AN EMPIRICAL TESTING OF THE RICARDIAN EQUIVALENCE IN NAMIBIA

A THESIS SUBMITTED IN PARTIAL FULFILMENT

OF THE REQUIREMENTS FOR THE DEGREE OF

MASTER OF SCIENCE IN ECONOMICS

OF

THE UNIVERSITY OF NAMIBIA

BY

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200708015

April 2020

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Abstract

The study aims to empirically test the Ricardian Equivalence hypothesis in Namibia, using quarterly time-series data from 1991 quarter one to 2017 quarter four. The annual data was converted from annual to quarterly by using Eviews 10 software. Consumption function was used to test for Ricardian Equivalence Hypothesis by testing how government debt and tax affect consumption. Additional control variables such as inflation, government expenditure, population growth and income were included in the analysis. Data analysis included testing variables for unit roots. The autoregressive distributed lag model approach was utilised. ARDL model and bounds test for cointegration were used to determine the long-run relationships between variables as well as variables' long-run coefficients, which determine long-run impact of independent variables on consumption. The error correction model was used to determine the short-run coefficients, which determine the impacts of independent variables on consumption in a short-run as well as measuring the convergence of the model toward its long-run equilibrium. The results indicate a positive relationship between government debt and consumption in both short-run and long-run, which is inconsistent with the Ricardian Equivalence Hypothesis. The study found that tax has a significant negative effect on consumption in the short-run, which is inconsistent with the Ricardian Equivalence Hypothesis. It was also concluded that there is a long-run relationship between consumption and the explanatory variables. It can be generally concluded that the Ricardian Equivalence Hypothesis does not hold in the Namibian economy both in the short run as well as in the long-run. Policy implications emanating from the study indicate that it is worth increasing government spending to stimulate the economy through debt financing since Ricardian Equivalence Hypothesis does not hold in Namibia. The study recommends policymakers to encourage further researches on testing the Ricardian Equivalence in Namibia since it will help improve decision making on fiscal policy.

Keywords: *Ricardian Equivalence hypothesis, Government debt, tax, consumption, Error Correction Model, Autoregressive Distributed Lag and cointegration.*

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List of Abbreviations and/or Acronyms

ADF	Augmented Dickey Fuller
ARDL	Autoregressive Distributed Lag
DLNB	Differenced Log of Government debt
DLNCNS	Differenced Log of Consumption
DLNE	Differenced Log of Government Expenditure
DLNINF	Differenced Log of Inflation
DLNP	Log of Population Growth
DLNT	Differenced Log of Tax
DLNY	Differenced Log of Income
ECM	Error Correction Model
GDE	Gross Domestic Expenditure
LNB	Log of Government debt
LNCNS	Log of Consumption
LNE	Log of Government Expenditure
LNINF	Log of Inflation
LNP	Log of Population Growth
LNT	Log of Tax
LNY	Log of Income
NSA	Namibia Statistics Agency
OLS	Ordinal Least Square
PP	Phillip-Perron
REH	Ricardian Equivalence Hypothesis

Acknowledgements

I would like to thank the almighty God for the strength, energy and wisdom He gave me to complete this project, as well as for everything He has done for me throughout my entire life, especially during my studies. I would like to express my sincere appreciation and gratitude to the people and institutions mentioned below. Without their assistance, this study would not have been possible: My supervisor, Professor E. Ziramba, for his guidance; my fellow Economics students for helping me and sharing their expertise and opinions with me to enrich and ultimately complete this project; Word Bank and Bank of Namibia for the provision of relevant data.

DECLARATIONS

I, Loini Uutoni, hereby declare that this study is my own work and is a true reflection of my research, and that this work, or any part thereof has not been submitted for a degree at any other institution.

I, Loini Uutoni, grant The University of Namibia the right to reproduce this thesis in whole or in part, in any manner or format, which The University of Namibia may deem fit.

Loini Uutoni	ULoini	30.10.2019
Name of Student	Signature	Date

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

Most governments finance their spending through debt financing. However, it remains an economic concern on how debt financing affects the economy. Ogba (2014) explained that there are two views regarding government debt effects on the economy. The first one is the Keynesian view, with the reasoning that an increase in government debt due to tax cut raises disposable income and stimulates the demand side. The second one is the Ricardian Equivalence Hypothesis, with the reasoning that an increase in government debt due to tax cut leads to consumers reducing their current consumption to reserve money for future tax increase payments thus aggregate demand does not change. To find which view applies to a certain economy, it is important to test for Ricardian Equivalence hypothesis in that particular economy.

The Ricardian Equivalence is more elaborated as an economic hypothesis, which proposes that if the government attempts to stimulate the economy by rising debt-financed government expenditure, demand will not be altered. That is because households are assumed to be forward-looking and do not take government bonds as net wealth (Barro, 1974). Hence, if a government substitute debt for tax, then consumers will accumulate the additional income as an alternative to raise consumption. As a result, aggregate demand will be the same regardless of the government's choice to finance deficit through an increase in tax or debt financing.

Debt financing means any government spending excess of government revenues

(Jhingan, 2001). Debt financing has been an ongoing discussion worldwide. Some African countries' citizens have different views of their governments financing some of the government spending with loans specifically from China. There has been an increasing trend of total government debt since independence based on data from Bank of Namibia. For instance, the Namibian government received a loan from China in 2018/2019 financial year, an issue which attracted different views among Namibians. However, a justification with regards to whether it was reasonable to borrow has necessitated a Ricardian Equivalence hypothesis test to be conducted in Namibia.

The Ricardian Equivalence Theory (RET) suggests that if the government attempts to stimulate the economy through debt-financed government spending, the demand remains unchanged thus the government does not stabilize the economy using fiscal policy. That is because consumers are assumed to be rational thus they will expect future tax increase which will be used to make up for those debts. Therefore, instead of increasing consumption, they increase saving to make provision for future increase in tax (Barro, 1989). However, from Keynesian point of view, it is assumed that the government can stabilize the economy using fiscal policy through influencing consumption amount by reducing tax and increase debt financing.

The result of this study helps to predict if debt financing might be good or bad for Namibia. According to the World Bank, Namibia's annual GDP growth has declined from 6.11% to 0.70% and -0.77% in the year 2015, 2016 and 2017, respectively, thus, the government considered debt financing option. Namibia's annual GDP growth has reduced from 6.11% to 0.70% and -0.77% from the year 2015 to 2016 and 2017, respectively based on data from World Bank thus, the government considered debt financing option. If an increase in debt financing leads to a decrease in Consumption then, Ricardian Equivalence is likely to hold. Thus, aggregate demand does not increase and the economy will not grow which makes it even more difficult to pay back government debt. If there is collateral to such debts, then the probability of losing those assets will be high.

1.2 Statement of the problem

For the past few years the Namibian economy performed poorly. This led to government experiencing revenue reduction due to the deteriorating economy. Implementation of fiscal consolidation is the main contributing factor to Namibia's recession (Ngatjiheue, 2018). Other factors include low rainfall and slowing world trade growth. As a result, increasing tax as a means to finance the deficit is not favourably considered because there is also a need to stimulate the economy. The budget deficit is therefore financed by debt finance, for instance, in 2017/2018 it was financed by borrowing from the domestic capital market complemented by borrowing from the African Development Bank. However, the Namibian economy might only be stimulated through an increase in aggregate demand if there is an absence of Ricardian Equivalence Hypothesis (REH). Thus, there is a need to test the REH in Namibia to know if a fiscal policy will have a role in macroeconomic stabilisation in Namibia. Therefore, this study aimed at empirically testing the REH in Namibia. Several empirical studies have been carried out in both developed and developing countries other than Namibia. Most of those empirical studies concluded that the REH holds mostly in developed countries as confirmed by an investigation in Germany (Lucke, 1999) but it rarely holds in developing countries thus among the reviewed literature in developing countries it only holds in Lesotho (Mosikari & Eita, 2017). To the best knowledge of the researcher, no study was done on this topic on Namibia**.**

1.3 Objectives of the study

The main objective of the study is to empirically test the Ricardian Equivalence in Namibia using quarterly time series data from 1991 quarter one to 2017 quarter four. The specific objectives are:

1. To investigate the impact of government debts and tax on final household's consumption expenditure.
2. To test if there is a long-run relationship between tax and consumption.
3. To examine if there is a long-run relationship between government debts and consumption.

1.4 Hypotheses of the study

1. H_0: Government debts and tax have no impact on consumption.

   H_1: Government debts and tax have an impact on consumption.
2. H_0: There is no long-run relationship between tax and consumption.

   H_1: There is a long-run relationship between tax and consumption.
3. H_0: There is no long-run relationship between consumption and government debts.

   H_1: There is a long-run relationship between consumption and government debts.

1.5 Significance of the study

The study finding benefits the fiscal policymaking in Namibia, as it specifically determines if it is worth increasing government spending through debt financing. Similarly, the results determine difference between debt financing and tax financing. Furthermore, this study contributes to the empirical literature. The results are useful as they reveal possible policy implications concerning the potential consequences of borrowing, as a means of government financing their spending, as an alternative to tax.

1.6 Limitation of the study

The unavailability of data for several variables is a limitation. As a result, the study justifiably employed a method which includes variables with available data leaving out those which lack data.

1.7 Delimitation of the study

The study empirically tested the Ricardian Equivalence Hypothesis in the Namibian context only.

1.8 Conclusion

This chapter covered the background of the study, statement of the problem, objectives and hypotheses of the study. Additionally, significance, limitation and delimitation of the study formed part of this chapter. Literature review for testing the Ricardian Equivalence Hypothesis is analysed in the next chapter to ensure relevant information on how to carry out the study.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

The Literature review gives the baseline for existing knowledge on the topic under study. Specifically, it is crucial for identifying a research gap and enables a comparison of the findings. A variety of literature related to the topic under study was found to contain sound information about testing the Ricardian Equivalence Hypothesis. To authenticate the outcomes of this research, some of the available literature was consulted for the literature review. In this chapter, theoretical and empirical literature related to testing the Ricardian Equivalence Hypothesis is presented. The theoretical literature refers to a hypothetical of what is thought as a common-sense based on certain assumptions, while empirical literature is known through testing of certain theory using data or an experiment.

2.2 Theoretical Literature

Ogba (2014) explained that there are two views regarding the effect of government debt on the economy. A first argument from a Keynesian point of view, highlight that an increase in government debt due to tax cut raises disposable income and thereby stimulates the demand. The second argument, from Ricardian Equivalence, illustrates that households are forward-looking and avoid taking government bonds as net wealth. Ricardian Equivalence hypothesis states that if the government substitutes debt for tax, then consumers accumulate the additional income as an alternative to raise consumption.

Barro (1974) has concluded that changes in the composition of government expenditure finance have no real effect on consumption. It argued that there is no choice between compositions of government expenditure finance, since debt postpones taxes. Economic analysis on both government debt and deficit generally advocate that deficit-financed tax cuts increase disposable income which stirs up aggregate demand at least in the short-run while creating to a negative effect on aggregate demand in the long run. Nevertheless, that idea has been challenged, considering that rational consumers see an increase in the deficit in the short term as an increase in future taxes, thus consumers do make provision for an increase in future taxes. As a result, private consumption remains unchanged even in the short run. Barro's model assumes that consumers have finite lives and care about their children welfare by providing them with positive bequests hence they act like they have endless life. Furthermore, if the tax cut is associated with a reduction in government expenditure by the same amount, the real effect would be a rise in consumption. There is similarly effect if the government announces a reduction in its future expenditure, leaving taxes unchanged due to permanent income increases.

The general idea of the Ricardian Equivalence Hypothesis is that, households are forward-looking and do not take government bonds as net wealth (Barro, 1974). If the government substitutes debt for tax, then consumers will accumulate the additional income as an alternative to raise consumption. Thereafter, individuals will use accumulated income to buy government bonds which will be used to pay for an increase in future tax to increasing government revenue to pay the accumulated debt (Saeed & Khan, 2012). It is further explained that private savings rise by the same amount like budget deficit then net public savings will stay unchanged thus interest rate will also be unchanged. In short, government debt financing is not net wealth and thus neutral to the consumers.

It was also concluded that Ricardian Equivalence Hypothesis holds mostly in developed countries but it rarely holds in developing countries because those assumptions do hold mostly in developed countries and rarely hold in developing countries. Ricardian Equivalence Hypothesis holds if several assumptions are met (Barro, 1974). The first being income life cycle hypothesis, it stipulates that consumers do smooth their consumption if they anticipate future tax rise by saving their current tax cut to pay for an increase in future tax. A second assumption is a rational expectation by consumers by which they realise that tax cut probably means a future tax increase. A third assumption entails perfect capital markets which imply that consumers can borrow to finance their spending if necessary. A fourth assumption is an intergenerational unselfishness, knowing that tax cut for a current-generation means a tax increase for the future generation. Thus responsible parents respond by leaving bequests to their children for them to pay high future tax. It was concluded that Ricardian Equivalence Hypothesis holds mostly in developed countries but it rarely holds in developing countries because those assumptions do hold mostly in developed countries and rarely hold in developing countries.

