD)_{t-1} + \beta_4 (GDP)_{t-1} + \beta_5 (RER)_{t-1} + \sum_{i=1}^p \beta_6 \Delta(BB)_{t-i} + \sum_{i=1}^{q1} \beta_7 \Delta(CAD)_{t-i} + \sum_{i=0}^{q2} \beta_8 \Delta(GDP)_{t-i} + \sum_{i=0}^{q3} \beta_9 \Delta(RER)_{t-i} \dots (4.4)$$

4.3.3. Test for Ricardian equivalence theory

To test for the Ricardian equivalence hypothesis we followed the specification proposed by Perelman and Pestieau (1993) and reproduced below (equation 4.5) with slight modification (refer to footnote 9).

$$C = \alpha_0 + \alpha_1 (Y - TX)_t + \alpha_2 BDEF_t + \alpha_3 W_t + \alpha_4 GD_t + \varepsilon_t \quad (4.5)$$

Where: C is private consumption, (Y-TX) is disposable income, BDEF is the budget deficit, W is private wealth and GD is the government debt.

In this formulation, the sum $(\alpha_1 + \alpha_2)$ gives the effect on current consumption of a tax-for-deficit substitution, holding public expenditure unaltered. Hence, the Ricardian equivalence hypothesis is interpreted as implying $\alpha_1 + \alpha_2 = 0$ and $\alpha_4 = 0$, meaning that a

K1 tax for debt swap has no effect on current consumption. On the contrary, the pure Keynesian view implies that $\alpha_2 = 0$, i.e. that a tax-for-deficit swap has a strong impact on consumption (Perelman and Pestieau, 1993).

In particular, we have excluded wealth⁹ from the analysis. To come up with the following ARDL model:

$$\Delta(CONS)_t = \alpha_0 + \alpha_1 t + \alpha_2 (CONS)_{t-1} + \alpha_3 (DY)_{t-1} + \alpha_4 (BDEF)_{t-1} + \alpha_5 (GD)_{t-1} + \sum_{i=1}^p \alpha_6 \Delta(CONS)_{t-i} + \sum_{i=1}^{q1} \alpha_7 \Delta(DY)_{t-i} + \sum_{i=0}^{q2} \alpha_8 \Delta(BDEF)_{t-i} + \sum_{i=0}^{q3} \alpha_9 \Delta(GD)_{t-i} \dots \dots \dots (4.6)$$

Where:

- CONS =real per capita private consumption
- DY =real per capita disposable income
- BDEF =real per capita government budget deficit, and
- GB =real per capita government debt.

4.4. Variable measurement and data sources

The variables included in this study are chosen on the basis of theory as well as in keeping with empirical evidence drawn from previous studies which used similar variables in their quest to examine the twin deficits and the Ricardian equivalence theories. In the ensuing paragraphs, we explain briefly how economic theory explains the different relationships and our a priori expectations and the measurements methods we used.

⁹ Wealth data was found to be I(2), just like Marinheiro (2007).

Variables were measured in their real per capita values. Real value is obtained by removing the effect of price level changes from the nominal value of time series data, so as to obtain a truer picture of economic trends. The nominal value of time series data such as gross domestic product and incomes is adjusted by a deflator to derive their real terms. Real values are more important than nominal values for economic measures such as GDP and incomes because they help ascertain the extent to which increases over time are driven by inflation and which are driven by actual growth.

To transform a series into real terms, two things are needed: the nominal data and an appropriate price index. The nominal data is simply the data measured in current units. The appropriate price index can come from any number of sources. Among the more prominent price indexes are the Consumer price index (CPI), the Producer price index (PPI), the Personal consumption expenditure index (PCEI) and the GDP deflator. In this study nominal series are converted to real terms using the GDP deflator, as that is the only index that goes as far back as 1970.

4.4.1. Keynesian Model

In the Keynesian models, the justification for the inclusion of the variables for budget deficit and current account deficit is taken from the theoretical Keynesian proposition of the twin deficits explained in the previous chapter. Where we have $(X-M-F) = (S-I) + (T-G)$, where; Y is the national income; C is private consumption; I is investment; G is government expenditures on final goods and services; $(X-M)$ is net exports of goods and services; F is net factor services and income; S is national savings (private sector savings,

Y-C); and T is government tax revenues (Plibeam, 1998). The GDP and real exchange rate variables are included as controls to eliminate estimation bias associated with simultaneity and serial correlation (Oseni, 2012).

Current Account Deficit

The current account deficit enters in its natural logarithm form in real per capita values, and it is measured as the net domestic exports over imports of goods and services of the trade balance plus foreign incomes and unilateral transfers. In the reverse causality model, we expect a positive sign if reverse causality exists.

Budget deficit

Budget deficit is measured as the difference between government revenues and government expenditures in millions of kwacha, and it enters the model in its natural logarithm form in real per capita values. The government influences economic activity through its budgetary operations and the simplest definition of its budget, known as the primary budget, is that it collects revenues from taxation and makes expenditures on consumption or purchases of goods and services and on transfers to the private sector (Nakyambadde, 2008). Fiscal deficits are associated with the increase in domestic liquidity. This leads to a rise in private nominal demand for imports reinforcing the negative impact on the current account position. The twin hypothesis implies a negative expectation for the fiscal deficit coefficient, since in developing countries, a greater proportion of the agents are liquidity constrained, and thus the relationship is expected to be more pronounced (Nakyambadde, 2008).

Gross Domestic Product

An increase in a country's income (GDP growth rate) is an indication of increased level of output in the country. On one hand, this would lead to increased productivity, and thus an increase in the volume of exports as the country's output increases, and a decrease in the level of imports as domestic production increases. On the other hand, if this increase in national income (aggregate demand) is not met by domestic production, this could also lead to an increase in imports to satisfy the rise in aggregate demand. Thus, the expected sign is ambiguous, depending on which rises higher between exports and imports.

Real exchange rate

Real exchange rate acts as a major determinant of supply and demand of foreign exchange (price determination function). Depending on the elasticities of demand for both imports and exports, the current account balance is going to improve with a depreciation of the real exchange rate. The expected sign is positive given the Marshall Lerner condition which states that provided the sum of the price elasticity of demand coefficients for exports and imports is greater than one, then a fall in the exchange rate will reduce the deficit and a rise will reduce the surplus, but if the Marshall Lerner condition does not hold the expected sign is negative (Pilbeam, 1998). The expected sign for the non linear (depreciation and appreciation) effects of the real exchange is expected to be negative. The real exchange rate here is calculated using 2005 as the base year.

