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Factors affecting Gross Saving in Nepal

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Gross saving is the engine of capital formation which leads to rise the investment to rise the public welfare by rising income employment of the country. Therefore, the major aim of this study is to examine the major macroeconomic determinants of gross saving within the country by employing Engel-Granger cointegration test and Error Correction Model using the time series data of 1994/95 to 2020/21. Engel-Granger test has identified the gross domestic product is positive and consumer price index is negative major determinants of saving in short-run as well as in long-run but remittance and interest rate are positive and significant determinants only in long-run. Furthermore, the coefficient of Error Correction Term is 0.89% implies that 89% of adjustments toward equilibrium have been confirmed, providing evidence of a stable long term causal relationship

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between the variables. Therefore, government should undertake the action to rise the GDP and reduce the general price level within Nepal.

[**Keywords :** Gross domestic product, Remittance, Lending rate of interest, Gross consumption, Consumer price index]

1. Introduction

The gross saving within the country holds paramount significant in Nepal due to its far-reaching economic and social effects. From an economic standpoint, the issue of country's gross saving rate has very low however, saving has direct impact on various aspects of the economy, i.e., at the field of gross consumption, gross capital formation, various balance of payment account (current, capital, financial), interest rate and economic growth of the country. Furthermore, saving is also rising the living standard of the people in current situation as well as after retirement life during the old age situation. However, Nepal has unable to maintain the required level of saving or it is a challenging goal to achieve. Most of the Nepalese marginalize group of the people relies on government assistance through safety net, direct cash assistance and other assistance that rises the financial burden for government as well future generation. Therefore, gross national saving is an important macroeconomic issue and social factor which effects gross investment, individual living standard, national productivity and production of output, and it might be sufficient saving for future needs during a period of old age life (Chaudhry et al., 2010).

Gross saving with in country is one of the major sources of financing and it is an essential source of capital supply within the country. Rise in supply of capital due to rise in gross saving within the country leads to decrease in market rate of interest which is the major determinants of demand for capital to invest in productive sectors. In this situation, the issue of determinant of saving is very prominent for developing countries like Nepal. Life cycle hypothesis (1957) revealed that permanent income and transitory income are the major determinant of saving. Permanent income is a regular income which is received by people regularly whereas transitory income is the difference between actual and permanent income. Furthermore, Ando and Modigliani (1963) developed the life cycle hypothesis and stated that people maintain the consumption at constant rate whereas earn the maximum income during young age which save for retirement life over the consumption. The consumption pattern of

the people is stable for each group; therefore, people save more for retirement in the young age. Furthermore, saving also helps to raise the long run real growth of the country (Cardenas & Escobar, 1998; Krieckhaus, 2002; Matthias et al., 2015). Therefore, it is necessary to identify the major determinants of saving in Nepal.

2. Literature Review

Various scholars (Baharumshah & Thanoon, 2007; Chaturvedi, et al., 2008; Dash & Sahoo, 2013; Lee & Kwack, 2004; Loayza, et al., 2000; Wood, 1995) examined the main determinants of gross saving and these studies had found the real interest rate, GDP, per capita income, inflation rate and dependency ration etc. are the major factors which effect on gross saving.

Ozcan et al. (2003) analyzed the determinants of private saving in Turkey by covering the period of 1968-1994. Time series data were analyzed through ordinary least squares method by including gross saving as a dependent variable and broad money supply, interest rate, credit to private sector, inflation rate and national income were used as explanatory variables. This study had developed five models to examine the major determinants of saving in Turkey. The regression model found that income level has positive impact on gross saving whereas growth rate of income does not significant effect on gross saving. Furthermore, interest rate and financial depth (broad money supply, credit towards private sector) had positive and statistically significant effect on gross saving. Inflation rate crates the volatility in the country however, it has positive impact on saving. Moreover, this study found the negative impact of life expectancy rate has supported the life cycle hypothesis of consumption function.

Chaudhry et al. (2010) investigated the determinants of gross saving in Pakistan by employing the macroeconomic variables and time series data of 1972 to 2008. Unit root test, Granger cointegration test, Johansen cointegration and vector error correction test were used to examine the short run and long run determination of gross saving. Export, remittance, consumer price index, public expendi-ture, public loans, and rate of interest were the macroeconomic variables used in this study. This study found that export, consumer price index, public expenditure, remittance and interest rate were positive and significant determinants of gross saving in Pakistan whereas, the coefficient of public loan was negative and its effect was

significant on domestic saving of the country. Error correction model also confirmed the convergence of saving model towards equilibrium hence, saving had played the important role to stabilize the Pakistani economy.