Ricardian Equivalence Hypothesis was also explained in a hypothetical framework by (Romer, 1996). It assumed that household optimization is a function of government budget constraint. A government budget is constrained by the present value of its spending which have to be smaller than or equal to the governments' initial wealth plus present value of tax receipts. If r(t) denote real interest rate at time t, $e^{-r(t)}$ denote discounts future values to present values, G(t) is government spending at time t, T(t) is the tax revenue at time t and D(0) represents debt at time zero rather than wealth thus, it is negative in the budget constraint then government constraint equation is as follow.

$$\int_{t=0}^{\infty} \mathrm{e}^{-r(t)} \quad G(t)d(t) \leq -D(0) + \int_{t=0}^{\infty} \mathrm{e}^{-r(t)} \quad T(t)dt \dots\dots\dots\dots\dots.\dots (1)$$

Household's budget constraint is that, the present value of their consumption cannot exceed their initial wealth plus present value of their disposable income. Where C(t) represent household consumption at time t, W(t) represent household's income at time t, T(t) represent taxes at time t, K(0) is quantity of capital at time 0 and D(0) represent quantities of capital and government bonds at time 0. Then household constraint equation is as follow.

$$\int_{t=0}^{\infty} \mathrm{e}^{-r(t)} \quad C(t)dt \leq K(0) + D(0)\int_{t=0}^{\infty} \mathrm{e}^{-r(t)} \quad W(t)dt \dots\dots\dots..(2)$$

Romer, (1996) further assumed that the government satisfies its budget constraint in equation 1, means that the government don not pay its debts thus, its wealth would be growing forever, which is rather unrealistic. Hence moving government debt to the left side of equality of equal sign with equation 1 changing to:

$$\int_{t=0}^{\infty} \mathrm{e}^{-r(t)} \quad T(t)dt = \int_{t=0}^{\infty} \mathrm{e}^{-r(t)} \quad G(t)dt + D(0) \quad \dots\dots\dots\dots\dots\dots\dots.\dots (3)$$

Substituting (3) into (2) gives the following household's budget constraint:

$$\int_{t=0}^{\infty} \mathrm{e}^{-r(t)} \quad C(t)dt \leq \int_{t=0}^{\infty} \mathrm{e}^{-r(T)} \quad W(t)dt - \int_{t=0}^{\infty} \mathrm{e}^{-r(t)} \quad G(t)dt \dots..(4)$$

It means government spending is inversely related to private consumption, however, whether the government budget deficit is financed by taxes or by bonds does not change a household's lifetime consumption pattern, thus the Ricardian Equivalence.

The Ricardian Equivalence Hypothesis has some theoretical criticisms such as the one explained in the Diamond Overlapping Generations Model. It criticized that the Ricardian Equivalence Hypothesis does not consider population dynamics and presumed unlimited horizons. If individuals live in exactly successive periods of overlapping generations and derive utility from their own consumption then, Ricardian Equivalence Hypothesis will not hold (Seater, 1993). Government debt in the present era lower taxes of the present generation which will be paid with taxes levied on upcoming generations. In other words, the current value of future tax obligations for the current generations will be small than the current value of tax reduction. Eventually, government bonds represent net wealth to the present generation, thus increasing their consumption and subsequently contradicting the Ricardian Equivalence Hypothesis (Romer, 1996).

The other criticism considered childless families based on (Tobin & Buiter 1980; Seater 1993). They argued that in spite of forward-looking families with children, the Ricardian Equivalence Hypothesis will collapse in cases of childless families because they ignore higher future taxes on the next generation in their optimisation constraint. Those families will treat government bonds as net wealth thus, increases their current consumption. It was also criticised that besides the assumption that families with children might foresee a higher burden on their future generations. Hence, leaving higher bequests, such higher bequests will not exceed higher future taxes (Barro 1989; Seater 1993).

2.3 Empirical Literature

There are some studies which were carried out in different countries. Lucke (1999) examined the validity of Ricardian Equivalence Hypothesis in Germany using quarterly time series data from 1960 quarter 1 to 1994 quarter 4. The paper used consumption, Euler equation, interest rate and exchange rate to test for Ricardian equivalence. The study used an error correction model (ECM) and cointegration approach to examine the association between variables. It was concluded that the REH holds in Germany, which means consumers are forward- looking in that country.

There was also a study carried out in Greece to test the Ricardian Equivalence Theorem using Time Series data (Drakos, 2001). To achieve the objective, the paper investigated the long-run association among government domestic borrowing with private savings. Particularly, deficit-financed by debts are matched by a rise in household savings was the hypothesis tested. The study employed the Johansen procedure which fits well the time series properties of the variables. The paper's finding was in line with the Ricardian Equivalence theorem projection. To elaborate more, government borrowing in Greece caused a rise in household savings. Contrary to the Ricardian Equivalence theorem, the rise in private savings did not fully counterbalance the rise in government debt. Furthermore, to some degree households viewed government bonds as net wealth and as a result augmented their expenditures. Those contradictions behaviour of a negative impact of government borrowing on savings was explained in the paper as the outcome of liquidity constraints faced by households and narrow-minded behaviour due to ambiguity concerning the expected path of taxes.

There is also an article by Nickel and Vansteenkiste, (2008) titled "Fiscal policies, the current account and Ricardian equivalence”. The purpose of the study was to analyse the empirical relationship among fiscal policy and the current account and considered how Ricardian equivalence changes such a relationship. The study has estimated the dynamic panel threshold model for 22 industrialised countries. The study concluded that the relationship between fi-scal policy and the current account varies based on government debt to Gross Domestic Product ratio because those variables affect private-sector expectations.

The outcomes showed that for countries with debt to GDP ratios up to 90% the relationship between the fiscal deficit and the current account deficit is positive. On the other side, huge debt countries which are above 90% such relationship become inversely related but not significant. The outcomes also suggested that households from countries with huge debt trend tend to comply with Ricardian Equivalence Hypothesis. However, it was also concluded that only 14% of the countries fall in the category of huge debt. Thus why the study summed up that there was more Keynesian reaction of the consumer and therefore a positive relationship between the -fiscal deficit and the current account defi-cit is more likely to be happening. The study further estimated the same model for the 11 largest euro area countries which showed the same results, however, that the relationship between the government balance and the current account becomes statistically not significant when the debt to GDP ratio exceeds eighty percentage points.

Another useful literature is a study by Saeed and Khan (2012) to empirically test the validity and stability of the Ricardian Equivalence Hypothesis and Budgetary Deficits in Pakistan. They used yearly time series data for the period 1972-2008. The variables used in the investigation a budget deficit, external debts, consumption and disposable income. The investigation included examining the long-run relationships between variables using Johansen multivariate co-integration method. The consumption function was estimated using vector with restrictions as well as a vector with restrictions to test for the Ricardian Equivalence.

They concluded that Pakistan is a non-Ricardian economy with budget and current account deficits. The results demonstrated no support of the Ricardian Equivalence Hypothesis in Pakistan. Nevertheless, the paper had cautioned that outcome of the research should be taken with caution. The common practice in trend is that governments select all 3 sources of financing the budget deficits at the same time that is taxation, internal and external borrowing as well as bank borrowing. The governments have infrequently relied only on borrowing thus no increase in taxation. It was also stated that the disposable incomes of most households are already at the subsistence level. Most consumers do not see any relief in the budgets presented by the governments annually and for that reason, they are slightly interested in statistical manipulations. Hence, it was unexpected Ricardian equivalence hypothesis to hold in Pakistan. It was therefore concluded that fiscal policy might be playing an effective role to stabilize the economy because the Keynesian view on consumption level was not rejected whereas the Ricardian Equivalence view was rejected for Pakistan.

There is also another study by Waqas and Awan (2012) titled “Exchange Rate, Interest Rate and Ricardian Equivalence Evidence from Pakistan”. The research aimed to look into the validity of Ricardian Equivalence Hypothesis in Pakistan. It used yearly data for the period 1973-2010. The study has examined the Ricardian Equivalence Hypothesis in Pakistan in terms of interest rate and exchange rate. The variables used in the regression are government debt, exchange rate, government budget deficit and rate of interest Auto-Regressive Distributed Lag cointegration approach was used to analyse the long-run association between variables using F-statistic. The approach was used because it suits best when variables are integrated of different orders, which are order (0) and order (1) and it is more robust for small samples. The study showed that there is a long-run relationship among variables. OLS technique has rejected the Ricardian Equivalence Hypothesis in Pakistan with the outcome indicating that fiscal policy is essential in raising private consumption. Furthermore, the study was also based on the assumption that for Ricardian Equivalence Hypothesis to holds, two restrictions must be fulfilled. One restriction was that, government debt has no impact on exchange rate. The other restriction was that, government budget deficit has no impact on exchange rate. Both restrictions have been rejected by the Wald test. In conclusion, the Ricardian Equivalence Hypothesis is rejected.

Olasunanmi and Akanni (2013) tested the validity of REH in Nigerian using data for the periods 1981 to 2011. The variables used in the regression are private consumption, tax, personal income, total wealth, government expenditure and government debt. The study employed Johansen procedure and Error Correction Mechanism and found a mixed result with the set of variables used. The coefficient of government spending as well as the relationship between the sign and magnitude of government debt and total wealth supported the existence of Ricardian Equivalence Hypothesis in Nigeria while the signs and magnitude of taxes and personal income disproved the existence of Ricardian

Equivalence in Nigeria. The study concluded that the validity of Ricardian Equivalence Hypothesis in Nigeria is a function of the variables used in the analysis.

One of the literatures reviewed includes a study by Sunge, Matsvai and Mufandaedza (2015) which econometrically tested for Ricardian Equivalence Hypothesis in Zimbabwe. The paper examined if there is a long-run equilibrium relationship among private consumption and gross domestic product, tax revenue, total public debt, government expenditure and interest payments. The study used Bounds Testing approach to Cointegration and ECM in the framework of ARDL. It investigated the long-run relationship using Impulse Response Functions. The analysis method also included OLS regression on the reduced form consumption function to test the Ricardian Equivalence Hypothesis in Zimbabwe. OLS consumption's long-run model coefficient for gross domestic product, tax revenue, total public debt, government expenditure and interest payments were expected to be zero if Ricardian Equivalence Hypothesis. The outcome showed that there is a long-run relationship running from gross domestic product, total public debt and interest payments government expenditure and tax revenue to private Consumption. It was concluded that the Ricardian Equivalence Hypothesis does not hold in Zimbabwe because all coefficient is non zero which means consumers are not forward-looking. The finding supported Keynesian debt non-neutrality. The result consequently entails that fiscal policy is important for macroeconomic stabilisation in the Zimbabwean economy.

Belingher and Moroianu (2015) also provided insightful literature titled "Empirical evidence on the Ricardian equivalence in Romania". The study tested how household consumption acts in response to variation in government spending to examine the Ricardian Equivalence Hypothesis. Variables include household's consumption growth rate, government spending growth rate, household's disposable income growth rate and a dummy variable for the time with a deficit. The dummy variable takes 1 when there is a deficit and equals 0 when there is no deficit. The study has used quarterly data for the period from 2006 quarter 1 to 2012 quarter 3 was analyzed by estimating a consumption function. A positive linear relation was found between Households consumption and government spending which invalidated the existence of the Ricardian equivalence in Romania.

The finding of the study supported Keynes' view which supposed that to boost consumption, it is essential to increase government spending. The paper articulated possible factors why the Ricardian Equivalence Hypothesis does not apply to the Romanian economy, those factors can be found in logical error of the model as detailed below: a) the markets are not as perfect as assumed by the Ricardian Equivalence Hypothesis's assumptions. b) The purpose of the public funds do vary, the inheritance structure varies from one generation to another and not all the families are transferring their wealth from one generation to another. The paper also highlighted the possibility of model imperfection due to the inadequate access to the data accessible for Romania and the limited number of exogenous variables, which is capable of influencing the results.

Another study by Adji and Alm (2016) tested the Ricardian Equivalence Hypothesis in Indonesia, a developing country. It focused on empirical tests of the effect of government debts on consumption, interest rates, and current account balance by using the error correction model (ECM) to analyse time-series data from 1972 to 2003. Ricardian Equivalence Hypothesis was rejected based on the aggregate consumption function's outcome with a conclusion that consumers increase the consumption of their current income due to debt financing. The Euler equation's outcome also rejected Ricardian Equivalence Hypothesis because it gave evidence against rational expectations and debt neutrality. Interest rate function has indicated that when the oil price is excluded in the interest rate function evaluation, deficits and debt notably boost real interest rate eventually nullifying the Ricardian equivalence. On the other hand, whenever oil price is included as one of interest rate determinants, a rise in oil price reduces the real interest rate, subsequently providing support for the Ricardian theory.