4.4.2. Ricardian Equivalence Model

In the Ricardian equivalence model, we are focusing on the reaction of private consumption on government financing decisions. And we are using a reduced form consumption function. The justification of private consumption as our dependent variable comes from the theoretical national identity, and we are using private consumption to determine if government financing decisions has an indirect influence on private savings.

Total private consumption

From the various theories of the consumption function, planned current private or household consumption expenditure is determined by the present value of human and financial wealth, including current disposable income (DY), the real interest rate, etc. Following the Perelman and Pestieau (1993) consumption equation our total private consumption function will also include budget deficit and government debt.

Gross national disposable income

Disposable income at the aggregate level is total income net of total tax revenue. And it is one of the main determinants of the consumption function. We expect it to have a highly positive and significant coefficient sign.

Government debt

Government debt is expressed as the debt owed to nonresidents repayable in currency, goods, or services. It is measured as the sum of public, publicly guaranteed, and private nonguaranteed long-term debt, use of IMF credit, and short-term debt. Short-term debt

includes all debt having an original maturity of one year or less and interest in arrears on long-term debt (World Bank, metadata database). If the Ricardian equivalence holds, we expect this variable not to have any impact on private consumption, and the coefficient to be zero.

4.4.3. Data Sources

Availability of adequate and reliable data is very important for consequential analysis. The validity of results depends on sufficient and consistent data. We have done our utmost effort for the collection of reliable and consistent data set for our research¹⁰. The study used data from the following sources: Financial and Economic Review (various editions), Reserve Bank of Malawi; National Statistics Office; International Monetary Fund Financial Statistics; and World Bank Development Indicators. We used annual data for the period 1970-2012, since quarterly data on budget deficit is not available on Malawi.

4.5. Diagnostic Tests

This section endeavors to ensure that model framework, as discussed in section 4.3, satisfies the various econometric assumptions in order to derive reliable coefficient estimates. These include Breusch –Godfrey LM test for serial correlation, Engles ARCH test for conditional heteroscedasticity and Ramsey’s RESET tests for omitted variables and model specification.

¹⁰ Detailed descriptions of each variable contained in the Keynesian and reduced consumption equations are contained in appendix 1.

4.5.1. Stationarity tests

Augmented Dickey Fuller and Phillips-Perron tests were used to determine the stationarity of the data used in the analysis. As the theoretical framework presented in the previous chapter will be examined and tested using cointegration techniques, it is essential that the time series properties of the data are considered. Considering the stationarity of the data is important, since if the economic time series are characterized by non-stationarity then the classical t-test and F-test are inappropriate since the limiting distribution of the asymptotic variance of the parameter estimates becomes infinite (Perron, 1990). This often leads to spurious results in conventional regression analysis.

4.5.2. Breusch-Godfrey LM test

The Breusch-Godfrey LM test was used to detect the presence of serial correlation. If serial correlation is detected, it will violate the ordinary least squares (OLS) assumption that the error terms are uncorrelated. This would make the results of the ARDL insignificant because the model is dependent on OLS assumptions.

4.5.3. Engel's ARCH test

Engel's ARCH test was used to detect the presence of conditional heteroscedasticity. The standard error component presented in equation (4.1) assumes that the regression disturbances are homoscedastic with the same variance across time. Failure to correct for homoscedastic disturbances results in consistent but inefficient estimates of the regression coefficient.

4.5.4. Ramsey Reset test

The model was also subjected to the Ramsey Reset Test to test for the omitted variables, incorrect functional form and model mis-specification.

CHAPTER FIVE

EMPIRICAL RESULTS AND DISCUSSIONS

5.1. Introduction

This chapter estimates the analytical model that was discussed in Chapter 4. The model will be estimated using the Autoregressive Distributed Lag (ARDL) approach to co integration. The ARDL procedure will provide estimates of the short-run dynamics and the long-run relationship between current account deficit and budget deficit and their effects on each other and private consumption.

5.2. Unit root tests for stationarity

Before proceeding with the estimation of the analytical model, the time series properties of the data need to be investigated. The standard Augmented Dickey-Fuller (ADF) and the Phillips-Perron unit root tests were used to check for the stationarity and the order of integration of the time series variables involved with the two hypotheses of this study. The results obtained are reported in Table 5.1.

Table 5.1: Unit Root Estimation

Variable	ADF		PPERRON		Integration order
	Levels	1 st Difference	Levels	1 st Difference	

CAB	3.621*	8.6127*	3.5731**	13.3237*	I(0)
BB	2.9566**	11.1886*	5.0147*	27.0898*	I(0)
GDP	3.1988	7.6969*	3.2010	7.8118*	I(1)
RER	3.4312***	5.164*	4.2685***	5.164*	I(1)
CONS	4.7457*	5.9869*	4.7893*	22.987*	I(0)
DY	2.774	7.5169*	2.7618	7.8443*	I(1)
BDEF	5.8779*	11.5827*	5.9171*	25.4248*	I(0)
GD	0.8358	5.4135*	0.7663	5.4279*	I(1)

Note: The null hypothesis is that the series is non-stationary, or contains a unit root. *, ** and *** indicate the rejection of the null hypothesis of non-stationary at 1%, 5% and 10% significant level, respectively.

5.2.1 Augmented Dickey Fuller test

The Augmented Dickey-Fuller (ADF) tests were conducted with a null hypothesis of a unit root. Lag selection was automatic (based upon the Schwarz-Bayesian criterion). All the variables contained an intercept, except for Government debt (GD). Based on the visual inspection of the variables, some variables were tested with trends and others not.¹¹ Based on the ADF test statistic, we found that at the 5 percent level of significance, for our Keynesian variables, out of four, two had unit root at levels i.e., GDP (p-0.5460) and RER (p-0.0611), while BB(p-0.0477) and CAB (p-0.0094) were I(0) variables. For the Ricardian equivalence, we found that CONS (p-0.0023) and BDEF (p-0.0001) had unit root at levels, while DY(p-0.2145) and GD (p-0.3479) did not.

