A Test of the Ricardian Equivalence Hypothesis for Nepal

Priyanka Poudel[1] and Bhanu Bhakta Pandey[2]
Lecturer
Department of Education and Social Science
Janamaitri Multiple Campus, Kuleshwar, Kathmandu, Nepal
Email: prianka.paudel@gmail.com, pandeybhanu48gmail.com

ABSTRACT

This study is undertaken to verify the application of Ricardian Equivalence Hypothesis (REH) for Nepal by using annual time-series data covering from 1975 to 2019. The study employs Augmented Dickey–Fuller unit root test, Engel Granger causality test, the long run multiple regression model, Error correction model (ECM) in estimating the systems equations to examine the objectives of the study. From the perspective of this study, the empirical findings demonstrated that the Ricardian Equivalence Hypothesis (REH) doesn't hold for Nepal invalidating the proposition of the Ricardian Hypothesis.

Key Words: Ricardian Equivalence Hypothesis (REH), Augmented Dickey–Fuller unit root test, Engel Granger causality test, Error correction model (ECM)

Introduction

The Ricardian equivalence theorem (RET) is important in macroeconomic theory. It specifies that a person's consumption is decided by the present value of their lifespan after-tax income. Therefore, the Ricardian equivalence says a government cannot encourage consumer spending, since people assume that whatever is gained in the present will be offset by higher taxes due in the future. Thus, the main idea behind Ricardo's theory is that no matter how a government chooses to increase spending, whether by debt financing or tax financing, the outcome is the same and demand remains constant.

Furthermore, Ricardian equivalence is an economic theory that argues that, to stimulate an economy by increasing debt-financed government spending and the consumers anticipate future taxes will rise. Therefore, lifetime income of the consumer remains constant and similar impact is seen in the consumer's spending as well. This theory was the first propounded by David Ricardo in the 19th century and later was elaborated by Robert Barro in 1974. Hence it is also known as the Barro-Ricardo equivalence proposition.

REH is very important to examine the effect of fiscal policy actions because otherwise it is very difficult for the government to adopt best policy to achieve its objectives. As, Ricardian equivalence holds in the presence of certain assumptions i.e., Consumers are

infinitely lived and are rational, liquidity constraints aren't faced by consumers, Taxes are lump-sum and perfectly known to the other side, high indebtedness causes problems for both developed but mainly for developing countries. Moreover, at the start of 21st century, the major challenge faced by developing countries is successful management of public debt. From past few years Nepal is facing the problem of budget deficit. Nepal's government is financing its deficit and developmental projects with public debt from past few years but due to high indebtedness country is facing problems like circular debt, high debt outstanding etc. In Nepal, domestic debt is also raising compared to past few years. Hence, it is essential to know about the relationship of debt and private consumption and savings and its impact on macroeconomic variables.

Nepal, being the least developed country, is heavily dependent on remittances, which amount to about 30% of GDP. Furthermore, agriculture is the mainstay of the economy which provides the livelihood for almost two-thirds of the population but accounting for less than a third of GDP. The empirical test of the Ricardian Equivalence is appropriate for Nepal because in recent years there has been a major concern about government debt as a % of GDP.

The major reason for selection of the Nepalese economy is because it is relied on remittance and debt besides that the effect of external disturbances cannot be ignored in the process of economic development in Nepal. In particular, the external shocks have significantly influenced economic activity in Nepal. On contrary, in developing countries like Nepal, there are many queries regarding the existence of Ricardian Equivalence. In this regard, further studies are required to find either presence or absence of Ricardian Equivalence in Nepal. The main significance of the Ricardian approach to budget deficits are the prediction that consumers don't spend much when they get a deficit-financed tax cut.

This study contributes to existing literatures by testing the validity of Ricardian Equivalence Hypothesis based on Nepalese data. Hence, this study intends to contribute to existing literatures by testing the Ricardian Equivalence Hypothesis empirically in Nepalese consumption.

Objective of the Study

The aim of the present study is to explore the applicability of the Ricardian equivalence theory in Nepal. Thus, the general objective of this study is to determine the existence of REH in Nepalese economy.

Literature Review

Many studies related to REH can be found and they result that liquidity constraints affect an appreciable number of households. There are many issues being related to Ricardian hypothesis.