On average, the outcomes of the analysis entails that debt finance does raise interest rates and current consumption at the expense of future consumption. Debt finance slows down exports and encourages imports through currency appreciation. A conclusion has been drawn that the Ricardian Equivalence Hypothesis does not hold in Indonesia because consumers in Indonesia are not forward-looking. The result implied that fiscal deficits impose huge long-run costs on the Indonesian. That is because deficit spending only does stabilize an economy that is at less than full employment in the short run based on the Keynesian view. Nevertheless, the study's finding showed that deficits can lead to decreased capital formation, reduced productivity and lowered economic growth in the long-run.

Hayo and Neumeier (2016) provided useful information in their study which applied data from a German population obtained in 2000 and 2013 survey to test the soundness of the Ricardian equivalence theorem. Households were asked if they changed their consumption and saving as a result of a rise in public debt that happened between 2008 and 2012. Additionally, the study has evaluated consumption and saving reactions to a decrease in payroll taxation executed in a while before carrying out the survey. The study found evidence that Ricardian equivalence theorem does not hold if public debt increases, merely 7% of the respondents consumed a smaller percentage of their income to save a large percentage of their income. Ricardian equivalence theorem was rejected due to violation of at least one of the assumptions of Ricardian equivalence theorem.

Nadeniche (2016) carried out a research to study the validity of Ricardian equivalence and twin deficits hypotheses across 50 countries worldwide. The null hypothesis tested was that, consumers behave as if they have infinite planning horizons against the alternative hypothesis that consumers behave as if they have a finite planning horizon. The study used annual cross-sectional data from 1970 to 2013 as it estimated the main regression using a sub-sample containing 23 industrialized countries; Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Japan, Luxembourg, Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, United Kingdom, United States. The analysis further examined a long-run variation in government budgets and trade deficits among those countries to evaluate the consequences of persistent government budget deficits. The study's finding rejected Ricardian equivalence proposition using the cross-country data and supported the twin deficits stating that that country which has been experiencing government budget deficits for a long period is likely to experience trade deficits for a long period.

Another study by Haug (2016) has empirically tested the new test of Ricardian equivalence hypothesis using a descriptive measure of tax shocks. According to Huang, a tax increase is encouraged only by concerns for improving the financial wellbeing of the government with an increase in tax news representing a switch from debt to tax funding which should have no effects on the economy if Ricardian equivalence hypothesis holds. It is further explained that, such increase in tax gives the impression to have positive effects on real gross domestic product. It was further elaborated that it happens because of fiscal expectation as many of the tax increases are executed with significant delays and distorted taxes does boost economic activity before taxes increase caused by inter-temporal substitution.

The study has used OLS and VAR to study the effect of exogenous tax change on real output growth. The aims of the study were to answer the following empirical question: How good Ricardian equivalence can be used to estimate fiscal policy? It was explained that if governments consolidate their budgets by rising taxes only with the aim to decrease government debt, which reduces future taxes, no negative aggregate demand effects follow that act for the reason that the intertemporal tax burden is unchanged. The empirical results do not support the Ricardian equivalence hypothesis because the effects of a tax increase, keeping government spending fixed, have a statistically significant influence on real GDP.

One of the reviewed studies included research carried out in Lesotho by Mosikari and Eita (2017). The study aimed to test Ricardian Equivalence Hypothesis in Lesotho. In the first analysis, government expenditure was used as a measure of fiscal policy while the second analysis used debt and GDP to measure fiscal policy. The paper used annual data for 2 sample periods; 1980–2014 and 1988–2014 in both analyses. It applied the autoregressive distributed lag model (ARDL) and cointegration approach to examine the association between variables. Government expenditure, gross domestic product per capita, household consumption, government debt, population growth and inflation were used in the study. To test for Ricardian Equivalence, the household consumption function was estimated to get the relationship between consumption and government debts. The result reveals that, there is a long-run equilibrium relationship between variables in both analyses. Furthermore, analyses also found that a rise in government debt or government expenditure reduces household consumption per capita, in other words, there is an inverse relationship. It implies that, the Ricardian Equivalence Hypothesis holds for Lesotho, which means consumers are forward looking when it comes to their expenditure decision making in relation to fiscal policy in the Kingdom of Lesotho. It was therefore concluded that fiscal policy is an ineffective tool to stabilize the economy in Lesotho.

An article by Omotosho and Datom (2017) had tested the validity of Ricardian Equivalence Hypothesis in Nigeria by means of quarterly data for the period 1985Q1 - 2014Q4 which was used to estimate a standard reduced-consumption function and examine how households treat government debt in terms of net wealth. Autoregressive Distributed Lag bound test was used to examine the long-run association among disposable income, government debt, government final consumption expenditure and government budget deficit. The study found that government debt has a positive impact on consumption expenditure confirming that Ricardian Equivalence Hypothesis does not hold in Nigeria simply because households consider debt as net wealth. Additionally, households do not exist forever and do not care about the next age group the same way they can be caring about themselves. Similarly, capital markets are not perfect because of borrowing constraints.

Pickson and Ofori-Abebrese, (2018) tested the validity of the Ricardian equivalence in Sub-Sahara African Countries with a pooled mean group estimation approach, also called panel autoregressive distributed lag model estimation approach to examine the Ricardian Equivalence Hypothesis in 5 Sub-Sahara African states, which are Gambia, Nigeria, Botswana, Ghana, and Kenya. The study used 1981 to 2014 annual time series data for those countries. Private consumption, GDP per capita, government debt, government purchases, interest rate, government interest payment on the outstanding debt and inflation were the variables used in the study. The study concluded that the Ricardian equivalence hypothesis does not hold in Sub-Sahara African countries. The study used a Panel ARDL approach to investigate the evidence of Ricardian Equivalence Hypothesis by estimating the consumption function. It further explained that based on the Ricardian Equivalence Hypothesis, individuals' consumption pattern is not supposed to be affected by the option that the government choose to finance its expenditures. The study concluded that the Ricardian equivalence hypothesis does not hold in Sub-Sahara African countries.

It is empirically concluded that the Ricardian Equivalence Hypothesis holds mostly in developed countries than in developing countries because consumers are forward-looking in those countries more in comparison to consumers in developing countries.

Furthermore, Saeed and Khan (2012) concluded that limited work has been done in developing countries as far as testing the validity and stability of the Ricardian Equivalence Hypothesis is concerned. The REH assumptions couldn't be fulfilled in developing countries giving an impression that REH doesn't hold in developing countries.

2.4 Conclusion

The chapter covered theoretical and empirical literature review on testing the Ricardian Equivalence Hypothesis. It was empirical concluded the importance of testing the Ricardian Equivalence Hypothesis in all countries due to variations of the results. Despite a review of several studies, the researcher found none linked to Namibia. Therefore, it motivated the researcher to cover the gap by testing the Ricardian Equivalence Hypothesis in Namibia. The research methodology will be covered in the next chapter.

CHAPTER THREE: ANALYTICAL FRAMEWORK AND METHODOLOGY

3.1 Introduction

This chapter includes four critical and essential components. Firstly, a research design in which types of research, as well as research methods is presented. Secondly, procedures which included the types of data, data period and data source are presented. Thirdly, data analysis wherein software, types of tests applied including non-stationary test used, Bounds Test for cointegration, ECM model, stability test and diagnostic tests used in the study were part of this chapter. Finally, research ethics which guided the researcher is covered in this chapter.

3.2 Research Design

A quantitative research design was used in the study along the econometric modelling to achieve the specified objectives. Ricardian Equivalence Hypothesis can be tested using several methods which include aggregate consumption function, Euler equation, interest rate function, exchange rate function and current account function (Barro, 1974). The aggregate consumption function was used in the study due to availability of data. Most of the studies reviewed used consumption function to test for Ricardian Equivalence Hypothesis. The studies which also used the consumption function are the following: (Adji & Alm 2016; Belingher & Moroianu 2015; Mosikari & Eita 2017; Omotosho & Datom 2017; Pickson & Ofori-Abebrese 2018; Saeed & Khan 2012; Sunge, Matsvai & Mufandaedza 2015).

Different variables were used in the analysis; Consumption (C) is measured as a final consumption expenditure (constant Local Currency Unit (LCU)) while Tax (T) is measured as Taxes minus subsidies on products (constant LCU). Government debt (B) is measured as central government debt, total (current LCU). Inflation (π) is measured as a GDP deflator (annual %) while Income (Y) is measured as gross national income (GNI) (constant LCU using 2010 as a base year). Government expenditure (E) is measured as general government final consumption expenditure (constant LCU) and population growth is denoted by P.

3.3 Procedure

Secondary quarterly time series data for the period from 1991 quarter 1 to 2017 quarter 4 were used in the study. The study period was selected based on the availability of data during data collection. The results generated are intrinsically Namibian. Annual data for consumption, tax, inflation, income, and government expenditure and population growth were obtained from the World Bank database while data for government debt was obtained from Bank of Namibia. The annual data was converted to quarterly data using Eviews 10.

3.4 Data analysis

Eviews software was used for data analysis with the main objective being to empirically test the Ricardian Equivalence in Namibia using quarterly time-series data from 1991 quarter one to 2017 quarter four. The specific objectives were achieved as follows: The ARDL long run form and bound test for cointegration were used to determine the variables' long run coefficients, which determine long run impact of independent variables on consumption. The long-run relationship between tax and consumption as well as between government debts and consumption were also investigated using ARDL long run form and bounds test for cointegration. The error correction model was used to determine the short run coefficient, which determines short run impact of independent variables on consumption as well as measuring the convergence of the model toward its long run equilibrium. The estimation process followed the following sequence. Unit Root Tests, ARDL long run form and bound test, ECM, stability test and diagnostic tests.

3.4.1 Unit Root Tests

As a standard, the initial step is to test for non-stationarity (unit root) of time-series to establish the univariate characteristics of data and the order of integration for all variables. To investigate the non-stationarity of the series, the Augmented Dickey-Fuller (ADF) test and the Phillips-Perrons (PP) were applied. The two used unit root tests specified the null hypothesis that the variable is non-stationary against the alternative hypothesis that the variable is stationary (Gujarati, 2003). The decision rule is to reject H_0 if test statistics value is greater than critical value in absolute terms and conclude that the variable is stationary.

Where variables are not stationary in levels, they were differenced until the order of integration for the series was known. For variables which were stationary in level, the ECM analysis was conducted using the level values of such variables. Similarly, for non-stationary variables, the ECM analysis was conducted using first differences. ARDL model is ideal for variables whose order of integration has a combination of order zero I

(0) and order one (1).

3.4.2 ARDL long run form and bound test for co-integration.

Data analysis included consumption model estimation using autoregressive distributed lag model in order to determine how government debt and tax affect consumption to test for REH. The impact of government debts and tax on consumption is determined by the sign of coefficient for government debts and tax in equation 5. The impact can either be negative, positive or there is no impact if their coefficients are equal to zero. The REH is a short-run as well as a long-run phenomenon as it is tested by (Daaniyall & Rahman, 2013). According to the Ricardian equivalence hypothesis, a change in taxes is expected to have no effect on consumption. In equation (5) below α_1 is tax coefficient and it is hypothesized to equal to zero because taxes is expected to have no effect on consumption. Finally, government debt should have a negative coefficient (α_2) because it is assumed to have a negative effect on consumption if REH holds (Barro, 1974). The next consumption function was used with variables as defined in research design while α_0 and μ is constant and error term respectively.

$lnC_t = \alpha_0 + \alpha_1 lnT_t + \alpha_2 lnB_t + \alpha_3 \, ln\pi_t + \alpha_4 lnY_t + \alpha_5 lnE_t + \alpha_6 lnP_t +$

μ_t.......equation 5

The study adapts the ARDL or bound cointegration technique used by Mosikari and Eita (2017) to test for cointegration. The ARDL does fit for Ricardian Equivalence Hypothesis testing because debt financing brings changes to other economic variables, beyond the time it is incurred. Such changes in variables are not only what reflects immediately but it is distributed over future period because most of the government loans are on long-term basis. The variables as defined in research design, the unrestricted error correction model was specified as follow:

$\Delta lnC_t =$

$\beta_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta lnC_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta lnT_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta lnB_{t-i} + \sum_{i=0}^{n} \alpha_{4i} \Delta ln\pi_{t-i} +$

$\sum_{i=0}^{n} \alpha_{5i} \Delta lnY_{t-0} + \sum_{i=0}^{n} \alpha_{6i} \Delta lnE_{t-i} + \sum_{i=0}^{n} \alpha_{7i} \Delta lnP_{t-i} + \delta_1 lnC_{t-1} + \delta_2 lnT_{t-1} +$

$\delta_3 lnB_{t-1} + \delta_4 ln\pi_{t-1} + \delta_5 lnY_{t-1} + \delta_6 lnE_{t-1} + \delta_7 lnP_{t-1} + \epsilon_t$...............equation 6

β_0 denotes the intercept, and α_i are short run parameters, δ_i are long run coefficients, Δ is the first difference operator and ϵ_t is the random error term, ln is the logarithm. Another test conducted is co-integration test in order to find out if variables have long-run equilibrium. The co-integration test can be applied in several ways, depending on the nature of the equation that is tested. However, for this study the Bounds Testing for cointegration was used to determine the long run relationships between variables, which are integrated of different orders.