5.2.2 Phillips-Perron test

The Philips-Perron test results concurred with the results from the ADF tests. For the Keynesian variables we were unable to reject the null hypothesis of unit root at levels for GDP (p-0.5758) and RER (p-0.0657), while CAB (p-0.0106) and BB (p-0.0002) were

¹¹ GDP, RER, DY & GD, all showed upward trends. While BB, CAB, CONS and BDEF showed no evidence of trends.

found to have unit root in their first differences. Results for the Ricardian variables showed that we were unable to reject the null hypothesis of unit root at levels for CONS (p-0.0020) and BDEF (p-0.003), while for DY (p-0.2188) and GD (p-0.3783) we were unable to reject the null hypothesis only in their first differences.

5.2.3 Summary and conclusion of unit root tests

As the unit root tests undertaken suggest, there is a mixture of I(0) and I(1) variables. Conventional co integration procedures such as that of Johansen (1991, 1988), usually require that all data entering into an equation be of the same order of integration I(m). Noticeably, the mixture of both I(0) and I(1) variables would not be possible under the Johansen procedure. This gives a good justification for using the bounds test approach, or ARDL model, which was proposed by Pesaran et al. (2001). None of our series was an I(2), so we were able to proceed with our ARDL model. It is necessary that the variables are integrated at level or the first difference; I(0) or I(1) or mutually integrated but still it is pre-requisite that no variable is integrated at second difference I(2) or higher order.

5.3. Model specification and diagnostics

Reconsidering the discussion in Chapter 4, the Keynesian proposition brings us to the analytical model which considers the relationship between current account balance and the budget balance deficit. The model is as follows:

$$(X-M-F)_t = (T-G)_t + (S-I)_t + \varepsilon_t \quad (5.1)$$

Where:

$(X-M-F)_t$ = Current Account deficit

$(T-G)_t$ = Budget Deficit

$(S-I)_t$ = Savings-Investment gap
 ε_t = White-noise error term

5.3.1 The Keynesian Proposition

We developed the following Autoregressive Distributed Lag (ARDL) specification for equation (5.1) as follows:

$$\Delta(CAB)_t = \beta_0 + \beta_1 t + \beta_2 (CAB)_{t-1} + \beta_3 (BB)_{t-1} + \beta_4 (GDP)_{t-1} + \beta_5 (RER)_{t-1} + \sum_{i=1}^p \beta_6 \Delta(CAD)_{t-i} + \sum_{i=1}^{q1} \beta_7 \Delta(BB)_{t-i} + \sum_{i=0}^{q2} \beta_8 \Delta(GDP)_{t-i} + \sum_{i=0}^{q3} \beta_9 \Delta(RER)_{t-i} + u_t \dots\dots\dots(5.2)$$

Where: Δ is the first-difference operator and u_t is a white-noise disturbance term.

CAB = real per capita Current Account Balance;

BB = real per capita Budget Balance;

GDP = real per capita Gross Domestic Product;

RER = Real exchange rate.

In the ARDL specification above, the summation signs represent the short-run error correction dynamics, while the second section of the equation, denoted by first lags of the variables, represents the long-run relationship.

The optimum lag lengths for differenced terms were selected using the Schwarz Bayesian Criteria (SBC), Hannan-Quinn Criteria (HQC) and Akaike Information Criteria (AIC). The first combination chosen was ARDL (1,1,1,0), but using the Breusch Godfrey LM test we found serial correlation from lag 2, as LM statistics were significant at the 5% level, meaning that we were not accepting the null of no serial correlation. We then added higher order lags to do away with the serial correlation, and found the combination of

ARDL (2,3,3,3) was giving us the lowest AIC and HQC. The Breusch Godfrey Lagrange Multiplier (BG-LM) test suggested that no serial correlation was present in the new ARDL model up to lag order 4.¹²

Table 5.2: Diagnostic tests on CAD model

	Ramsey's RESET test		Engel's ARCH test	
	F ₂	F ₃	χ^2_1	χ^2_3
	1.7914	4.908729	0.12029	0.9328
P-value	0.4083	0.1786	0.7220	0.8175

Note: F₂ and F₃ are the test statistics for investigating the appropriateness of quadratic and cubic models, respectively. Similarly, χ^2_1 and χ^2_3 are the test statistics for ARCH (1) and ARCH (3) effects, respectively. (p) denotes the corresponding probability values under the respective null hypotheses of correct specification and no conditional heteroscedasticity.

As can be seen above (Table 5.2), the diagnostic statistics for the error correction mechanism are positive and indicate that the model is correctly specified, and no evidence of conditional heteroscedasticity was found.

Table 5.3: Estimation Results on CAD model

ARDL (2, 3, 3, 3) selected lags based on Schwarz Bayesian criterion			
	Coefficient	t-Statistic	Prob.
C	-4.3286**	-2.37781	0.0265
ΔCAB_{t-1}	0.3895***	1.792109	0.0869
ΔCAB_{t-2}	0.0869***	1.9623	0.0625
ΔBB	0.1926**	2.132918	0.0443
ΔBB_{t-1}	-0.4619**	-2.33923	0.0288
ΔBB_{t-2}	-0.4135**	-2.5627	0.0177
ΔBB_{t-3}	-0.243**	-2.15276	0.0426

¹² See Table 1 in appendix 2, the BG-LM test results looked much better.

ΔGDP	0.9253***	0.384527	0.7043
ΔGDP_{t-1}	-8.3879*	-2.95431	0.0073
ΔGDP_{t-2}	-8.4648**	-2.74637	0.0118
ΔGDP_{t-3}	-2.8571	-1.18171	0.2499
ΔRER_{t-1}	0.019	1.205115	0.241
ΔRER_{t-3}	0.03335**	2.137889	0.0439
CAB_{t-1}	-1.2795*	-4.65674	0.0001
BB_{t-1}	0.8451*	3.551502	0.0017
GDP_{t-1}	6.07862**	2.351163	0.0277
RER_{t-1}	-0.0359*	-4.30915	0.0003
R-squared	0.715578	Adjusted R-squared	0.508726
F-statistic	3.45937	Prob(F-statistic)	0.00386

Note: *, ** and *** denotes statistical significance at 1%, 5% and 10% significant level, respectively.

From Table 5.3 above we can see that all of the first differenced variables of the budget deficit were significant at the 5% significance level and some of the GDP and RER variables. The inclusion of a dummy variable to account for the regime change of 1994 was found to be insignificant.