Drakos (2001) investigated the long run relationship between government domestic borrowing and private savings for EU country Greece. The study found an inverse to the Ricardian Equivalence hypothesis i.e., households, distinguish government bonds as net wealth and consequently stimulate their private consumption to some extent.

Waqas and Awan (2012) explored the existence of Ricardian equivalence in Pakistan using the data from 1973 to 2010. The study had utilized the ARDL cointegration approach to find out the short run and long run relationship among the variables whereas Wald test was applied to check restrictions on Ricardian equivalence hypothesis. They found no evidence of REH in Pakistan. Saeed and Khan (2012) also found no evidence of REH.

Nickel and Vansteenkiste (2008) examined the relationship between the current account and fiscal policy in 22 different decentralized countries to check the existence of REH. The study used a dynamic panel threshold model to enlighten on the relationship between the current account and the fiscal balance. The study found that in highly indebted countries where debt ratio above 90percent of GDP, the association with current account was negative.

Berben and Brosens (2005) found that OECD countries have less private consumption and high government debt and showed that within the OECD, a fiscal expansion results an increment in government debt, and will partly be crowded out by a decrease in consumption of household.

Gogas, Plakandaras, and Papadimitriou (2014) tested the effect of real private spending to changes in the level of public debt for 15 OECD countries. The study failed to detect a cointegration between consumption and public debt in the long run and implied that the Ricardian Equivalence proposition was rejected.

Bhattacharya and Mukherjee (2010) investigated the relationship between private expenditure, government expenditure and debt in OECD economies. The results from the study indicate that the negative relationship between private expenditure and government debt during periods of high government indebtedness mainly for Australia, Belgium, Canada and Spain.

Haris and Mohammad (2015) studied the role of government debt by the changes in private expenditure. ARDL method was used to investigate the relationship between government debt and private expenditure in Malaysia. It was found that government debt has a positive and significant effect on household expenditure at 5percent significant level. Waqas and Awan (2012), and Haris and Mohammad (2015) explored the validity of Ricardian Equivalence in Asian countries. In most of the studies REH was rejected which suggests that consumers in Asian economies are forward looking while spending.

Datta Kanchan and Mukhopadhyay (2009) had rejected the existence of Ricardian equivalence in Nepalese economy. They found that the high interest rate fueled the accumulation of more debt through an increase in interest payments and consequent debt-deficit spiral.

To analyze the existence of Ricardian Equivalence in Nepal is one of the important issues for the reason that in recent years there has been a major concern about government debt. Several studies have been carried on the existence of REH in international level. However, in context of Nepal, only one study was conducted. Datta Kanchan and Mukhopadhyay (2009) found that there is no existence of Ricardian equivalence in Nepalese economy. It is considerable for developing country like Nepal to study and interpret empirical evidence on the relationship between private consumption with expenditure, domestic saving and government borrowing.

Research Methodology

The following methodology procedures were followed to carry out the research.

Research Design

This study focuses quantitative technique. The descriptive and analytical approaches have been employed as descriptive statistics of the variables are calculated and presented in table and later the study is analyzed by using tables. Similarly, different economic tools and methods are used. The time series data from 1975 A.D. to 2019 A.D. has been used to analyze the existence of Ricardian Equivalence in Nepalese consumption.

Tools for Data Collection

The required data and information were collected by the researcher herself by visiting concerned institutions and collected various published documents of these institutions like Quarterly economic bulletin from Nepal Rastra Bank (NRB) and Economic survey reports from Ministry of Finance (MoF).

Specification of Tools and Method of Data Analysis

The tables and graphs were used to examine the existence of Ricardian, Engel Granger causality test, the long run multiple regression model, Error correction model (ECM) were used. The study uses the E-views, "Econometric Views" software for data analysis and verifies the existence of Ricardian equivalence in Nepalese consumption.

Variables

The dependent variable used in this research is Household final Consumption Expenditure (HFCE) whereas independent variables are Gross Domestic saving (GDS), Government Final consumption Expenditure (GFCE), Domestic government borrowings (GD) and Population.

Sample Period Covered

The study covers the annual data set of 45 years from the FY 1974/75 A.D. to 2018/19 A.D. This time period is chosen due to the unavailability of data of all variables before this time period.

Tools and methods of data collection

The required data and information were collected by the researcher herself by visiting concerned institutions and collected various published documents of these institutions like Quarterly economic bulletin from Nepal Rastra Bank (NRB) and Economic survey reports from Ministry of Finance (MoF).