Hypothesis to be tested in equation (6) is: H_0: $\delta_1 = \delta_2 = \delta_3 = \delta_4 = \delta_5 = \delta_6 = \delta_7 = 0$ against the alternative H1: $\delta_1 \neq 0 \; or \; \delta_2 \neq 0 \; or \; \delta_3 \neq 0 \; or \delta_4 \neq 0 \; or \delta_5 \neq 0 \; or \delta_6 \neq 0 \; or \delta_7 \neq 0$. Rejecting H_0 means there is cointegration. Diagnostic tests, which were employed in the study to measure the reliability of the findings, are: Serial correlation, normality test, stability test and heteroscedasticity test. The test for co-integration showed that there is co-integration among the variables thus; the adjustment of the short-run to the long-run equilibrium is obtained through the error correction model (ECM) and a short run through ARDL model (Gujarati, 2003). If there was no existence of co-integration, only ARDL model could be estimated.

3.5 Research Ethics

The researcher took accountability for the results, by reporting accurate results and cited every source used in the study using Harvard style of citing and referencing. The study is an original work of the writer.

3.6 Conclusion

Chapter 3 was about Research Design, Procedure, Data analysis and Research Ethics.

Furthermore, chapter 3 defined the variables and clarified the sources of variables used in the study. The chapter also explained the ARDL model Methodology applied in the investigation to empirically test the Ricardian Equivalence in Namibia. It further explained the ARDL long run form and bound test for co-integration and then specified the ARDL model adopted in the study. To sum up, it explained the method used to achieve the objective of the study. Chapter 3 cleared the pathway for data analysis and interpretation which is presented in chapter 4

CHAPTER FOUR: DATA ANALYSIS AND EMPIRICAL RESULTS

4.1 Introduction

Chapter four presents the results estimated for the study. The chapter starts with the unit root test for consumption, tax, government debt, inflation, income, government expenditure and population growth presented in table format using the Augmented Dickey-Fuller and the Phillips Peron tests. It then continues with long run form and bound test for cointegration and ECM model estimation. Finally, the last part of the chapter deals with testing the validity of the model generated in the study using stability test and diagnostic tests, which is essential to confirm the robustness of the results obtained.

4.2 Estimation of the model

4.2.1 Unit root test

The Phillips Peron (PP) and Augmented Dickey-Fuller tests (ADF) were used to test the series for their order of integration. The table below presents the test statistics value and critical from unit root test for all variables as well as the order of integration at 5 % level of significance see Appendix B for more information.

Table 4.1: Unit root test

Variable	Model Specification	ADF	ADF	PP	PP	Order of Integration
		Levels	1st Difference	Levels	1st Difference	

Lninf	**None**	-1.023 (-1.944)	-6.041*** (-1.944)	-0.644 (-1.944)	-12.949*** (-1.944)	I(0)
	Constant	-3.411** (-2.890)	-6.085*** (-2.892)	-3.495*** (-2.890)	-12.838*** (-2.890)	
	Constant, Linear Trend	-3.547** (-3.452)	-6.041*** (-3.458)	-3.625** (-3.452)	-12.725*** (-3.458)	
Lnb	**None**	1.997 (-1.944)	-5.466 *** (-1.944)	2.484 (-1.944)	-10.091*** (-1.944)	I(1)
	Constant	-0.806 (-2.892)	-5.803*** (-2.892)	-3.315** (-2.890)	-10.091*** (-2.890)	
	Constant, Linear Trend	-1.605 (-3.452)	-5.297*** (-3.458)	-3.236* (-3.452)	-11.036*** (-3.453)	
Lncns	**None**	2.578 (-1.944)	-2.594*** (-1.944)	4.731 (-1.944)	-10.635*** (-1.944)	I(1)
	Constant	-0.036 (-2.890)	-3.708*** (-2.890)	0.801 (-2.890)	-11.990*** (-2.890)	
	Constant, Linear Trend	-2.730 (-3.454)	-3.639*** (-3.454)	-2.782 (-3.452)	-12.264*** (-3.453)	
Lne	**None**	2.156 (-1.944)	-3.116*** (-1.944)	3.668 (-1.944)	-10.485*** (-1.944)	I(1)
	Constant	-0.513 (-2.890)	-3.832*** (-2.890)	-0.241 (-2.890)	-11.330*** (-2.890)	
	Constant, Linear Trend	-2.712 (-3.454)	-3.832*** (-3.454)	-2.551 (-3.452)	-11.276*** (-3.452)	
Lnt	**None**	2.692 (-1.944)	-1.212 (-1.944)	5.413 (-1.944)	-10.252*** (-1.944)	I(1)
	Constant	-0.843 (-2.890)	-10.939*** (-2.890)	-0.782 (-2.890)	-12.983*** (-2.890)	
	Constant, Linear Trend	-3.434* (-3.452)	-10.898*** (-3.453)	-3.314* (-3.452)	-13.010*** (-3.453)	
Lny	**None**	2.876	-2.484**	5.740	-10.872***	I(1)

		(-1.944)	(-1.944)	(-1.944)	(-1.944)	
	Constant	-0.037 (-2.890)	-3.853*** (-2.890)	0.138 (-2.890)	-12.654*** (-2.890)	
	Constant, Linear Trend	-3.176* (-3.454)	-3.844* (-3.454)	-3.156* (-3.452)	-12.643*** (-3.453)	
Lnp	**None**	-1.265 (-1.944)	-3.183** (-1.944)	-1.306 (-1.944)	-11.367*** (-1.944)	I(1)
	Constant	-1.824 (-2.891)	-3.222** (-2.891)	-1.610 (-2.890)	-11.374*** (-2.890)	
	Constant, Linear Trend	-1.882 (-3.454)	-3.742 *** (-3.454)	-0.993 (-3.452)	-11.446*** (-3.453)	

Source: Author's compilation using Eviews 10

Note: ***, ** and * means the rejection of the null hypothesis at 1%, 5% & 10% level of significance respectively. The numbers appearing at the top of a table's cells represent a test statistics value, while the numbers appearing at the bottom of a table's cells stand for the critical values at 5% level of significance.

Hypothesis: H_0: Variable has a unit root / not stationary

H_1: Variable does not have a unit root / stationary

Decision rule: reject H_0 if test statistics value is greater than critical value in absolute terms and conclude that the variable is stationary.

By looking at the results presented in table 4.1 above table consumption, tax, income, government expenditure and population growth are non-stationary at level when tested at all mode of specifications which is none, constant as well as constant and linear trend using Phillips Peron and Augmented Dickey Fuller test. However, they do not have a unit root at first differences. This confirm they are integrated of order one I(1).

Furthermore, it attest that government debt is stationary at level when tested at constant using Phillips Peron test but otherwise stationary at first difference based on the majority rule. Inflation is stationary at level when tested at none and intercept only using Phillips Peron and Augmented Dickey Fuller test. On the other hand, it is stationary at first difference when tested at trend and intercept using Phillips Peron test and Augmented Dickey Fuller test. However, inflation is concluded to be integrated of order zero by following the majority rule. There is a mixture of variables integrated of order zero I(0) and order I(1) thus, an Autoregressive Distributed Lag technique was used in the study.

4.2.2 ARDL long run form and bound test to cointegration

The ARDL long run form and bound test to cointegration was used to determine the long run relationships between variables as well as long run coefficients.

Table 4. 2: Bound test to cointegration from F-bounds test's finite sample

Level of significance	**Lower bound I(0)**	**Upper bound I(1)**	**F-bounds test's F statistic**	**Cointegration**	**ARDL or ECM**
10%	2.088	3.103	6.079	**Yes**	**ECM**
5%	2.431	3.518	6.079	**Yes**	**ECM**
1%	3.173	4.485	6.079	**Yes**	**ECM**

Source: Author's compilation using Eviews 10, Note: K=6 d.f and the lag length is chosen automatic by the Eviews using Akaike information criteria

The lower bound I(0) and upper bound I(1) are from F-bounds test's finite sample in appendix C: Bounds test for cointegration. Additionally, table 4.2 is compiled from appendix: C.

Hypothesis: H_0: There is no cointegration

H_1: There is cointegration

The F-statistic is calculated as a residual sum of squares divided by a number of restrictions over the residual sum of squares divided by a number of independent variables. A decision rule would be to reject H_0 when F-statistic is greater than the upper limit I(1) and conclude that there is cointegration. Similarly, accept H_0 when F-statistic is less than the lower limit I(0) and conclude that there is no cointegration. If F-statistic is between lower limit I(0) and upper limit I(1) cointegration is indecisive. The result presented in table 4.2 shows a cointegration at 1% level of significance which means F-statistic is greater than the upper limit. Also, F-statistic of 6.073 is greater than 3.103, thus, concluding that there is cointegration.

Table 4.3, presents the estimated long-run coefficients for consumption function using inflation, government debt, government expenditure, tax, population growth and income as independent variable. The table is compiled from appendix C: ARDL long run form and Bounds test.

Table 4. 3: Long-run coefficients

Variable	Coefficient	Std. Error	t-Statistic	Prob.

LNB	0.014	0.007	1.909	0.060
LNE	0.779	0.083	9.403	0.000
LNINF	0.005	0.008	0.655	0.514
LNP	0.002	0.016	0.119	0.906
LNT	-0.035	0.066	0.524	0.602
LNY	0.078	0.139	0.562	0.576
C	2.326	1.205	1.930	0.057

Source: Author's compilation using Eviews 10.

The consumption function is as follow:

LNCNS=2.326 + 0.014LNB+ 0.779LNE+ 0.0054LNINF+ 0.002LNP- 0.035LNT+ 0.078LNY

The P-values indicate that only government debt and government expenditure have a significant positive impact on consumption in Namibia at 10% and 1% level of significance, respectively. The sign for government debts and government expenditure are in line with Keynesian view on the effect of government debts and government expenditure on consumption. A 1% increase in government debts will lead to approximately 0.014% increases in consumption, ceteris paribus. A 1% increase in government expenditure will lead to about 0.779% increases in consumption, all other things being equal. Population growth, income, inflation, and tax are insignificant, therefore are not determinants of consumption in the long run. The constant (2.326) means, if all independent variables (inflation, government debt, government expenditure, income, population growth and tax) in the model are steady, then consumption would be equals to 2.3261 units and it is significant at 10% level of significance.

The main objective of the study was to empirically test the Ricardian Equivalence in Namibia by investigating the impact of government debts and tax on final household's consumption expenditure. According to the Ricardian Equivalence hypothesis, government debt supposed to have a negative sign if REH holds. The ARDL long run form and Bounds test results show a significant positive relationship between government debt and consumption, which is inconsistent with the REH in the Namibian economy. According to the Ricardian Equivalence Hypothesis, tax coefficient supposed to be zero if REH hold. Tax is however, insignificant in the model. In conclusion, the REH does not hold in the Namibian economy in a long-run.

4.2.3 Error Correction Model Estimation.

Since there is cointegration, the error correction model is estimated. The optimal lag was selected automatically using the Akaike Information Criterion (AIC). The appropriate lag length of 1, 0, 4, 1, 0, 1 and 1 was selected for consumption, government debt, government expenditure, inflation, population growth, tax and income respectively as indicated in appendix D. The error correction model results are presented in Table 4.4.

Table 4. 4: Error Correction Model results

Dependant Variable: D(LNCNS)

Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**
C	0.597	0.171	3.499	0.001

DLNCNS(-1)	0.039	0.079	0.498	0.620
DLNB	0.018	0.011	1.698	0.093
DLNE	0.430	0.052	8.339	0.000
DLNE(-1)	-0.092	0.068	-1.356	0.179
DLNE(-2)	-0.090	0.049	-1.848	0.068
DLNE(-3)	-0.090	0.049	-1.848	0.068
DLNE(-4)	0.207	0.053	3.898	0.000
LNINF	0.013	0.005	2.662	0.009
LNINF(-1)	-0.014	0.005	-2.913	0.005
DLNP	0.054	0.033	1.640	0.105
DLNY	0.353	0.117	3.024	0.003
DLNY(-1)	-0.042	0.098	-0.426	0.671
DLNT	-0.119	0.040	-3.002	0.004
DLNT(-1)	-0.009	0.034	-0.282	0.779
ECT(-1)	-0.251	0.072	-3.476	0.001
Adjusted R-squared	0.734			
F-statistic	18.865			
Prob(F-statistic)	0.000			
Durbin-Watson stat	1.919			

Source: Author's compilation using Eviews 10, Note: the lag length is chosen automatic by the eviews using Akaike information criteria

Table 4.4 shows the results of the ECM which is a combination of the short-run coefficient and long-run representation in the model which is the lagged error correction term (ECT(-1)). The error correction term measures the convergence of the model toward its long-run equilibrium. The error correction term is negative (-0.251) and statistically significant at all levels of significance since the p-value is 0.000 which is less than 1% level of significance. It is suggesting that there will be a correction of the previous error in the following period. The absolute value of the coefficient of the error-correction term is 0.251, implying that consumption will be adjusting by 25.1% towards its long-run equilibrium in the next quarter.