Blanc et al. (2014) examined the household saving behaviour and motivates for saving in 15 Euro countries by employing cross section data of 2010-2011. This study found that 11% of young, female and divorced people had spent above of their income on consumption expenditure. However, most of the people were made the saving for precautionary motive as well as for old age provision in all countries. The main determinants of household saving were the characteristics of household, structure of tax rate, social security prevails in the country, and welfare system. Household characteristics and institutional macroeconomic variables were found to be more homogenous variables that make the significant effects on household saving.

Suppakitjarak and Krishnamra (2015) investigated the factors affecting to household saving behaviour, firms saving, determinants of firms saving and investment decision in Thailand by employing risk return concept. The descriptive method was used by collecting the data from 844 respondents whose age was above 20 years and their income above 20,000 Baht. This study found that the average saving rate was 29.17% of their income for future retirement spending. Furthermore, saving rate of the peoples was determined by insurance policy, interest rate, price of bond, and mutual fund.

Azimova and Mollaahmetoglu (2017) analyzed the impact of financial services on saving of 20 high income countries of panel data by covering the period of 2005-2014. Hausman test was used to check the either fixed effects or random effects models were used to examine the effects of financial development on saving. The panel data analysis confirmed that there was positive and significant impact of financial innovation on gross saving of these countries, however, net interest margin and banking crisis made the negative impact on gross saving. This paper concluded that higher financial innovation and diversification led to rise saving.

Khan et al. (2017) examined the factors affecting the gross saving in different countries (Pakistan, China, Singapore, Japan Turkey and Russia) by using panel data of 1995-2016. Descriptive statistics, correlation analysis and fixed effect model were employed. Dependency rate of aged people, broad money supply, per capita

income, and gross domestic product made the positive and significant impact on gross domestic saving whereas foreign direct investment and inflation rate made the negative and significant effects on gross saving.

Ismail et al. (2018) investigated saving behaviour of Malaysian employees by taking the 150 respondents. This study had collected the primary data from Malaysian employee to identify the major determinants of saving. The purposive sampling procedure was used to collect the data and the data were analyzed through descriptive as well as regression method and the regression result found that service quality, knowledge and religious belief were the major factors which affects saving behaviour of the people.

Rapian and Ahmad (2019) reviewed the various articles to examine the determination of saving behaviour. The various articles were abstracted from online of Emerald and google search. Based on the previous scholar's research work reviewed, this study found that knowledge, income, social environment, financial innovation, religious belief, and service quality were the major factors that influence the gross saving of the country.

Yigezu (2022) analyzed the factors which have short run and long run effects on gross domestic saving in Ethiopia using the data of 1985-2020. The main objective of this study was to investigate the macroeconomic factors which effect on gross domestic saving. Johansen cointegration test and victor error correction model were used. This study found that interest rate, GDP, development assistance and inflation rate were the main determinants of gross domestic saving in Ethiopia.

3. Data and Method

In this study, to examine the determinants of gross saving in Nepal, data were gathered from Nepal Data of Nepal Rastra Bank (NRB). The time series data from 1994/95 to 2020/21 have collected to examine the causal relationship between dependent variable, gross domestic saving (GDS) and explanatory variables gross domestic product (GDP), consumer price index (CPI), remittance (RMT) and lending interest rate (Lr). Engle and Granger (1987) cointegration (single equation) model has been used to examine the major determinants of GDS. On the basis of previous studies of various scholars (Chaudhry et al., 2010; Ismail et al., 2018; Khan et al., 2017; Wood, 1995); GDS is a function of GDP, CPI, RMT, and Lr.

Therefore, gross domestic saving is the function of GDP, CPI, RMT, and RT. This function is presented in equation (1) below :

Saving=f (GDP, CPI, RMT, RT)   (1)

Equation (1) has converted into log linear econometric model to avoid the problem of misspecification single equation model and it has made the more convenient to interpret the results (Box & Cox, 1964; Sargan, 1964). In addition, the log linear model has offered to address issues like heteroscedasticity and multicollinearity, as suggested by (Goldstein & Khan, 1976; Gafar, 1988). Therefore, equation (1) has converted into log linear model as follows:

LnGDS =   + $_1$(LnGDP) + $_2$(LnCPI) + $_3$(LnRMT) + $_4$(LnLr) + μ   (2)

Where, μ is disturbance term, and Ln refers to log value of variables used in the model. Equation (2) has analyzed through cointegration analysis and error correction model. To perform the cointegration analysis, unit root (Augmented Dickey Fuller [ADF] and Philips Peron [PP]) tests have been employed in the first stage. If all the variables are stationary at the first difference I(1) then the Engle and Granger (1987) cointegration test has employed, which estimating the cointegration regression by employed ordinary least squares (OLS) method. this has involved obtaining the residual series, denoted as μ^t and testing for unit root of μ^t. To conform the presence of cointegration among the variables, this study has conducted ADF test of residual term μ^t and has compared the result with the critical value established by Mackinnon (1991). If the value is found to be cointegrated, it is essential to employ an Error Correction Model (ECM) to uncover both short run dynamics and long run equilibrium. The ECM model can be presented as equation (3).