Our F-statistic which was found using the Wald test is presented in Table 5.4 below, we found the value of our F-statistic to be 7.99, and we have $(k + 1) = 4$ variables in our model. So, when we go to the Bounds Test tables of critical values, we have $k = 3$. We haven't constrained the intercept of our model, and we have not included the trend term (it was insignificant). Using table Ci.(III) of Pesaran et al. (2001, pg. 33), the lower and upper bounds for the F-test statistic at the 10%, 5%, and 1% significance levels are [2.72 , 3.77], [3.23 , 4.35], and [4.29 , 5.61] respectively. As the value of our F-statistic exceeds

the upper bound at the 5% significance level, we can conclude that *there is evidence of a long-run relationship between the time-series* (at this level of significance or greater).

Table 5.4: Co integration test results

Null Hypothesis	F statistic	5% critical values		10% critical values	
		CV _L	CV _U	CV _L	CV _U
$\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$	7.9874	3.23	4.35	2.72	3.77

Note: CV_L and CV_U are the lower bound and upper bound critical values provided by Pesaran et al. (2001).

In the spirit of Granger causality testing, the joint significance of each variable's lagged differenced terms was evaluated as reported in Table 5.5 below. Surprisingly, we did not find any evidence of joint short run effects from either one of the independent variables at the 5% significant level. We can see from Table 5.4 above that for instance most of the short run values for the budget deficit were statistically significant when looked at separately, but results in Table 5.5 show that jointly the budget deficit does not have a significant impact on the current account.

Table 5.5: Joint short run effects on CAD model

Effect	Null Hypothesis	F statistic	P value
Own	$\alpha_1 + \alpha_2 = 0$	2.1792	0.1369
Budget balance	$\Phi_0 + \Phi_1 + \Phi_2 + \Phi_3 = 0$	2.3301	0.0878
GDP	$P_0 + P_1 + P_2 + P_3 = 0$	2.6291	0.0620
RER	$\lambda_1 + \lambda_3 = 0$	2.383	0.1167

Note: $\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \alpha_5$, $\Phi_1 + \Phi_2 + \Phi_3$, $P_1 + P_2$ and $\lambda_1 + \lambda_2 + \lambda_3$, are the lagged coefficients of the first difference of Current account balance, budget balance, GDP and real effective exchange rate, respectively.

The long-run sensitivities of current account deficit values to the various exogenous variables were established through normalization, as shown in Table 5.6.

Table 5.6: Normalized long run effects on CAD model

Effect	Value	Null Hypothesis	Probability
Budget balance: $-\beta_2 / \beta_1$	0.7907	$-\beta_2 / \beta_1 = 0$	(0.0003)
GDP: $-\beta_3 / \beta_1$	6.369	$-\beta_3 / \beta_1 = 0$	(0.0172)
REER: $-\beta_4 / \beta_1$	-0.0397	$-\beta_4 / \beta_1 = 0$	(0.0001)

Note: The normalized effects are calculated by dividing the long-run coefficients over the dependent variables coefficient

Budget deficit

We find that the normalized effect for the budget deficit on the current account deficit, which is the main focus of this study, is 0.79. This means that in the long run, a 1 percent increase in the budget deficit will lead to an increase of 0.79 percent in the current account deficit. This is in line with our expectations according to the Keynesian absorption theory and the Mundell Fleming model as well as findings of Zengin (1999), Chang (2004), Neaime (2008) and Nakyambadde (2008). This means that an increase in either the government spending or the private disposable income has a major impact on the current account, most likely as government being the biggest consumer of imports, will tend to import more when it increases its spending. Evidence from the χ^2_1 Wald test statistics suggested that there was significant long run effect of the budget balance on the current account deficit, confirming that the Keynesian Hypothesis is true in the Malawian case.

Gross Domestic Product

The normalized effect of GDP is found to be significantly positive and having a statistically significant impact on the current account balance. A one percent change in the real per capita GDP will lead to a 6.37 percent increase on the current account. This is somewhat in line with theory, as we expect that the more the country produces, the more it will export, and this will lead to an improvement in the net exports and ultimately, the current account balance. Although in the case of Malawi, quality of the exports also needs to be kept in mind.

Real Exchange rate

We find that the normalized effect of the real effective exchange rate on the current account balance is statistically significant and negative. We find that a 1 percent increase in the real exchange rate (depreciation) will lead to about 0.04 percent increase in the current account balance. This is in line with economic theory that depreciation would lead to decreased prices of the country's exports, which would make them more competitive, and it would discourage imports by making them relatively more expensive. This is somewhat in contrast to the findings of Mangani (2011) which rejected co integration between real effective exchange rate and exports and imports in the case of Malawi, implying that the J-curve effect does not hold true for Malawi. The discrepancy might be due to the fact that we are measuring the effect on the current account balance rather than trade balance, and we are using the real exchange rate rather than the real effective exchange rate.

5.3.2 Reverse Causality

To test for the reverse causality we developed a separate ARDL model (model 2) with the budget deficit as the dependent variable to test if the causality can run from the current account deficit to the budget deficit. With the following UECM:

$$\Delta(BB)_t = \delta_0 + \delta_1 t + \delta_2 (BB)_{t-1} + \delta_3 (CAD)_{t-1} + \delta_4 (GDP)_{t-1} + \delta_5 (RER)_{t-1} + \sum_{i=1}^p \delta_6 \Delta(BB)_{t-i} + \sum_{i=1}^{q1} \delta_7 \Delta(CAD)_{t-i} + \sum_{i=0}^{q2} \delta_8 \Delta(GDP)_{t-i} + \sum_{i=0}^{q3} \delta_9 \Delta(RER)_{t-i} \dots \dots \dots (5.4)$$

The AIC was giving us a different optimal lag combination than the SBC, the combination chosen by AIC was ARDL (2,2,2,1), which suffered from serial correlation¹³. Thus, we went with the SBC combination of ARDL (1,1,1,1,) which did not have a problem with serial correlation.