The F-statistic value is 18.865 with a P-value of 0.000. It implies that the error correction model is significant for the whole model and the independent variables jointly influence consumption. The adjusted R-squared is 0.73, which means 73% of the variation in consumption is explained by government debt, government expenditure, inflation, tax population growth and income. The Durbin-Watson statistic is 1.919 asserting that there is no autocorrelation.

In the Namibian context, the ECM indicates that government debt does determine consumption significantly at 10% level of significance while government expenditure, inflation, income and tax determine consumption significantly at 1% level of significance. Tax is measured as taxes minus subsidies on products. Population growth was found to be insignificant in explain consumption. Government debt, government expenditure, inflation and income have a positive impact on consumption while the tax hurts consumption. The ECM's short-run coefficients for significantly variable is explained as follows: A 1% increase in government debt, government expenditure, inflation and income leads to 0.018%, 0.430%, 0.013% and 0.353% increase in consumption respectively. Furthermore, 1% tax increase lead to 0.119% decrease in consumption.

The main aim of the research was to empirically test the REH in Namibia by examining the impact of government debt and tax on final household's consumption expenditure. According to the REH a change in tax is expected to have no impact on consumption if REH hold. However, the ECM found that tax has a significant negative effect on consumption, which is inconsistent with the REH in Namibian economy. Government debt is expected to have a negative sign if REH holds. The ECM results show a significant positive relationship between government debt and consumption, which is evidence against REH in Namibian economy. In conclusion, in short run the REH does not hold in Namibia.

Since REH does not hold in Namibia, it implies that Namibian consumers are not consistent with the assumptions which are assumed to be met for Ricardian Equivalence Hypothesis to hold (Barro, 1974). It further attests that consumers are not consistent with Income Life Cycle hypothesis. In other words, consumers do not smooth their consumption, thus if current tax is reduced then they increase their consumption, without anticipating tax increase in the future. It also implies that consumers are not complying with the assumption of rational expectations, thus they do not realise that current tax cut might leads to tax increase in the future.

There might be imperfect capital markets, thus Ricardian Equivalence Hypothesis does not hold in Namibia because it makes it difficult for consumers to borrow and finance their spending if necessary. There is a possibility of inter-generational selfishness thus, on top of knowing that tax cut for current generation means tax increase for future generation. Selfish parents can respond by leaving bequests to their children for them to pay high future tax. The findings are in line with a conclusion by (Saeed and Khan,

2012) that the REH is not likely to hold in developing countries, because it requires some assumptions that may not be fulfilled in developing countries.

4.3 Model efficiency test

Residual and stability diagnostics test were used for model efficiency test.

4.3.1 Residual Diagnostics for ECM.

4.3.1.1 ECM's Normality test

Residuals should be normally distributed. Jarque Bera test was used to measure the difference of skewness and kurtosis of the series from the one of normal distribution. Hypothesis setting is as follows:

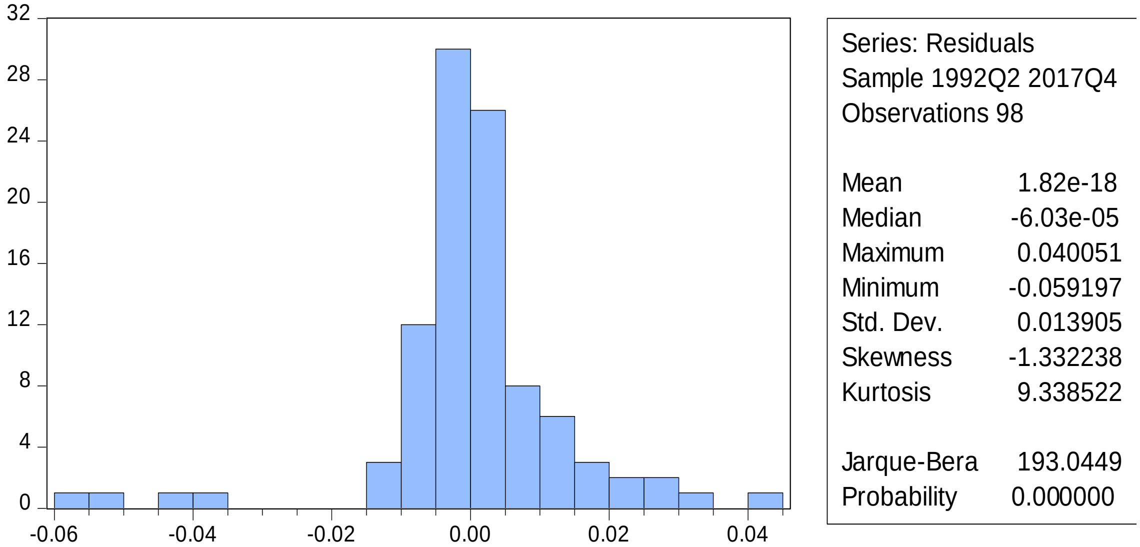
H_o: Normal distribution (residual follows a normal distribution)

H_1: No normal distribution (residual does not follows a normal distribution)

If the p-value of Jarque-Bera statistics is less than 5 percent (0.05), null hypothesis can be rejected and accept the alternative hypothesis. Histogram-Normality test (Jarque-Bera Statistic) was used in the study. The results for Jarque-Bera test are shown in the graph on figure 4.1 on the next page.

The p-value of Jarque-Bera statistics is 0.000 which is less than 0.05 hence the null hypothesis that residual follows a normal distribution is rejected and it is concluded that residuals do not follow a normal distribution.

Figure 4. 1: ECM's Normality Test



4.3.1.2 ECM's Serial correlation

Serial correlation is a condition when the residuals are serially correlated over time. Serial correlation is not desirable in econometric models. It can be formed in the model due to incorrect model specification, omitted variables, incorrect functional form or incorrectly transformed data. There are several ways, which can be used to detect the existence of serial correlation in the model. An approach of detecting serial correlation used in the study is the Breusch-Godfrey serial correlation LM test. Hypothesis setting is as follows:

Null hypothesis Ho: no serial correlation (no correlation between residuals)

Alternative hypothesis H1: serial correlation (correlation between residuals)

The study has tested for serial correlation with the results shown in table 4.5 on the next page. The results confirmed that there is no presence of serial correlation since the probability of Chi-Square 0.482, is greater than 0.05 thus failing to reject the Null hypothesis and conclude that there is no presence of serial correlation.

Table 4. 5: ECM's Breusch-Godfrey Serial Correlation

F-statistic	0.604	Prob. F(2,80)	0.549
Obs*R-squared	1.458	Prob. Chi-Square(2)	0.482

Source: Owner's compilation using Eviews 10

4.3.1.3 ECM's Heteroscedasticity

Heteroscedasticity is a situation when the variance of residuals in the model is not constant over time. The opposite is homoscedasticity, which means the variance of the residuals is constant. Heteroscedasticity is not desirable in the model and it may be caused by incorrect model specification or incorrectly transformed data. Hypothesis setting for heteroscedasticity is as follows.

H_0: Homoscedasticity (variance of residual is constant)

H_1: Heteroscedasticity (variance of residual is not constant)

The ARCH test for heteroscedasticity was employed in the study and the results are presented in Table 4.6.

Table 4. 6: ECM's Heteroskedasticity Test: ARCH

F-statistic	0.374	Prob. F(1,94)	0.542
Obs*R-squared	0.381	Prob. Chi-Square(1)	0.537

Source: Owner's compilation using Eviews 10

The results above confirmed that there is no heteroscedasticity because the p-value of Obs*-R-squared is 0.537 which is greater than 5% level of significance. It means the null hypothesis (homoscedasticity) was not rejected, which is desirable. Therefore, the econometric model employed in the study is certainly strong from a practical viewpoint. The model has met most of the desired econometric properties.

4.3.2 Stability Diagnostics for ECM

To determine the stability of the ECM model, stability test should be tested. The Ramsey Reset test, the Cusum test and Cusum of square test were used for stability test.

4.3.2.1 ECM's Ramsey RESET Test

The stability test is used to test whether the model is stable. One of the tests used in the study is the Ramsey Reset test. Ramsey reset test's null hypothesis states that the model is stable, while the alternative hypothesis states that the model is not stable. The decision rule is to accept the null hypothesis if F-statistic is greater than the level of significance. If F-statistic is less than the level of significance, that means the model is not stable. If F-statistic is less than the level of significance, that means the model is not stable. The result of the test is shown in table 4.7. Since the probability of F-statistic is 0.53, which is greater than 5% level of significance, the null hypothesis is accepted.

Table 4. 7: ECM's Ramsey RESET Test

	Value	**df**	**Probability**

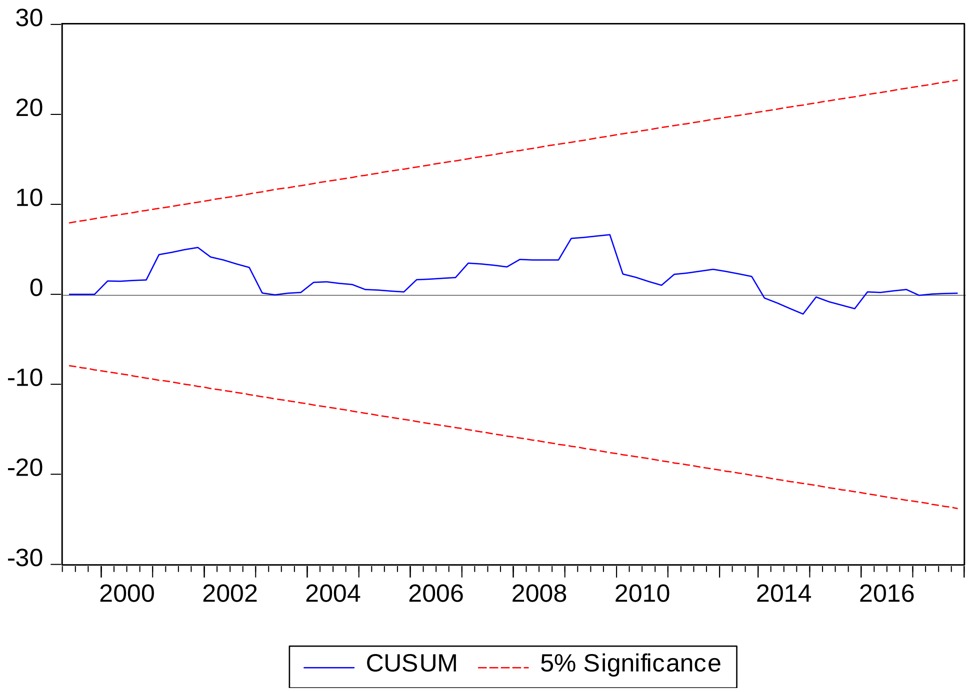
t-statistic	0.631	81	0.530
F-statistic	0.398	(1, 81)	0.530

Source: Owner's compilation using Eviews 10

4.3.2.2 ECM's Cusum

Another stability test used in the study is the Cusum test approach to test the stability of the model. The result of the test is revealed in figure 4.2. The model does indeed satisfy the stability condition as the line lies within the 5% significant boundary as shown in figure 4.2 on the next page.

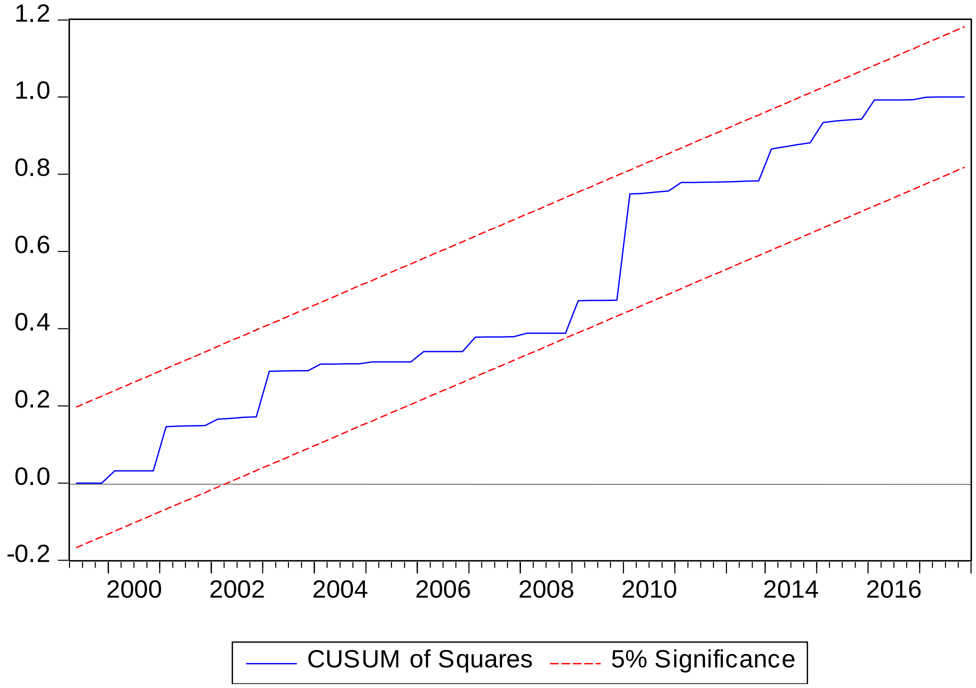
Figure 4. 2: ECM's Cusum test



4.3.2.3 ECM's Cusum of Square test

The Cusum of square test approach was another stability test used in the study to test the stability of the model. The result of the test is presented in figure 4.3 on the next page. The figure shows that the model is stable as the blue line lies within the boundary limit indicated by the red dotted line.

