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Impact of External Debt on the Economy of India

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Abstract

External debt impact on the developing economies has been a much-debated issue. The shortfall in the revenue generated from tax and non-tax sources of revenue of the government, as well as deficit faced from capital raised from domestic financial institutions, leads to the situation of external debt borrowing. When borrowing from abroad, the interest rate, currency denomination of loan and repayment schedule matters a lot. While some agencies and friendly countries provide loans at a concessional rate for specific projects, other loans are provided at a high rate and are not denominated in the rupee. External debt provides the necessary capital to the government to carry out economic activities, but if not utilized properly for asset building activities it increases the burden of repayment on the government. Many developing economies have fallen into the debt trap which occurs when new debt is taken to repay the old debt. We have tried to study the impact of external debt on factors such as per capita income, expenditure on education, foreign exchange rate, human development index, exports, inflation, defense expenditure, infrastructure expenditure, and capital expenditure in the case of the Indian economy. The study aims to identify the trend of India's external debt borrowing and to determine whether over the years from 1970 – 2018, this external debt has helped in improving the economic growth of India. We also would like to suggest some methods to improve the current debt position if the situation is, in fact, worsening due to external borrowing.

Keywords: *Economic Growth, External Debt, Exchange Rate, Debt Service Payments, VECM*

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I. INTRODUCTION

Post-independence, India has attempted to uplift the lives of its people by raising their socio-economic status. A major part of this upliftment is creating an infrastructure that provides the people with means to earn and conduct business. This infrastructure focuses on sectors such as roads, railways, industry, power, telecommunications, water pipelines, irrigation networks, and canals, etc. To fund this infrastructure development government has to depend on local and foreign sources of money.

We need to develop an understanding of internal and external debt to proceed further with the study. When the government raises money locally from sources such as tax collections, or by selling government bonds, or through interest earned on the investment made government in other countries, and also through dividends earned from government entities and local banks. This borrowing to raise capital is called internal debt, it is owed by the government to the citizens of its country. This is the most preferred method to raise money as the citizens of the country only indebt themselves. But if the money through internal sources is not enough, governments can raise capital through external sources. To raise further capital government can borrow from international financial institutions, foreign governments, bilateral and multilateral

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organizations such as IMF, WB, ADB, etc. and through other commercial borrowings. Sometimes Indian citizens living outside the country or NRIs deposit their money denominated in foreign currency in Indian bank accounts is also a form of external borrowing.

Foreign borrowing is justified often by the governments on the basis of grounds such as constrained resources of the country. The government also argues that these borrowings are invested in projects that generate returns which is higher than the cost of the borrowing. This assumption needs to be validated as if it is falsified then it can result in further debt obligations. These debt obligations arising out of poor returns on capital borrowed from foreign sources can result in an additional flight of domestic capital from the country which worsens the situation further as the debt needs to be repaid even if the income is not sufficient. This fact is also highlighted by the research conducted by Reinhart and Rogoff, (2010) who said that beyond a threshold level public debt can impact the economic growth of a country in a negative manner [1]. Also, oftentimes this debt is nominated in dollars and not rupee which can further worsen the situation if rupee takes a hit due to a change in the economic environment. Also, the government loses the flexibility to manipulate currency to lower levels to boost exports as it will further worsen the debt payment requirements. High levels of government borrowing from international sources can also hamper the domestic industry by crowding out their sources of funds.

The role of external debt to finance the requirements of the country also needs to be evaluated since the poverty rate has continued to be high and the growth in incomes with respect to other Southeast Asian economies has been much lower. In light of all the reasons mentioned above, we try to find a relationship between external debt and economic growth in India.

A brief timeline of India's external debt

External debt in India had risen tenfold between the years 1970 and 1990. In FY 1970-71 the total external debt on Indian account was USD 8.4 billion and in FY 1990-91 this figure totaled USD 83.4 billion. This led to a severe debt payment crisis in 1990-91 due to which India had to mortgage the country's gold to avoid default on the debt payments. During the period from the year, 1987 to 1990 in the prelude to gulf war crude oil prices soured and Indian Rupee exchange rate was impacted significantly. In this period the USD/INR exchange rate slid from 12.96 USD/INR in the Year 1987 to 30.94 USD/INR in the Year 1993 which is a testimony to the fact that the external economic environment can deteriorate sharply which is factored in while borrowing from external sources by the government. Post this fiasco, an effort was made to reduce the external debt to GDP ratio and bring it within a certain threshold level. This event also led to liberalization, privatization, and globalization of the economy by then Finance minister Manmohan Singh. The external debt to GDP ratio which was 32.7% in FY 1993-94 has been reduced to 19.17% in FY 2018-19 and has stayed lower than or around 20% levels for a significant number of years post the start of 21st century. India's external debt has totaled USD 521.39 billion in FY 2018-19.