LnGDS = $_1$ $\sum_i^k$ +   LNGDS$_{t\,1}$ $_2$ $\sum_i^k$ LnOGDP$_{t\,1}$ $_3$ $\sum_i^k$ LnCPI$_{t\,1}$
$_4$ $\sum_i^k$ CRMT$_{t\,1}$ + $_5$ $\sum_i^k$ LnLr$_{t\,1}$ + EC$_{t\,1}$ + $_t$ (3)

represents the first difference, ECT$_{t-1}$ indicates Error Correction term,   is coefficient of ECT (-1 <   < 0) and $_t$ represents purified random term.

4.   Data Analysis and Discussion

The aim of this paper has been examined the major factors which influence the gross domestic saving of Nepal by employing the Engle Granger cointegration technique whereas GDS as dependent variable and GDP, RMT, CPI and Lr are the explanatory variables. The nature of these variables has shown by descriptive statistics in Table-1:

Table-1 : Descriptive Statistics of the Variable

variables	Mean	Median	Max	Min	SD	JB	N
LnCPI	4.07	3.97	4.92	3.21	054	2.05	27
LnGDP	13.78	13.61	15.28	12.29	0.96	2.13	27
LnRMT	11.30	11.84	13.64	7.88	2.01	2.83	27
LnGDS	11.53	11.29	13.28	10.38	0.86	2.11	27
LnLr	2.29	2.24	2.80	1.91	0.25	2.20	27

Note : Descriptive statistics are estimated based on data abstracted from Nepal Data of NRB (2023).

The above table depicts the descriptive statistics of the variables used in model whereas mean values of LnCPI is 4.07 with maximum 4.92 and minimum 3.21. Similarly, the mean value of LnGDP, LnRMT, LnGDS and LnLr is 13.78, 11.30, 11.53 and 2.29 with standard deviation of 0.96, 2.01, 0.86 and 0.25 respectively. Furthermore, median and mean values of all variables are nearest, standard deviation is very small and there is no big gap between maximum and minimum value of all variables used in the model. Therefore, the data used in the analysis is appropriate to further analysis.

For the purpose of further analysis, it is necessary to check the data, either data are stationary or not to check the order of the variables. If the variables remained stationary at the same level, Engel-Granger cointegration test is deemed suitable. As a result, the examination moved forward with conducted unit root test, especially employing the ADF and PP tests for every variable considered in the study.

Table-2 : ADF & PP Unit Root Test of Log Levels of Variables at Level

Variables in Test Statistic Level	ADF		PP	
	Test statistic	Critical value at 5%	Test statistic	Critical value at 5%
LnGDP	0.01	-2.98	-0.03	-2.98
LnCPI	-0.34	-2.98	-0.28	-2.98
LnRMT	-1.59	-2.98	-1.59	-2.98
LnLr	-2.92	-2.98	-2.01	-2.98
LnGDS	0.51	-2.98	-0.90	-2.98

Note : Descriptive statistics are estimated based on data abstracted from Nepal Data of NRB (2023).

Table-2 shows that all variables included in the model are not stationary at the level. Hence, ADF and PP tests suggest to check either the variables are stationary at first difference or not. Table-3 shows the unit root test of all variables included in the model at first difference.

Table-3 : ADF & PP Unit Root Test of Log Levels of Variables at Level

Variables in Test Statistic Level	ADF		PP	
	Test statistic	Critical value at 5%	Test statistic	Critical value at 5%
LnGDP	-4.12	-2.98	-4.17	-2.98
LnCPI	-3.64	-2.98	-3.64	-2.98
LnRMT	-4.18	-2.98	-4.17	-2.18
LnLr	-2.99	-2.98	-3.37	-2.98
LnGDS	-5.88	-2.98	-12.95	-2.98

Note : Descriptive statistics are estimated based on data abstracted from Nepal Data of NRB (2023).