Figure 4. 3: ECM's Cusum of square



CHAPTER FIVE: CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

In this chapter, the conclusion of the study is covered. Furthermore, findings are linked to the objective of the study. Results are also linked to the reviewed theories and reviewed study. The recommendations for future study and policymaking is also presented.

5.2 Short run conclusion of the study

The objective of the study was to empirically test the Ricardian Equivalence Hypothesis in Namibia using quarterly time-series data from 1991 quarter one to 2017 quarter four. The findings addressed the objectives of the study by summing up that, in short-run, there is a positive relationship between Government Debt and Consumption, which means REH does not hold in the Namibian economy. It was also concluded that tax harms consumption which is evidence against REH in the Namibian economy. In the short-run, it was summed up that REH does not hold in Namibia.

Unfortunately, the researcher did not come across any paper about a study undertaken to test the REH in Namibia. Therefore the findings could not be compared to any past study carried out in Namibia. However, articles with evidence against REH were found in studies done in Pakistan, Romania, Germany and Sub-Sahara African Countries (Saeed & Khan, 2012), (Belingher & Moroianu, 2015), (Hayo & Neumeier 2016) and by (Pickson & Ofori-Abebrese, 2018) respectively.

There are several policy implications in the short run finding of this study. The findings are useful for fiscal policy's decision making in Namibia. The study found out that it is worth increasing government spending to stimulate the economy through debt financing since REH does not hold in Namibia. The reason being households considered government debt as net wealth. Policy implication regarding tax is that it may be used to stimulate the economy since tax was found to be inversely related to the consumption therefore, a decrease in tax is assumed to lead to an increase in consumption. It is therefore, believable that, fiscal policy plays an effective role in stabilising the economy because consumers are not forward-looking when it comes to their expenditure decision making concerning fiscal policy in the Republic of Namibia.

5.3 Long run conclusion of the study

The objective of the study was addressed by concluding that there is a long-run relationship between consumption and the explanatory variables. The findings also addressed the objectives of the study by summing up that there is a positive relationship between Government Debt and Consumption which is inconsistence with the REH in the Namibian economy. In the long-run, it can be generally concluded that the REH does not hold in the Namibian economy.

There are some fiscal policy implications in the long-run finding of this study. The results are useful as it will help with fingerling out some of the possible policy implications concerning the potential consequences of using debt financing and Tax financing as a means of financing government spending. The study found that it is worth increasing government spending to stimulate the economy through debt financing since

REH does not holds. Policy implication regarding tax is that it may be used to stimulate the economy since consumers are not forward-looking. Most of all, the study will contribute to the empirical literature.

5.4 Recommendations to future researchers and policy makers.

Policymakers may use fiscal policy to stimulate the economy. Policymakers should motivate researchers to do further researches about testing the Ricardian Equivalence in Namibia context since it will help in coming up with good decision making on fiscal policy. More research about testing the Ricardian Equivalence hypothesis in Namibia should be done to provide more empirical literature.

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APPENDICES

Appendix A: Data Set

Quarter	LNCNS	LNB	LNE	LNINF	LNP	LNT	LNY
1991Q1	24.279	16.811	24.346	1.792	1.265	21.429	24.424
1991Q2	24.279	16.811	24.346	1.792	1.265	21.429	24.424
1991Q3	24.279	16.811	24.346	1.792	1.265	21.429	24.424
1991Q4	24.279	16.811	24.346	1.792	1.265	21.429	24.424
1992Q1	24.275	18.793	24.406	2.331	1.170	21.523	24.469
1992Q2	24.275	18.793	24.406	2.331	1.170	21.523	24.469
1992Q3	24.275	18.793	24.406	2.331	1.170	21.523	24.469
1992Q4	24.275	18.793	24.406	2.331	1.170	21.523	24.469
1993Q1	24.276	19.395	24.499	2.158	1.102	21.557	24.466
1993Q2	24.276	19.395	24.499	2.158	1.102	21.557	24.466
1993Q3	24.276	19.395	24.499	2.158	1.102	21.557	24.466
1993Q4	24.276	19.395	24.499	2.158	1.102	21.557	24.466
1994Q1	24.285	19.386	24.404	3.030	1.082	21.614	24.479
1994Q2	24.285	19.386	24.404	3.030	1.082	21.614	24.479
1994Q3	24.285	19.386	24.404	3.030	1.082	21.614	24.479
1994Q4	24.285	19.386	24.404	3.030	1.082	21.614	24.479
1995Q1	24.314	19.856	24.494	1.885	1.093	21.725	24.541
1995Q2	24.314	19.856	24.494	1.885	1.093	21.725	24.541
1995Q3	24.314	19.856	24.494	1.885	1.093	21.725	24.541
1995Q4	24.314	19.856	24.494	1.885	1.093	21.725	24.541
1996Q1	24.392	20.715	24.582	2.705	1.113	21.798	24.553
1996Q2	24.392	20.715	24.582	2.705	1.113	21.798	24.553
1996Q3	24.392	20.715	24.582	2.705	1.113	21.798	24.553
1996Q4	24.392	20.715	24.582	2.705	1.113	21.798	24.553
1997Q1	24.454	21.241	24.595	1.937	1.109	21.899	24.592
1997Q2	24.454	21.241	24.595	1.937	1.109	21.899	24.592
1997Q3	24.454	21.241	24.595	1.937	1.109	21.899	24.592
1997Q4	24.454	21.241	24.595	1.937	1.109	21.899	24.592
1998Q1	24.488	21.359	24.622	2.120	1.061	21.925	24.630
1998Q2	24.488	21.359	24.622	2.120	1.061	21.925	24.630
1998Q3	24.488	21.359	24.622	2.120	1.061	21.925	24.630
1998Q4	24.488	21.359	24.622	2.120	1.061	21.925	24.630
1999Q1	24.511	21.593	24.688	1.902	0.951	21.973	24.638
1999Q2	24.511	21.593	24.688	1.902	0.951	21.973	24.638

1999Q3	24.511	21.593	24.688	1.902	0.951	21.973	24.638
1999Q4	24.511	21.593	24.688	1.902	0.951	21.973	24.638
2000Q1	24.554	21.694	24.693	2.512	0.786	21.985	24.685
2000Q2	24.554	21.694	24.693	2.512	0.786	21.985	24.685
2000Q3	24.554	21.694	24.693	2.512	0.786	21.985	24.685
2000Q4	24.554	21.694	24.693	2.512	0.786	21.985	24.685
2001Q1	24.624	21.753	24.782	2.421	0.583	21.910	24.688
2001Q2	24.624	21.753	24.782	2.421	0.583	21.910	24.688
2001Q3	24.624	21.753	24.782	2.421	0.583	21.910	24.688
2001Q4	24.624	21.753	24.782	2.421	0.583	21.910	24.688
2002Q1	24.606	21.981	24.847	2.373	0.382	22.074	24.746
2002Q2	24.606	21.981	24.847	2.373	0.382	22.074	24.746
2002Q3	24.606	21.981	24.847	2.373	0.382	22.074	24.746
2002Q4	24.606	21.981	24.847	2.373	0.382	22.074	24.746
2003Q1	24.672	22.300	24.846	0.007	0.211	21.853	24.822
2003Q2	24.672	22.300	24.846	0.007	0.211	21.853	24.822
2003Q3	24.672	22.300	24.846	0.007	0.211	21.853	24.822
2003Q4	24.672	22.300	24.846	0.007	0.211	21.853	24.822
2004Q1	24.699	22.488	24.864	0.644	0.127	22.171	24.904
2004Q2	24.699	22.488	24.864	0.644	0.127	22.171	24.904
2004Q3	24.699	22.488	24.864	0.644	0.127	22.171	24.904
2004Q4	24.699	22.488	24.864	0.644	0.127	22.171	24.904
2005Q1	24.688	22.356	24.835	1.710	0.128	22.228	24.902
2005Q2	24.688	22.356	24.835	1.710	0.128	22.228	24.902
2005Q3	24.688	22.356	24.835	1.710	0.128	22.228	24.902
2005Q4	24.688	22.356	24.835	1.710	0.128	22.228	24.902
2006Q1	24.777	22.170	24.984	2.227	0.141	22.268	24.979
2006Q2	24.777	22.170	24.984	2.227	0.141	22.268	24.979
2006Q3	24.777	22.170	24.984	2.227	0.141	22.268	24.979
2006Q4	24.777	22.170	24.984	2.227	0.141	22.268	24.979
2007Q1	24.839	21.822	25.068	1.933	0.156	22.453	25.031
2007Q2	24.839	21.822	25.068	1.933	0.156	22.453	25.031
2007Q3	24.839	21.822	25.068	1.933	0.156	22.453	25.031
2007Q4	24.839	21.822	25.068	1.933	0.156	22.453	25.031
2008Q1	24.952	21.977	25.206	2.390	0.234	22.471	25.059
2008Q2	24.952	21.977	25.206	2.390	0.234	22.471	25.059
2008Q3	24.952	21.977	25.206	2.390	0.234	22.471	25.059
2008Q4	24.952	21.977	25.206	2.390	0.234	22.471	25.059
2009Q1	25.056	21.979	25.281	1.941	0.368	22.548	25.059
2009Q2	25.056	21.979	25.281	1.941	0.368	22.548	25.059
2009Q3	25.056	21.979	25.281	1.941	0.368	22.548	25.059

2009Q4	25.056	21.979	25.281	1.941	0.368	22.548	25.059
2010Q1	25.018	22.108	25.259	1.271	0.517	22.548	25.098
2010Q2	25.018	22.108	25.259	1.271	0.517	22.548	25.098
2010Q3	25.018	22.108	25.259	1.271	0.517	22.548	25.098
2010Q4	25.018	22.108	25.259	1.271	0.517	22.548	25.098
2011Q1	25.097	22.788	25.312	1.336	0.660	22.599	25.159
2011Q2	25.097	22.788	25.312	1.336	0.660	22.599	25.159
2011Q3	25.097	22.788	25.312	1.336	0.660	22.599	25.159
2011Q4	25.097	22.788	25.312	1.336	0.660	22.599	25.159
2012Q1	25.172	23.360	25.443	2.556	0.769	22.684	25.193
2012Q2	25.172	23.360	25.443	2.556	0.769	22.684	25.193
2012Q3	25.172	23.360	25.443	2.556	0.769	22.684	25.193
2012Q4	25.172	23.360	25.443	2.556	0.769	22.684	25.193
2013Q1	25.251	23.669	25.513	2.174	0.831	22.794	25.284
2013Q2	25.251	23.669	25.513	2.174	0.831	22.794	25.284
2013Q3	25.251	23.669	25.513	2.174	0.831	22.794	25.284
2013Q4	25.251	23.669	25.513	2.174	0.831	22.794	25.284
2014Q1	25.312	23.781	25.649	1.834	0.843	22.833	25.350
2014Q2	25.312	23.781	25.649	1.834	0.843	22.833	25.350
2014Q3	25.312	23.781	25.649	1.834	0.843	22.833	25.350
2014Q4	25.312	23.781	25.649	1.834	0.843	22.833	25.350
2015Q1	25.432	24.057	25.756	0.686	0.822	22.951	25.407
2015Q2	25.432	24.057	25.756	0.686	0.822	22.951	25.407
2015Q3	25.432	24.057	25.756	0.686	0.822	22.951	25.407
2015Q4	25.432	24.057	25.756	0.686	0.822	22.951	25.407
2016Q1	25.503	24.390	25.731	2.303	0.792	22.960	25.393
2016Q2	25.503	24.390	25.731	2.303	0.792	22.960	25.393
2016Q3	25.503	24.390	25.731	2.303	0.792	22.960	25.393
2016Q4	25.503	24.390	25.731	2.303	0.792	22.960	25.393
2017Q1	25.448	24.559	25.641	1.920	0.769	22.903	25.394
2017Q2	25.448	24.559	25.641	1.920	0.769	22.903	25.394
2017Q3	25.448	24.559	25.641	1.920	0.769	22.903	25.394
2017Q4	25.448	24.559	25.641	1.920	0.769	22.903	25.394

Appendix B: Unit Root Test

Inflation ADF test
Level

Null Hypothesis: LNINF has a unit root

Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.411030	0.0127
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNINF has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.547322	0.0395
Test critical values:	1% level	-4.046072	
	5% level	-3.452358	
	10% level	-3.151673	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNINF has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.022661	0.2741
Test critical values:	1% level	-2.586753	
	5% level	-1.943853	
	10% level	-1.614749	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNINF) has a unit root
Exogenous: Constant
Lag Length: 11 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.084749	0.0000
Test critical values:	1% level	-3.500669	
	5% level	-2.892200	
	10% level	-2.583192	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNINF) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 11 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.040556	0.0000
Test critical values:	1% level	-4.057528	
	5% level	-3.457808	
	10% level	-3.154859	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNINF) has a unit root
Exogenous: None
Lag Length: 11 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-6.096318	0.0000
Test critical values:	1% level	-2.589531	
	5% level	-1.944248	
	10% level	-1.614510	

*MacKinnon (1996) one-sided p-values.