Table 5.7: Diagnostic tests on reverse causality model

	Ramsey's RESET test		Engel's ARCH test	
	F ₂	F ₃	χ^2_1	χ^2_3
	1.9354	1.2947	0.1346	0.0597
P-value	0.1639	0.2972	0.7158	0.9806

Note: F₂ and F₃ are the test statistics for investigating the appropriateness of quadratic and cubic models, respectively. Similarly, χ^2_1 and χ^2_3 are the test statistics for ARCH(1) and ARCH(3) effects, respectively. (p) denotes the corresponding probability values under the respective null hypotheses of correct specification and no conditional heteroscedasticity.

The diagnostic tests in Table 5.7 above indicate that the estimations satisfy standard tests for serial correlation and functional form, normality and conditional heteroscedasticity.

¹³ See BG-LM test results in Table 2 in appendix 2.

Table 5.8: Estimation Results on reverse causality model

ARDL (1,1,1,1) selected lags based on Schwarz Bayesian criterion			
	Coefficient	t-statistic	Prob
C	63.64288	2.766251	0.0098
ΔBB_{t-1}	-0.09386	-0.43763	0.6649
ΔCAD	0.464997	1.319497	0.1973
ΔCAD_{t-1}	0.156839	0.514069	0.6111
ΔGDP	-5.84888	-1.32419	0.1958
ΔGDP_{t-1}	3.457259	0.85239	0.401
ΔRER	0.013522	0.591924	0.5585
ΔRER_{t-1}	-0.01298	-0.449269	0.6566
BB_{t-1}	-1.1013*	-3.56856	0.0013
CAD_{t-1}	0.2345	0.480069	0.6348
GDP_{t-1}	-10.4979**	-2.74998	0.0102
RER_{t-1}	-0.01298**	2.054541	0.049
R-squared	0.5917	Adjusted R-squared	0.4369
F-statistic	3.82132	Prob(F-statistic)	0.001842

Note: *, ** and *** denotes statistical significance at 1%, 5% and 10% significant level, respectively.

Considering the possibility of reverse causation, where budget deficit is the long-run dependent variable, the calculated F-statistic of 3.89 is lower than the upper bound critical value at the 5 percent level provided by Pesaran et al. (2001), but greater than the lower bound (Table 5.9) – implying that our finding is inconclusive, as we have no evidence supporting a long run relationship or its absence. However, the F-statistic is above the upper bound critical value at the 10 percent significance level and we can conclude that some weak long run cointegration has been found at the 10 percent level.

Table 5.9: Co integration test results on reverse causality model

Null Hypothesis	F statistic	10% critical values		5% critical values	
		CV _L	CV _U	CV _L	CV _U
$\delta_1 = \delta_2 = \delta_3 = \delta_4 = 0$	3.8867	2.72	3.77	3.23	4.35

Note: CV_L and CV_U are the lower bound and upper bound critical values provided by Pesaran et al. (2001).

Current Account balance

Both the non-normalized and normalized long run effects of the current account balance on the budget balance were found to be statistically insignificant (refer to Table 5.8 above and 5.10 below). Consequently, reverse causation is ruled-out in Malawi, meaning that in the long run the current account does not affect the budget deficit.

Gross Domestic Product

Contrary to expectations the subsequent estimation of the normalized long-run parameter of GDP was significant and highly negative. Results from Table 5.10 show that a one percent increase in GDP will lead to a 9.53 percent decrease in the budget balance. This does not make any economic sense as we would expect higher GDP per capita to mean there is improved productivity in the country and thus, lead to increased tax collections.

Real Exchange Rate

The real exchange rate was also found to have a significant long run effect on the budget balance; the normalized long run effect found in Table 5.10 showed that a one percent increase in real exchange rate (depreciation) would lead to a 0.03 percent improvement in the budget balance. This could be due to the impact the exchange rate has on the conversion rates of the grants disbursed to government for budgetary support from its developing partners, as this is the primary budget.

Table 5.10: Normalized long run effects on reverse causality model

Effect	Value	Null Hypothesis	Probability
CAD: $-\delta_2 / \delta_1$	0.213	$-\delta_2 / \delta_1 = 0$	(0.6131)
GDP: $-\delta_3 / \delta_1$	-9.5326	$-\delta_3 / \delta_1 = 0$	(0.0067)
REER: $-\delta_4 / \delta_1$	0.0256	$-\delta_4 / \delta_1 = 0$	(0.0041)

Note: The normalized effects are calculated by dividing the long-run coefficients over the dependent variables coefficient.

As shown in the estimation results in Table 5.8 above, the short run effects from all the variables were statistically insignificant. Similarly, the joint short run results presented in Table 5.11 below show that the current account balance has no significant short run effect on the budget balance, confirming that the hypothesis of reverse causality really does not exist in Malawi even in the short run.

GDP and the real exchange rate were similarly found to have insignificant joint short run effects on the budget balance, which as explained above is contrary to theory, as we expect GDP to have a positive significant effect on the budget balance as the tax collections increase with increased productivity in the country.

Table 5.11: Joint short run effects on reverse causality model

Effect	Null Hypothesis	F statistic (p)	P value
Own	$\alpha_1 + \alpha_2 = 0$	0.0938	0.6649
Current Account Deficit	$\Phi_0 + \Phi_1 + \Phi_2 = 0$	1.6255	0.3712
GDP	$P_0 + P_1 = 0$	1.3934	0.2644
RER	$\Lambda_0 + \lambda_1 = 0$	0.2568	0.7753

Note: $\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \alpha_5$, Φ_0 , $P_1 + P_2 + P_3 + P_4 + P_5$ and $\lambda_1 + \lambda_2 + \lambda_3$, are the lagged coefficients of the first difference of budget balance, current account balance, GDP and real exchange rate, respectively.

5.3.3 Test for Ricardian Equivalence

For testing the Ricardian equivalence hypothesis, we formulated the following UECM,

model 3:

$$\Delta(CONS)_t = \alpha_0 + \alpha_1 t + \alpha_2 (CONS)_{t-1} + \alpha_3 (DY)_{t-1} + \alpha_4 (BDEF)_{t-1} + \alpha_5 (GD)_{t-1} + \sum_{i=1}^p \alpha_6 \Delta(CONS)_{t-i} + \sum_{i=1}^{q1} \alpha_7 \Delta(DY)_{t-i} + \sum_{i=0}^{q2} \alpha_8 \Delta(BDEF)_{t-i} + \sum_{i=0}^{q3} \alpha_9 \Delta(GD)_{t-i} \dots \dots \dots (5.5)$$

Where:

- CONS = Real per capita Private consumption;
- DY = Real per capita Disposable income;
- BDEF = Real per capita Budget deficit;
- GD = Real per capita Government external debt.