Data Organization and Processing

The collected data and information were organized in different groups and sub groups and processed as per the objectives and hypothesis of the study. The variables were at first collected in terms of millions and nominal terms converted into real terms by dividing the value of GDP deflator. Later, all the variables were expressed per capita. For that the real terms were later divided by the population.

Specification of Tools and Method of Data Analysis

The tables and graphs were used to examine the existence of Ricardian Engel Granger causality test. The long run multiple regression model and Error correction model (ECM) were used. The study uses the E-views, "Econometric Views" software for data analysis and to test the existence of Ricardian equivalence in Nepalese consumption.

The augmented Dickey–Fuller unit root test was employed in the analysis of the study to find out about the stationarity of the domestic savings and domestic government debt and find out whether there is any convergence between them. Further, the study employed Engel- Granger cointegration test, which determined whether the null hypothesis of no cointegration was accepted or rejected in the study.

The data collected through online sources were entered in MS-Excel and were converted into real per capita to remove variability and present it as close to a normally distributed form as possible. The data were then imported to EViews for the further analysis. EViews was used to run the augmented Dickey–Fuller unit root test for stationarity, Engle Granger cointegration test which was used to test the variables and the error correction model (ECM).

All the data were converted into real terms and then changed into per capita from to make our analysis convenient. The formulas used to obtain the variables are listed below:

$$\text{Real per capita household final consumption expenditure (HFCE)} = \frac{\text{Real household final consumption expenditure}}{\text{Total Population}}$$

Real per capita government domestic savings (GDS) =

$$\frac{\text{Real government domestic savings}}{\text{Total Population}}$$

Real per capita domestic government borrowings (GDB) =

$$\frac{\text{Real domestic government borrowings}}{\text{Total Population}}$$

Real per capita government final consumption expenditure (GFCE) =

$$\frac{\text{Real government final consumption expenditure}}{\text{Total Population}}$$

Econometric Model Specification

Following the approach pioneered by Feldstein (1972) and Kormendi (1983), the following consumption function using equation is estimated (1):

$HFCE = \beta 0 + \beta 1\ GDS + \beta 2\ GDB + \beta 3\ GFCE + e$……...(4), where HFCE is real household final consumption expenditures in per capita, GDS is real gross domestic saving in per capita similarly, GDB is the real per capita domestic government borrowing and GFCE is real Government final consumption expenditure in per capita lastly, e is the error term.

The relationship between household final consumption, gross domestic savings, and government debt should offer answers as to the extent of dependence of each variable on the other. In order to validate the no debt policy of the Ricardian equivalence hypothesis, the debt variable must have a negative coefficient. The Ricardian equivalence stands correct if the coefficient of the government spending is less than zero.

Analysis and Interpretation of Result

The descriptive statistics of the variables are calculated and presented in table.

Table 1.1: Result of Augmented Dickey Fuller Unit Root Test

Variable	Level	First Difference	Order of integration
HFCE	0.9959	0.0000	I (1)
GDS	0.9846	0.0000	I (1)
GD	0.4027	0.0000	I (1)
GFCE	1.0	0.0011	I (1)

Source: Calculation by author from E-views

It is found that all the variables are stationary in their first difference form and so the results for their unit root test are significant. The p-value for the variable is found to less than the critical values and the significant value of 0.05 at 5% significance.

Prior to the estimation of the private consumption model to test the validity of Ricardian Equivalence Hypothesis in Nepal, it is necessary to check the long-run and short-run relationship among the variables. To do this, we employed Engel granger causality test and error correction mechanism.

Table 1.2 : Long Run Model by OLS Method: HFCE as Dependent Variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
GDS	-0.897727	0.194515	-4.615204	0.0000
GD	19.39192	4.260669	4.551379	0.0000
GFCE	5.918095	0.271240	21.81864	0.0000
C	4264.881	333.3670	12.79335	0.0000
R-squared	0.966126	Mean dependent var		13681.85
Adjusted R-squared	0.963647	S.D. dependent var		4549.925
F-statistic	389.7892	Durbin-Watson stat		1.189714
Prob(F-statistic)	0.000000			

Source: Author's computation, 2021

Table 1.2 shows the long run model and the coefficient gives the long-run coefficient. The result implies that real domestic borrowings per capita and real government final consumption expenditure have the significance positive role in increasing real household final consumption expenditure per capita but real gross domestic savings per capita has significance negative effect on real household final consumption expenditure per capita.