Inflation PP test
Level

Null Hypothesis: LNINF has a unit root
Exogenous: Constant
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.495078	0.0099
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNINF has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*

Phillips-Perron test statistic		-3.624825	0.0323
Test critical values:	1% level	-4.046072	
	5% level	-3.452358	
	10% level	-3.151673	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNINF has a unit root
Exogenous: None
Bandwidth: 16 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.643660	0.4362
Test critical values:	1% level	-2.586753	
	5% level	-1.943853	
	10% level	-1.614749	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNINF) has a unit root
Exogenous: Constant
Bandwidth: 20 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.83848	0.0000
Test critical values:	1% level	-3.493129	
	5% level	-2.888932	
	10% level	-2.581453	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNINF) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 20 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.72501	0.0000
Test critical values:	1% level	-4.046925	
	5% level	-3.452764	
	10% level	-3.151911	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNINF) has a unit root
Exogenous: None

Bandwidth: 20 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.94892	0.0000
Test critical values:	1% level	-2.586960	
	5% level	-1.943882	
	10% level	-1.614731	

*MacKinnon (1996) one-sided p-values.

Ln government debt ADF test
Level

Null Hypothesis: LNB has a unit root
Exogenous: None
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		1.997495	0.9888
Test critical values:	1% level	-2.589795	
	5% level	-1.944286	
	10% level	-1.614487	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNB has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.806055	0.8126
Test critical values:	1% level	-3.501445	
	5% level	-2.892536	
	10% level	-2.583371	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNB has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.604699	0.7839
Test critical values:	1% level	-4.058619	
	5% level	-3.458326	
	10% level	-3.155161	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNB) has a unit root
Exogenous: None
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.466182	0.0000
Test critical values:	1% level	-2.589795	
	5% level	-1.944286	
	10% level	-1.614487	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNB) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.803430	0.0000
Test critical values:	1% level	-3.501445	
	5% level	-2.892536	
	10% level	-2.583371	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNB) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-5.297483	0.0002
Test critical values:	1% level	-4.058619	
	5% level	-3.458326	
	10% level	-3.155161	

*MacKinnon (1996) one-sided p-values.

Ln government debt PP test
Level

Null Hypothesis: LNB has a unit root
Exogenous: None
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

	Adj. t-Stat	Prob.*

Phillips-Perron test statistic		2.484308	0.9968
Test critical values:	1% level	-2.587831	
	5% level	-1.944006	
	10% level	-1.614656	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNB has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.315081	0.0167
Test critical values:	1% level	-3.495677	
	5% level	-2.890037	
	10% level	-2.582041	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNB has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.235501	0.0834
Test critical values:	1% level	-4.050509	
	5% level	-3.454471	
	10% level	-3.152909	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNB) has a unit root
Exogenous: None
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.09060	0.0000
Test critical values:	1% level	-2.588292	
	5% level	-1.944072	
	10% level	-1.614616	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNB) has a unit root
Exogenous: Constant
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.65753	0.0000
Test critical values:	1% level	-3.497029	
	5% level	-2.890623	
	10% level	-2.582353	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNB) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.03635	0.0000
Test critical values:	1% level	-4.052411	
	5% level	-3.455376	
	10% level	-3.153438	

*MacKinnon (1996) one-sided p-values.

Ln consumption ADF test
Level

Null Hypothesis: LNCNS has a unit root
Exogenous: None
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.578344	0.9975
Test critical values:	1% level	-2.587607	
	5% level	-1.943974	
	10% level	-1.614676	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNCNS has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.036078	0.9524
Test critical values:	1% level	-3.495021	
	5% level	-2.889753	
	10% level	-2.581890	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNCNS has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.729826	0.2271
Test critical values:	1% level	-4.049586	
	5% level	-3.454032	
	10% level	-3.152652	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNCNS) has a unit root
Exogenous: None
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.593927	0.0098
Test critical values:	1% level	-2.587607	
	5% level	-1.943974	
	10% level	-1.614676	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNCNS) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.708458	0.0053
Test critical values:	1% level	-3.495021	
	5% level	-2.889753	
	10% level	-2.581890	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNCNS) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.638716	0.0314
Test critical values:	1% level	-4.049586	
	5% level	-3.454032	
	10% level	-3.152652	

*MacKinnon (1996) one-sided p-values.

Ln consumption PP test
Level

Null Hypothesis: LNCNS has a unit root
Exogenous: None
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		4.731348	1.0000
Test critical values:	1% level	-2.586753	
	5% level	-1.943853	
	10% level	-1.614749	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNCNS has a unit root
Exogenous: Constant
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.801288	0.9937
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNCNS has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.782144	0.2072
Test critical values:	1% level	-4.046072	
	5% level	-3.452358	
	10% level	-3.151673	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNCNS) has a unit root
Exogenous: None
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*

Phillips-Perron test statistic		-10.63452	0.0000
Test critical values:	1% level	-2.586960	
	5% level	-1.943882	
	10% level	-1.614731	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNCNS) has a unit root
Exogenous: Constant
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.99479	0.0000
Test critical values:	1% level	-3.493129	
	5% level	-2.888932	
	10% level	-2.581453	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNCNS) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.26417	0.0000
Test critical values:	1% level	-4.046925	
	5% level	-3.452764	
	10% level	-3.151911	

*MacKinnon (1996) one-sided p-values.

Ln government expenditure ADF test
Level

Null Hypothesis: LNE has a unit root
Exogenous: None
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.156365	0.9925
Test critical values:	1% level	-2.587607	
	5% level	-1.943974	
	10% level	-1.614676	

*MacKinnon (1996) one-sided p-values.

Augmented Dickey-Fuller Test Equation

Null Hypothesis: LNE has a unit root

Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.512608	0.8833
Test critical values:	1% level	-3.495021	
	5% level	-2.889753	
	10% level	-2.581890	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNE has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.711940	0.2342
Test critical values:	1% level	-4.049586	
	5% level	-3.454032	
	10% level	-3.152652	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNE) has a unit root
Exogenous: None
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.116146	0.0021
Test critical values:	1% level	-2.587607	
	5% level	-1.943974	
	10% level	-1.614676	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNE) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.832158	0.0036
Test critical values:	1% level	-3.495021	
	5% level	-2.889753	
	10% level	-2.581890	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(DLNE) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 2 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-14.83525	0.0000
Test critical values:	1% level	-4.049586	
	5% level	-3.454032	
	10% level	-3.152652	

*MacKinnon (1996) one-sided p-values.

Ln government expenditure PP test
Level

Null Hypothesis: LNE has a unit root
Exogenous: None
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		3.668262	0.9999
Test critical values:	1% level	-2.586753	
	5% level	-1.943853	
	10% level	-1.614749	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNE has a unit root
Exogenous: Constant
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.241431	0.9285
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNE has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 7 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-2.550667	0.3037
Test critical values:	1% level	-4.046072	

	5% level	-3.452358	
	10% level	-3.151673	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNE) has a unit root
Exogenous: None
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.48512	0.0000
Test critical values:	1% level	-2.586960	
	5% level	-1.943882	
	10% level	-1.614731	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNE) has a unit root
Exogenous: Constant
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.32979	0.0000
Test critical values:	1% level	-3.493129	
	5% level	-2.888932	
	10% level	-2.581453	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNE) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.27614	0.0000
Test critical values:	1% level	-4.046925	
	5% level	-3.452764	
	10% level	-3.151911	

*MacKinnon (1996) one-sided p-values.

Ln tax ADF test
Level

Null Hypothesis: LNT has a unit root
Exogenous: None
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.692105	0.9982
Test critical values:	1% level	-2.586753	
	5% level	-1.943853	
	10% level	-1.614749	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNT has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.842870	0.8024
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNT has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.433983	0.0523
Test critical values:	1% level	-4.046072	
	5% level	-3.452358	
	10% level	-3.151673	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNT) has a unit root
Exogenous: None
Lag Length: 11 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.212342	0.2053
Test critical values:	1% level	-2.589531	
	5% level	-1.944248	
	10% level	-1.614510	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNT) has a unit root
Exogenous: Constant
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.93942	0.0000
Test critical values:	1% level	-3.493129	
	5% level	-2.888932	
	10% level	-2.581453	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNT) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 0 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-10.89822	0.0000
Test critical values:	1% level	-4.046925	
	5% level	-3.452764	
	10% level	-3.151911	

*MacKinnon (1996) one-sided p-values.

Ln tax PP test
Level

Null Hypothesis: LNT has a unit root
Exogenous: None
Bandwidth: 26 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		5.412716	1.0000
Test critical values:	1% level	-2.586753	
	5% level	-1.943853	
	10% level	-1.614749	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNT has a unit root
Exogenous: Constant
Bandwidth: 24 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.781548	0.8200
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNT has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 6 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.313601	0.0696
Test critical values:	1% level	-4.046072	
	5% level	-3.452358	
	10% level	-3.151673	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNT) has a unit root
Exogenous: None
Bandwidth: 5 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.25197	0.0000
Test critical values:	1% level	-2.586960	
	5% level	-1.943882	
	10% level	-1.614731	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNT) has a unit root
Exogenous: Constant
Bandwidth: 23 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.98345	0.0000
Test critical values:	1% level	-3.493129	
	5% level	-2.888932	
	10% level	-2.581453	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNT) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 24 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-13.01041	0.0000

Test critical values:	1% level	-4.046925	
	5% level	-3.452764	
	10% level	-3.151911	

*MacKinnon (1996) one-sided p-values.

Ln income ADF test
Level

Null Hypothesis: LNY has a unit root
Exogenous: None
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		2.876325	0.9990
Test critical values:	1% level	-2.587607	
	5% level	-1.943974	
	10% level	-1.614676	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNY has a unit root
Exogenous: Constant
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.037313	0.9523
Test critical values:	1% level	-3.495021	
	5% level	-2.889753	
	10% level	-2.581890	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNY has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 4 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.175810	0.0951
Test critical values:	1% level	-4.049586	
	5% level	-3.454032	
	10% level	-3.152652	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNY) has a unit root

Exogenous: None
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-2.484428	0.0132
Test critical values:	1% level	-2.587607	
	5% level	-1.943974	
	10% level	-1.614676	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNY) has a unit root
Exogenous: Constant
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.853454	0.0034
Test critical values:	1% level	-3.495021	
	5% level	-2.889753	
	10% level	-2.581890	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNY) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 3 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.844464	0.0180
Test critical values:	1% level	-4.049586	
	5% level	-3.454032	
	10% level	-3.152652	

*MacKinnon (1996) one-sided p-values.

Ln income PP test
Level

Null Hypothesis: LNY has a unit root
Exogenous: None
Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		5.740038	1.0000
Test critical values:	1% level	-2.586753	
	5% level	-1.943853	
	10% level	-1.614749	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNY has a unit root
Exogenous: Constant
Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		0.137705	0.9672
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNY has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-3.155674	0.0991
Test critical values:	1% level	-4.046072	
	5% level	-3.452358	
	10% level	-3.151673	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNY) has a unit root
Exogenous: None
Bandwidth: 9 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-10.87230	0.0000
Test critical values:	1% level	-2.586960	
	5% level	-1.943882	
	10% level	-1.614731	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNY) has a unit root
Exogenous: Constant
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.65418	0.0000
Test critical values:	1% level	-3.493129	
	5% level	-2.888932	
	10% level	-2.581453	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNY) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 8 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-12.64251	0.0000
Test critical values:	1% level	-4.046925	
	5% level	-3.452764	
	10% level	-3.151911	

*MacKinnon (1996) one-sided p-values.