Lag selection using the Schwarz Bayesian criteria suggested an ARDL of (4,4,1,3) which was found to contain serial correlation by the Breusch Godfrey LM test. Thus, an ARDL of (3,3,2,2) was chosen instead¹⁴.

Table 5.12: Diagnostic tests on REH model

	Ramsey's RESET test		Engel's ARCH test	
	F ₂	F ₃	χ^2_1	χ^2_3
	1.1175	1.9653	0.2772	0.6271
P-value	0.3287	0.1575	0.6018	0.6028

Note: F₂ and F₃ are the test statistics for investigating the appropriateness of quadratic and cubic models, respectively. Similarly, χ^2_1 and χ^2_3 are the test statistics for ARCH(1) and ARCH(3) effects, respectively. (p) denotes the corresponding probability values under the respective null hypotheses of correct specification and no conditional heteroscedasticity.

¹⁴ See BG-LM test results in Table 4 in appendix 2.

The diagnostic results presented in Table 5.12 above showed that the model was well specified, normally distributed and no evidence of serial correlation or conditional heteroscedasticity was found.

In this model the Bounds test was conducted using Table Ci. (IV) of Pesaran et al. (2001, pg. 34), as the trend term here was significant. Our computed F-statistic as shown in Table 5.13 below of 7.67 was found to be above the 5% critical upper bound critical value (Table 5.13). Thus, we accepted the null hypothesis of a long-run relationship between the variables.

Table 5.13: Co integration test results on REH model

Null Hypothesis	F statistic	5% critical values		10% critical values	
		CV _L	CV _U	CV _L	CV _U
$\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$	7.6748	4.01	5.07	3.47	4.45

Note: CV_L and CV_U are the lower bound and upper bound critical values provided by Pesaran et al. (2001).

The estimation results of the ARDL model presented in Table 5.14 below also suggested that there is no long run impact of either one of the independent variables on the real per capita private consumption.

Table 5.14: Estimation Results on REH model

ARDL (3,3,2,2) selected lags based on Schwarz Bayesian criterion			
	Coefficient	t-Statistic	Prob.
C	4.342855***	3.219559	0.0043
TREND	0.009748***	4.631164	0.0002
ΔCONS_{t-1}	-0.18617	-0.92427	0.3664

ΔCONS_{t-2}	-0.54787***	-3.13671	0.0052
ΔCONS_{t-3}	-0.39806**	-2.19998	0.0397
ΔDY	0.764223***	4.864919	0.0001
ΔDY_{t-1}	0.729266***	3.276448	0.0038
ΔDY_{t-2}	1.383027***	5.496369	0.0000
ΔDY_{t-3}	0.813311**	2.373625	0.0277
ΔBDEF	-0.0069	-0.74286	0.4662
ΔBDEF_{t-1}	0.01512	0.937717	0.3596
ΔBDEF_{t-2}	0.004401	0.398721	0.6943
ΔGD	0.024509	0.775336	0.4472
ΔGD_{t-1}	-0.12111**	-2.36275	0.0284
ΔGD_{t-2}	-0.07166*	-1.81773	0.0841
CONS_{t-1}	-1.10007***	-4.10358	0.0006
DY_{t-1}	0.100009	0.399558	0.6937
BDEF_{t-1}	-0.030906	-1.366898	0.1868
GD_{t-1}	0.24495***	4.871995	0.0001
R-squared	0.899894	Adjusted R-squared	0.809798
F-statistic	9.988197	Prob(F-statistic)	0.00002

Note: *, ** and *** denotes statistical significance at 1%, 5% and 10% significant level, respectively.

In this model we are mainly interested in the interaction of the joint short run effects of the budget deficit and government external debt on the private consumption as proposed by Perelman and Pestieau (1993). But we reported all the findings of the short and long run effects presented in Table 5.16 and 5.17 below, although we draw our final conclusion from the Ricardian Equivalence tests found in Table 5.15.

Disposable Income

All lagged variables of short run real per capita disposable income have expected positive and statistically significant signs. This means that in the short run, an increase of one

percent of real per capita disposable income leads to an increase of over one percent in real per capita private consumption. The joint short run effects of disposable income on private consumption were also highly statistically significant with a probability of 0.000 as shown in Table 5.15.

Budget deficit

The results show that in the short and long-run real per capita budget deficit does not have a significant impact on real per capita private consumption. This is contrary to the REH, which suggests that private consumers tend to increase their consumption when budget balance increases because they anticipate a reduction in taxes in the future, and vice versa. Thus, we can conclude that the Ricardian Equivalence hypothesis does not hold in Malawi, as the private consumption/savings is not affected by the changes in budget deficit. Results of the Ricardian restrictions proposed by Perelman and Pestieau (1993) further confirmed that Ricardian equivalence hypothesis is rejected in the Malawian case, as the joint short run coefficients of DY (3.6898) did not cancel out the joint short run effects of BDEF (-0.0126).

Government External Debt

Although, the joint short run effect of government debt was found to be insignificant at the 5% percent level of significance, which showed that in the short run, government debt does not have an impact on real per capita consumption. The normalized long run effect showed that government does indeed have a significant positive effect on the real per capita consumption. The results showed that in the long run, a 1 percent increase in the

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government debt will lead to a 0.23 percent increase in real per capita consumption. This is in tandem with economic theory, as government is the biggest purchaser in the economy, and increased government spending through debt would lead to increased disposable income if the money is spent within the economy. This also further rejects the REH in Malawi, as indeed government debt does have an impact on consumption, and its coefficients are not equal to zero.

Table 5.15: Perelman & Pestieau restriction results on REH model

Restriction	Null Hypothesis	F statistic (p)	P value
Pure Ricardian Equivalence	$-BDEF = -DY, GD=0$	1.2893	0.3011
Mild Ricardian Equivalence	$-BDEF = DY$	2.5241	0.1305

Note: BDEF, DY and GD are budget balance, disposable income and government debt respectively.

As we can see from Table 5.15 above the pure Ricardian equivalence (p-0.3011) and even mild Ricardian equivalence restrictions (p-0.1305) were both rejected. Thus, evidence has shown that the theory of REH does not hold in Malawi.