The above table confirms that all variables are stationary at first difference and they follow the same order I(1). Therefore, this study has employed Engle-Granger cointegration test to check either the variables are cointegrated or not and to check the long run and short run association of variables. Engel-Granger long run equation is presented as follows:

Model 1

Estimated Long run Coefficients, Dependent Variable is LnGDS
$\text{Ln}GDS = -19.94 + 3.77\text{Ln}GDP - 4.53\text{Ln}CPI + 0.18\text{Ln}RMT + 0.24\text{Ln}Lr$
t (-2.51) (3.17) (-2.26) (2.08) (2.88)
$R^2 = 0.91$, F = 78.27, DW = 1.64, N = 27

Model 1 shows that all long run coefficients (LnGDP, LnCPI, LnRMT, LnLr) are significant which is confirmed by corresponding t-statistics of respective variables include in the model and possess the appropriate sign. Therefore, gross domestic product, remittance, and interest rate make positive effects on gross saving whereas consumer price index make the negative impact on gross saving of the country. This result GDP, CPI, RMT and Lr are the major macro-economic determinants of gross saving is consistent with the result of Chaudhry et al. (2010), Loayza, et al. (2000), Wood, (1995), and Yigezu (2022).

The coefficient of determination R^2 (0.91) implies that 91% gross domestic saving within Nepal is determined by country GDP, CPI, RMT and Lr. The f-statistics 78.27 confirmed that the model is good fit.

In order to determine whether the estimated long run significant variables have cointegration relation or not, their status have verified through a series of errors estimated from Model 1, the result is depicted in Table-4, which displays the ADF t-statistics for the residual series of Model 1.

Table-4 : Augmented Dickey- Fuller Test of Residual Series of Model I at Level

		t-Statistic	**Prob.***
Augmented Dickey-Fuller test statistic		-5.182459	0.0003
Test critical values:	1% level	3.596616	
	5% level	-2.933158	
	10% level	-2.604867	

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

The above table shows that the ADF t-statistics for the residual series of Model 1 is -5.18 comparing this value with the critical value of ADF statistics for 27 observations with 5 parameters at the 5% significance level is -4.7, it is evident that the calculated ADF tstatistics exceed the critical value of ADF statistics. This result confirms that Model 1 is a cointegration equation, indicating a long run association among the variables.

Consequently, this study proceeds to estimate the error correction model as follows:

Model 2

Estimated Error Correction Model, Dependent Variable is D(LnGDS)

D(LnGDS) = -0.07+4.45D(LnGDP) -5.64D(LnCPI)+ 0.38D(LnRMT) + 0.27 D(LnLr) - 0.89Ect(-1)

t (-0.42) (4.72) (-2.60) (1.66) (0.45) (-4.27)

R^2 = 0.65, F = 9.79, DW = 1.90, N = 27

Model 2 represents the Error Correction Model (ECM) whereas only two (GDP, CPI) variables are significant in short run and other variables (RMT, Lr) having the positive sign but statistically insignificant. In the Model 2, it is evident that the estimated coefficient of the error correction term (-0.89) is statistically significant and negative.

This suggests that the explanatory variables are adapting to correct the previous periods disequilibrium at a rate of 89%. In other words, the explanatory variables are adjusting at a speed of 89% annually to bring the system back into equilibrium. Therefore, there is valid long run relationship between GDS and explanatory variables included in the model and variables are cointegrated and have a stable relationship that helps to correct any deviation from equilibrium.

The ECM model shows the coefficient of determination R^2 (0.65) indicating a substantial 65% of variation in Nepal's gross domestic saving could be accounted by the factors incorporated into the model. The f-statistics coefficient (9.79) has underscored the overall significance of the model. Furthermore, a thorough examination of the Model 2 for potential violations of ordinary least squares (OLS) assumptions, including the BreuschGodfrey serial correlation LM test, Breusch-Godfrey heteroscedasticity test and normality test, coefficient inflation factor test yields the results indicating the absence of autocorrelation, heteroscedasticity, non-normality, and multicollinearity. Consequently, these findings affirm the logical reliability of the estimated results and their appropriateness for informing policy decisions.

5. Conclusion and Policy Implication

In the modern age saving is an engine of capital formation which is necessary to rise the investment for public welfare within the country. Therefore, this paper examines the major determinants of gross saving within the country. Engel-Granger cointegration test identify gross domestic product, remittance and interest rate are the positive determinants of gross saving whereas consumer price index is the negative determinants in the long run but in the short run GDP makes positive impact and CPI yields negative impact on gross saving, other variables (RMT, Lr) are not making significant impact on gross saving of the country. The result of this study has identified the major two variables (GDP, CPI) which are makes the significant impact on gross saving, therefore government should undertake the action to rise the GDP and reduce the general price level within Nepal.

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