Population ADF test
Level

Null Hypothesis: LNP has a unit root
Exogenous: Constant
Lag Length: 8 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.824333	0.3669
Test critical values:	1% level	-3.497727	
	5% level	-2.890926	
	10% level	-2.582514	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNP has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 8 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-0.882416	0.9532
Test critical values:	1% level	-4.053392	
	5% level	-3.455842	
	10% level	-3.153710	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNP has a unit root
Exogenous: None
Lag Length: 8 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-1.264539	0.1886
Test critical values:	1% level	-2.588530	
	5% level	-1.944105	
	10% level	-1.614596	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNP) has a unit root
Exogenous: Constant
Lag Length: 7 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.221975	0.0216
Test critical values:	1% level	-3.497727	
	5% level	-2.890926	
	10% level	-2.582514	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNP) has a unit root
Exogenous: Constant, Linear Trend
Lag Length: 7 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.742138	0.0240
Test critical values:	1% level	-4.053392	
	5% level	-3.455842	
	10% level	-3.153710	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNP) has a unit root
Exogenous: None
Lag Length: 7 (Automatic - based on SIC, maxlag=12)

		t-Statistic	Prob.*
Augmented Dickey-Fuller test statistic		-3.182870	0.0017
Test critical values:	1% level	-2.588530	
	5% level	-1.944105	
	10% level	-1.614596	

*MacKinnon (1996) one-sided p-values.

Population PP test
Level

Null Hypothesis: LNP has a unit root
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*

Phillips-Perron test statistic		-1.609830	0.4741
Test critical values:	1% level	-3.492523	
	5% level	-2.888669	
	10% level	-2.581313	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNP has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-0.993149	0.9399
Test critical values:	1% level	-4.046072	
	5% level	-3.452358	
	10% level	-3.151673	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: LNP has a unit root
Exogenous: None
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-1.305788	0.1761
Test critical values:	1% level	-2.586753	
	5% level	-1.943853	
	10% level	-1.614749	

*MacKinnon (1996) one-sided p-values.

First difference

Null Hypothesis: D(LNP) has a unit root
Exogenous: Constant
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.37384	0.0000
Test critical values:	1% level	-3.493129	
	5% level	-2.888932	
	10% level	-2.581453	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNP) has a unit root
Exogenous: Constant, Linear Trend
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.44640	0.0000
Test critical values:	1% level	-4.046925	
	5% level	-3.452764	
	10% level	-3.151911	

*MacKinnon (1996) one-sided p-values.

Null Hypothesis: D(LNP) has a unit root
Exogenous: None
Bandwidth: 10 (Newey-West automatic) using Bartlett kernel

		Adj. t-Stat	Prob.*
Phillips-Perron test statistic		-11.36682	0.0000
Test critical values:	1% level	-2.586960	
	5% level	-1.943882	
	10% level	-1.614731	

*MacKinnon (1996) one-sided p-values.

Appendix C: Bound test to cointegration

ARDL Long Run Form and Bounds Test
Dependent Variable: D(LNCNS)
Selected Model: ARDL(1, 0, 4, 1, 0, 1, 1)
Case 2: Restricted Constant and No Trend
Date: 07/28/19 Time: 22:42
Sample: 1991Q1 2017Q4
Included observations: 100

Conditional Error Correction Regression

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.987391	0.509507	1.937934	0.0560
LNCNS(-1)*	-0.424486	0.065915	-6.439860	0.0000
LNB**	0.005883	0.003217	1.829131	0.0709
LNE(-1)	0.330468	0.057411	5.756210	0.0000
LNINF(-1)	0.002297	0.003557	0.645632	0.5203
LNP**	0.000806	0.006790	0.118749	0.9058
LNT(-1)	0.014670	0.027763	0.528415	0.5986
LNY(-1)	0.033146	0.060278	0.549895	0.5838
D(LNE)	0.471336	0.058350	8.077739	0.0000
D(LNE(-1))	-0.167016	0.050989	-3.275514	0.0015
D(LNE(-2))	-0.167016	0.050989	-3.275514	0.0015
D(LNE(-3))	-0.167016	0.050989	-3.275514	0.0015
D(LNINF)	0.011428	0.005185	2.204154	0.0302
D(LNT)	-0.071902	0.043880	-1.638622	0.1050
D(LNY)	0.313058	0.117505	2.664209	0.0092

* p-value incompatible with t-Bounds distribution.

** Variable interpreted as Z = Z(-1) + D(Z).

Levels Equation Case 2: Restricted Constant and No Trend				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
LNB	0.013860	0.007260	1.909038	0.0596
LNE	0.778514	0.082793	9.403151	0.0000
LNINF	0.005411	0.008256	0.655400	0.5140
LNP	0.001899	0.015969	0.118939	0.9056
LNT	0.034560	0.065983	0.523775	0.6018
LNY	0.078086	0.138918	0.562098	0.5755
C	2.326087	1.205132	1.930152	0.0569

EC = LNCNS - (0.0139*LNB + 0.7785*LNE + 0.0054*LNINF + 0.0019*LNP + 0.0346*LNT + 0.0781*LNY + 2.3261)

F-Bounds Test		Null Hypothesis: No levels relationship		
Test Statistic	Value	Signif.	I(0)	I(1)
			Asymptotic: n=1000	
F-statistic	6.079282	10%	1.99	2.94
k	6	5%	2.27	3.28
		2.5%	2.55	3.61
		1%	2.88	3.99
			Finite Sample:	
Actual Sample Size	100		n=80	
		10%	2.088	3.103
		5%	2.431	3.518
		1%	3.173	4.485

Appendix D: ECM Model

Appendix Table 4.3 Error Correction Model results

Dependent Variable: DLNCNS
Method: Least Squares
Date: 10/12/19 Time: 16:41
Sample (adjusted): 1992Q2 2017Q4
Included observations: 98 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.597227	0.170688	3.498932	0.0008
DLNCNS(-1)	0.039398	0.079180	0.497573	0.6201
DLNB	0.017899	0.010539	1.698284	0.0932
DLNE	0.429968	0.051563	8.338635	0.0000

DLNE(-1)	-0.092249	0.068035	-1.355917	0.1788
DLNE(-2)	-0.090274	0.048859	-1.847629	0.0683
DLNE(-3)	-0.090274	0.048859	-1.847629	0.0683
DLNE(-4)	0.207254	0.053170	3.897941	0.0002
LNINF	0.012578	0.004724	2.662255	0.0093
LNINF(-1)	-0.013613	0.004673	-2.912894	0.0046
DLNP	0.054051	0.032964	1.639677	0.1049
DLNY	0.353255	0.116810	3.024176	0.0033
DLNY(-1)	-0.042004	0.098487	-0.426491	0.6709
DLNT	-0.118867	0.039601	-3.001657	0.0036
DLNT(-1)	-0.009486	0.033686	-0.281601	0.7790
ECT(-1)	-0.251169	0.072255	-3.476166	0.0008

R-squared	0.775331	Mean dependent var	0.010397
Adjusted R-squared	0.734233	S.D. dependent var	0.029335
S.E. of regression	0.015123	Akaike info criterion	-5.396901
Sum squared resid	0.018754	Schwarz criterion	-4.974866
Log likelihood	280.4482	Hannan-Quinn criter.	-5.226197
F-statistic	18.86542	Durbin-Watson stat	1.919098
Prob(F-statistic)	0.000000		

Appendix E: Model efficiency test for Error Correction Model

Appendix Table 4.4 ECM's Breusch-Godfrey Serial Correlation LM Test results

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.604030	Prob. F(2,80)	0.5491
Obs*R-squared	1.457860	Prob. Chi-Square(2)	0.4824

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 10/12/19 Time: 18:11
Sample: 1992Q2 2017Q4
Included observations: 98
Presample and interior missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.283847	0.310259	0.914871	0.3630
DLNCNS(-1)	-0.100048	0.132717	-0.753847	0.4532
DLNB	-0.000410	0.010600	-0.038688	0.9692
DLNE	-0.000936	0.051821	-0.018061	0.9856
DLNE(-1)	0.008556	0.074513	0.114820	0.9089
DLNE(-2)	-0.045074	0.063972	-0.704584	0.4831
DLNE(-3)	-0.045074	0.063972	-0.704584	0.4831
DLNE(-4)	-0.044732	0.067166	-0.665994	0.5073
LNINF	0.000307	0.004757	0.064550	0.9487
LNINF(-1)	0.000167	0.004699	0.035481	0.9718
DLNP	-0.000803	0.033133	-0.024236	0.9807
DLNY	-0.008165	0.117679	-0.069380	0.9449
DLNY(-1)	0.040226	0.106073	0.379224	0.7055

DLNT	0.003864	0.039948	0.096715	0.9232
DLNT(-1)	-0.013918	0.036142	-0.385079	0.7012
ECT(-1)	-0.120060	0.131269	-0.914605	0.3631
RESID(-1)	0.257907	0.250584	1.029224	0.3065
RESID(-2)	0.100934	0.140696	0.717389	0.4752

R-squared	0.014876	Mean dependent var	1.82E-18
Adjusted R-squared	-0.194463	S.D. dependent var	0.013905
S.E. of regression	0.015197	Akaike info criterion	-5.371073
Sum squared resid	0.018475	Schwarz criterion	-4.896283
Log likelihood	281.1826	Hannan-Quinn criter.	-5.179030
F-statistic	0.071062	Durbin-Watson stat	2.038987
Prob(F-statistic)	1.000000		

Appendix Table 4.5 ECM's Heteroskedasticity Test: ARCH

Heteroskedasticity Test: ARCH

F-statistic	0.374369	Prob. F(1,94)	0.5421
Obs*R-squared	0.380818	Prob. Chi-Square(1)	0.5372

Test Equation:
Dependent Variable: RESID^2
Method: Least Squares
Date: 10/12/19 Time: 18:13
Sample (adjusted): 1992Q3 2017Q4
Included observations: 96 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.000205	6.09E-05	3.372388	0.0011
RESID^2(-1)	-0.063016	0.102991	-0.611857	0.5421

R-squared	0.003967	Mean dependent var	0.000193
Adjusted R-squared	-0.006629	S.D. dependent var	0.000561
S.E. of regression	0.000563	Akaike info criterion	-12.10681
Sum squared resid	2.98E-05	Schwarz criterion	-12.05339
Log likelihood	583.1270	Hannan-Quinn criter.	-12.08522
F-statistic	0.374369	Durbin-Watson stat	2.026054
Prob(F-statistic)	0.542109		

Appendix Table 4.6 ECM's Ramsey RESET Test

Ramsey RESET Test
Equation: UNTITLED
Specification: DLNCNS C DLNCNS(-1) DLNB DLNE DLNE(-1) DLNE(-2) DLNE(-3) DLNE(-4) LNINF LNINF(-1) DLNP DLNY DLNY(-1) DLNT DLNT(-1) ECT(-1)
Omitted Variables: Squares of fitted values

	Value	df	Probability

t-statistic	0.630582	81	0.5301
F-statistic	0.397634	(1, 81)	0.5301
Likelihood ratio	0.479911	1	0.4885

F-test summary:

	Sum of Sq.	df	Mean Squares
Test SSR	9.16E-05	1	9.16E-05
Restricted SSR	0.018754	82	0.000229
Unrestricted SSR	0.018663	81	0.000230

LR test summary:

	Value
Restricted LogL	280.4482
Unrestricted LogL	280.6881

Unrestricted Test Equation:
Dependent Variable: DLNCNS
Method: Least Squares
Date: 10/12/19 Time: 18:14
Sample: 1992Q2 2017Q4
Included observations: 98

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.582772	0.172845	3.371642	0.0011
DLNCNS(-1)	0.039110	0.079473	0.492113	0.6240
DLNB	0.016832	0.010713	1.571227	0.1200
DLNE	0.391034	0.080564	4.853719	0.0000
DLNE(-1)	-0.090372	0.068351	-1.322185	0.1898
DLNE(-2)	-0.088094	0.049162	-1.791926	0.0769
DLNE(-3)	-0.088094	0.049162	-1.791926	0.0769
DLNE(-4)	0.184712	0.064233	2.875664	0.0052
LNINF	0.011088	0.005298	2.093092	0.0395
LNINF(-1)	-0.012127	0.005250	-2.310109	0.0234
DLNP	0.042417	0.037882	1.119725	0.2661
DLNY	0.311392	0.134733	2.311179	0.0234
DLNY(-1)	-0.041116	0.098861	-0.415894	0.6786
DLNT	-0.102786	0.047225	-2.176510	0.0324
DLNT(-1)	-0.009163	0.033814	-0.270976	0.7871
ECT(-1)	-0.245091	0.073159	-3.350100	0.0012
FITTED^2	1.155797	1.832905	0.630582	0.5301

R-squared	0.776429	Mean dependent var	0.010397
Adjusted R-squared	0.732266	S.D. dependent var	0.029335
S.E. of regression	0.015179	Akaike info criterion	-5.381390
Sum squared resid	0.018663	Schwarz criterion	-4.932978
Log likelihood	280.6881	Hannan-Quinn criter.	-5.200017
F-statistic	17.58127	Durbin-Watson stat	1.914986
Prob(F-statistic)	0.000000		