The joint short run and normalized long run effects explained above are presented in Tables 5.16 and 5.17 below.

Table 5.16: Joint short run effects on REH model

Effect	Null Hypothesis	F statistic (p)	P value
Own	$\alpha_1 + \alpha_2 + \alpha_3 = 0$	4.4052	0.0156
Disposable income	$\Phi_0 + \Phi_1 + \Phi_2 + \Phi_3 = 0$	20.1927	0.0000
Budget deficit	$P_0 + P_1 + P_2 = 0$	0.564	0.6448
Government debt	$\Lambda_0 + \lambda_1 + \lambda_2 = 0$	2.1159	0.1302

Note: $\alpha_1 + \alpha_2 + \alpha_3 + \alpha_4 + \alpha_5$, $\Phi_1 + \Phi_2 + \Phi_3 + \Phi_4$, P_0 and $\lambda_1 + \lambda_2 + \lambda_3$, are the lagged coefficients of the first difference of private consumption, disposable income, budget deficit and government debt, respectively.

Table 5.17: Normalized long run effects on REH model

Effect	Value	Null Hypothesis	probability
DY: $-\beta_2 / \beta_1$	00909	$-\beta_2 / \beta_1 = 0$	(0.6774)
BDEF: $-\beta_3 / \beta_1$	-0.0281	$-\beta_3 / \beta_1 = 0$	(0.2224)
GD: $-\beta_4 / \beta_1$	0.2277	$-\beta_4 / \beta_1 = 0$	(0.0000)

Note: The normalized effects are calculated by dividing the long-run coefficients over the dependent variables coefficient

The results suggest as explained that budget deficit does not have any short run or long effect on private consumption, and savings, while the government debt has a significant positive long run effect on the private consumption. Thus, our conclusion is that REH does not hold in the case of Malawi.

CHAPTER SIX

CONCLUSIONS AND POLICY IMPLICATIONS

6.1 Summary

The study examined the empirical relationship between fiscal deficits and current account deficits in Malawi. In pursuit of this objective, the study explored among others, the various theoretical arguments that have been advanced in light of the relationship between the fiscal deficits and the current account balance.

The main finding of the study is that fiscal deficits have a positive impact on the current account balance in Malawi, and the impact is significant, indicating that the Keynesian hypothesis holds true in the case of Malawi. A dummy variable was created to account for the regime change in 1994, but it was found to be insignificant in the models. It was found that a 1 percent increase (improvement) in the budget deficit would lead to about 0.80 percent increase (improvement) in the current account deficit in the long run. Increasing fiscal deficits through reduced taxation or increased government borrowing will increase aggregate demand which in turn will lead to a rise in the volume of imports as domestic production is very low. The results also indicate that the theory of reverse causation from the current account deficit does not exist in Malawi, and also that the Ricardian equivalence hypothesis does not hold for the period under study. This is not

surprising as Malawi does not satisfy the assumption underlying the REH stipulated in previous chapters.

The study also found that both GDP growth and real exchange rate have positive, long-run impacts on the current account in Malawi, and no significant short run effects. However, the current account balance is more responsive to changes in GDP than to changes in the real exchange rate.

In summary, this study found that in the period under study the current account deficit in Malawi in the long run is partly caused by the general government fiscal deficit, and that there is no causal relationship flowing from the current account to the fiscal deficit, and that private consumption in the country is not affected by the fiscal deficits but responds to the external debt incurred by government.

6.2 Policy Implications

International trade is one of the main driving catalysts of an economy. Malawi's current account balance has been in deficit since independence in 1964, and attempts to improve this situation have not been very successful. Results from this study have shown that in order to achieve the objective of turning Malawi into an export-led economy and improving the external imbalance, the Government should begin with correcting the internal imbalance.

A contractionary fiscal policy channeled through lower government spending or improvements in tax collection systems (not tax rate adjustments as the tax base is low) would lead to a contraction in the current account deficit gap. The results in the previous chapter suggest that if the budget deficit could be cut by just 1 percent, this would lead to a tremendous improvement in the current account balance, of about 0.80 percent! Thus, government expenditure should focus on only the most crucial areas of social and economic development such as health, education and agriculture and food security. And try and minimize on other areas of recurrent expenditure, so as to get a lean budget which can be implemented using domestic resources, so that budgetary support and external debt can be strictly for the development expenditure.

The current exchange rate policy should be maintained, leaving the Kwacha to remain floating, so as to allow the factors of demand and supply to determine its value. This will allow the country's exports to trade at a value that is reflective of their quality and competitiveness on the international market. This could increase its competitiveness and in turn increase the volume traded.

Also, the significant negative relationship between GDP and the current account balance suggests that the more productive the nation becomes, the more we tend to import, and thus worsen our Current account balance. Thus, policies should be put in place to encourage export production in the country, and curb imports, so that the productivity may boost the export industry and in turn reverse the situation, so that the more productive we become, the more we export.

Finally, the significant positive relationship between government debt and private consumption shows that the debt accumulated by government does indeed trickle down to the private consumers. Again, policies should be put in place to ensure that this consumption is spent on investments rather than consumables, so that the money to repay this debt may be realized in the future.

Foreign debt is an important factor that leads to budget deficits in Malawi, as we highlighted in earlier chapters the only year that Malawi recorded a budget surplus was the year that we received debt relief from the development partners. As such, policies need to be geared towards reducing foreign debt, in the hope of narrowing the budget deficit. This can only be done if domestic production is increased and our tax revenue collection systems are improved to be more efficient and effective.

6.3 Limitations of the study

This study is subject to some limitations and the results must therefore, be read with caution.

The main limitation of the study was the availability and consistency of data. We could possibly have different results if all the data used in this study were compiled under one organization as there would not be any variations in the calculations and weights used. Another limitation is that this sort of study requires data that is investigated compiled at shorter intervals such as quarterly or bi-annually. Since the data here is recorded annually, this might also have affected the results. While it would have been desirable to

explore the impact of the different channels through which the fiscal budget could affect the current account deficit such as interest rates, this was not done. The study could be improved by looking at more rigorous data, at a wider scope, say using quarterly data as other empirical studies on this topic have done. Also, adding more explanatory or control variables especially for the reverse causality model, as the explanatory power of the model was quite weak.