The Engle-Granger Cointegration test indicates that variables are cointegrated and long run OLS model is free from spurious regression. The long run OLS model shows that real domestic borrowings per capita and real government final consumption expenditure have the significant positive role in increasing real household final consumption expenditure per capita but real gross domestic savings per capita however has significance negative effect on real household final consumption expenditure per capita. The coefficients of GD and GFCE depict that one percent increase in real domestic government borrowing per capita (GD) and real government final consumption expenditure per capita (GFCE) increase the real household final consumption expenditure (HFCE) by 19.39 percent and 5.92 percent respectively. Similarly, the coefficient of government domestic saving per capita (GDS) is negative which implies that when GDS increase by 1 percent then real household final consumption expenditure per capita (HFCE) will decrease by 0.90%.

Null Hypothesis : ECM has a unit root		
	t-statistic	Prob.*
Augmented Dickey-Fuller test statistic	-4.228244	0.0017
Test critical values:	1% level	-3.588509
	5% level	-2.929734
	10% level	-2.603064

Source: Author's Computation, 2021

The result of stationary test of the residual indicates that the probability value of Augmented Dickey- Fuller Test statistic is 0.0017 which is less than the Critical value at 5percent level of significance. So, the null hypothesis that the ECM has unit is rejected. ECM is stationary at level. Thus, being residual term is stationary at level form which concludes that there exists co-integration among the variables and the long run model will not be spurious.

The above shows the result of ECM model in the short-run, real Government final consumption expenditure per capita has positive and significant effect on real household final consumption expenditure per capita. But real domestic government borrowing per capita and real gross domestic savings per capita have negative effect on real household final consumption expenditure per capita. To test the short-run relationship between real household final consumption expenditure per capita and other explanatory variable the study has used the Error Correlation Model.

Table 1.4: Regression Result of Short-run Error Correlation Model: DHFCE as Dependent Variable

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	337.3886	84.68778	3.983911	0.0003
DGDS	-0.569229	0.118783	-4.792168	0.0000
DGD	-16.65235	11.03383	-1.509208	0.1393
DGFCE	1.139390	0.752740	1.513655	0.1382
ECM (-1)	-0.209428	0.114538	-1.828455	0.0751
R-squared	0.386613	Mean dependent var		302.2575
Adjusted R-squared	0.323701	S.D. dependent var		572.6145
F-statistic	6.145343	Durbin-Watson stat		2.033119
Prob(F-statistic)	0.000620			

Source: Author's computation from E-views, 2021

Table 1.4, is the short-run error correction model and the coefficient of short-run model shows the short-run elasticity of the variables with respect to real household final consumption expenditure per capita. In the short-run, real Government final

consumption expenditure per capita has positive and significant effect on real household final consumption expenditure per capita. But real domestic government borrowing per capita and real gross domestic savings per capita have negative effect on real household final consumption expenditure per capita.

To hold Ricardian equivalence to be true then any increase in government expenditure that increases the budget deficit would lead to a corresponding decrease in consumption expenditure, as households save more in anticipation of their future tax liability. The net effect on aggregate demand then is zero and fiscal policy is entirely ineffective. REH also states that individuals tend to save more with an increase in government debt. But opposite is the case in our study. Simultaneously, in accordance to our empirical result government expenditure and household expenditure have the positive and direct relationship.

Thus, the restriction of models is rejected and the study found no favor for Ricardian Equivalence Hypothesis with reference to Nepal.

Conclusion

In this paper, we tested the validity of the Ricardian equivalence theorem (RET) using a time series data of 45 years. RET implies that the level of private consumption decreases in response to an increase in public debt. In a similar vein, if the increase in public debt is due to an increase in public expenditure and if consumers expect this increase to be persistent (implying that taxes need to be raised in the future), then the optimal level of current and future private consumption decreases but the result of the study shows the contradictory result. The results imply to the absence of Ricardian equivalence in Nepal.

Suggestions for Future Research

The data is being used annually in this study but if we conduct the study by using the quarterly data, the empirical result would be more exact. The other main factors such as tax revenue and private sector credit, total wealth which state in causality empirical part might be performed as the main variables to test the REH and of course, this is beyond the scope of this paper, but this is open agenda for future research.

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