6.4 Suggestions for further research

Further studies could focus on investigating the transmission channels through which the fiscal deficits affects the current account deficits. More specifically to see if there is a direct impact or if the impact is caused indirectly through interest rates and/or exchange rates. Also, the Ricardian equivalence hypothesis could be further tested by using a different econometric technique as other studies did, and also by testing if there is a relationship between the budget deficit and the savings-investment gap directly, and not going through private consumption as done in this study. Further research can also be done to determine the factors that cause the budget deficits, so that appropriate policy recommendations can be made which would eventually help to reduce the external deficits as well. Additionally, further research can be done to look at the variation between the projected fiscal budgets, the revised budget and the actual fiscal budget expenditures, to explore why these variations come about.

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APPENDICES

APPENDIX 1: DATA SET

Year	GDP	BB	CAB	RER	Per cap DY	Per cap Cons	Per cap GD
1970	242.10	-25.508	-30.5		343.9583	268.7936	0
1971	303.60	-21.897	-26.3		388.5948	326.2159	0
1972	325.50	-27.779	-26.9		402.8367	330.1853	194.4221
1973	364.00	-24.545	-21.8		402.5249	318.9017	211.6335
1974	461.50	-48.72	-27.4		419.9719	310.3508	195.257
1975	529.70	-35.547	-68.6		429.7286	317.2365	188.0973
1976	612.00	-37.3	-45.6		442.2839	318.6157	193.8262
1977	728.00	-46.2	-33.6		446.6924	315.7349	253.0394
1978	800.70	-73.4	-105.2		468.4159	316.8195	324.0789
1979	864.50	-84.2	-161		453.6193	349.006	360.3824
1980	1005.10	-78.009	-168.1	39.39178	444.0696	346.2522	369.1656
1981	1108.10	-113.237	-77.9	42.84542	409.2439	318.7054	283.5955
1982	1245.60	-66.915	-131.3	48.82875	408.0985	303.4273	255.2479
1983	1437.00	-125.316	-169.4	49.41861	409.0105	309.674	228.4813
1984	1707.40	-137.189	-29.1	51.67481	416.3594	322.976	214.4916
1985	1944.90	-116.355	-184	58.89523	421.8766	329.4927	262.9249
1986	2202.90	-98.769	-131.5	56.94535	415.0286	322.9188	284.8092
1987	2613.10	-216.875	-133	56.01976	398.543	299.3412	335.3824
1988	3534.40	-109.2	-269.8	50.45544	389.2462	323.2196	296.2078
1989	4388.20	-147	-586.6	50.67682	365.9765	322.1951	257.178

1990	5132.44	-156.554	-411.7	47.23444	366.0642	306.2309	286.7894
1991	6177.20	-307.949	-512.7	44.91192	397.429	323.4034	302.3093
1992	6484.20	-348.153	-988.7	48.06139	347.4198	329.0294	280.5563
1993	9116.60	-208.96	-1107	49.24443	373.7495	358.7209	222.9799
1994	10324.70	-75.429	-547.5	74.46235	319.2795	256.09	196.5539
1995	21358.33	-1072.6	-2689.2	73.051	365.8308	328.5849	156.2774
1996	34919.21	-1120.7	-4779.8	54.73314	400.645	366.0317	128.8927
1997	43794.77	-2421	-4956.2	55.13063	424.8212	379.6186	202.7135
1998	54395.38	-517.8	-4672.6	81.53544	424.4886	362.1652	321.4414
1999	78297.01	-2528.9	-12751.3	81.64102	431.3282	413.6236	255.7041
2000	103815.00	-5458.4	-11245.6	87.96372	424.1889	383.7336	202.5797
2001	123926.87	-1935.5	-12831.1	89.38142	395.355	349.5254	283.0987
2002	204382.00	-17192.1	-28678.2	84.05184	403.3737	358.5984	268.7964
2003	236240.30	-9838.3	-41580.8	99.66932	413.117	371.7412	345.9363
2004	285869.80	-28264.7	-55232.1	102.6475	408.2857	393.8925	391.5047
2005	326245.90	-1366.1	-83135.8	100	404.7836	411.0958	338.8419
2006	423925.60	1437	-95347.5	104.0255	408.0891	377.7532	89.66354
2007	510538.60	-18763.7	-100593	101.9853	435.8812	344.8777	88.63461
2008	600983.19	-34938.6	-92614.2	97.80687	459.2116	396.0345	98.86044
2009	710160.06	-36450.9	-108177	90.30077	486.2792	368.8019	116.9564
2010	812419.82	-22943	-106105	91.08988	426.9021	334.9756	83.82798
2011	879773.46	-81315	-119916	90.80777	430.5282	353.2396	91.14032
2012	1062136.70	-18179	-199367	121.643	468.7104	0	81.82997

APPENDIX 2: DIAGNOSTIC RESULTS

Table 1: Breusch Godfrey LM test on CAD model

m	ARDL (1,1,1,0)		ARDL (2,3,3,3)	
	LM statistic	p-value	LM statistic	p-value
1	1.301	0.254	0.2961	0.5921
2	1.5815	0.4535	0.1795	0.8370
3	13.6137*	0.0036	0.1138	0.9510
4	15.3796*	0.004	0.3603	0.8335

Note: *, **, *** represents significance at the 1% , 5% and 10% significance levels, respectively.

Table 2: Breusch Godfrey LM test on Reverse Model

m	ARDL (2,2,2,1)		ARDL (1,1,1,1)	
	LM statistic	p-value	LM statistic	p-value
1	3.5211	0.0570	0.0875	0.7695
2	5.3273	0.0697	0.8958	0.4201
3	8.5820***	0.054	1.468	0.2463
4	10.0247**	0.0400	1.3294	0.2865

Note: *, **, *** represents significance at the 1% , 5% and 10% significance levels, respectively.

Table 3: Breusch Godfrey LM test on REH model

m	ARDL (4,4,1,3)		ARDL (3,3,2,2)	
	LM statistic	p-value	LM statistic	p-value
1	11.7203*	0.0005	1.3045	0.2676
2	17.8254*	0.0001	1.3208	0.2816
3	17.9734*	0.0004	0.8953	0.4638
4	18.0741*	0.0012	0.8622	0.5130

Note: *, **, *** represents significance at the 1% , 5% and 10% significance levels, respectively.