Year	External Debt (USD Billion)	USD/INR Exchange Rate
1970	8.43	7.50
1971	9.33	7.49
1972	10.03	7.59
1973	10.97	7.74
1974	12.70	8.10
1975	13.87	8.38
1976	14.59	8.96
1977	15.41	8.74
1978	16.52	8.19
1979	18.19	8.13
1980	20.72	7.86
1981	22.48	8.66
1982	26.94	9.46
1983	30.65	10.10
1984	32.76	11.36
1985	38.93	12.37
1986	44.91	12.61
1987	53.42	12.96
1988	59.29	13.92
1989	73.72	16.23
1990	83.47	17.50
1991	84.85	22.74
1992	87.78	25.92
1993	91.33	30.49
1994	97.90	31.37
1995	93.81	32.43
1996	93.97	35.43

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1997	94.06	36.31
1998	98.33	41.26
1999	99.78	43.06
2000	101.13	44.94
2001	99.50	47.19
2002	105.74	48.61
2003	118.88	46.58
2004	123.64	45.32
2005	121.20	44.10
2006	159.53	45.31
2007	204.06	41.35
2008	227.11	43.51
2009	256.31	48.41
2010	290.43	45.73
2011	334.40	46.67
2012	392.58	53.44
2013	427.25	58.60
2014	457.51	61.03
2015	478.83	64.15
2016	455.51	67.20
2017	511.48	65.12
2018	521.39	68.39

Table 1: India's External debt and USD/INR Exchange rate over the years 1970 to 2018
Source: World bank

Year	GDP (USD Billion)	Debt Service Payments (USD Billion)
1970	62.42	1.36
1971	67.35	0.58
1972	71.46	0.64
1973	85.52	0.69
1974	99.53	0.82
1975	98.47	0.86
1976	102.72	1.21
1977	121.49	1.22
1978	137.30	1.31
1979	152.99	1.28
1980	186.33	1.40
1981	193.49	1.55
1982	200.72	1.97
1983	218.26	2.48
1984	212.16	2.87
1985	232.51	3.40
1986	248.99	4.98
1987	279.03	5.24
1988	296.59	5.58
1989	296.04	6.53
1990	320.98	7.69
1991	270.11	7.45
1992	288.21	7.27
1993	279.30	7.93
1994	327.28	10.45
1995	360.28	13.14
1996	392.90	11.71
1997	415.87	12.18
1998	421.35	11.79
1999	458.82	9.93
2000	468.39	10.67
2001	485.44	11.77
2002	514.94	15.44
2003	607.70	25.76
2004	709.15	17.51
2005	820.38	23.92
2006	940.26	17.40
2007	1,216.74	39.40
2008	1,198.90	30.97
2009	1,341.89	16.53
2010	1,675.62	24.41
2011	1,823.05	29.28
2012	1,827.64	30.46
2013	1,856.72	38.72
2014	2,039.13	92.82
2015	2,103.59	49.66
2016	2,290.43	76.98
2017	2,652.24	51.23
2018	2,718.73	63.65

Table 2: India's GDP and Debt Service Payments over the years 1970 to 2018
Source: World bank

II. LITERATURE REVIEW

A. Theory Review

According to the law of increasing returns, a little increment in the input or efforts made in human or physical resource employed can bring a large change in output (GDP, GDP per capita). This fact has been established by Mankiw, Romer, and Weil (1992) who established that it is necessary to improve the nature of human capital along with physical capital to have higher levels of income [2]. Whereas characteristics of debt overhang were established by Krugman (1998) who stated that this situation occurs when the debt owed by a country exceeds its debt-paying capacity [3]. High levels of debt beyond certain thresholds make it more likely for the country to face the situation of debt overhang. In Asian countries, the projects are also characterized by

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mismanagement of debt in projects with poor returns, corruption in the project execution, etc which can worsen the situation further. Pattillo, Poirson, and Ricci (2002) added that in such situations when there is a probability of debt default, the morale of households and private ventures to repay the debt lowers as well [5].

But not all debt is bad for a country. A "Laffer Debt Curve" explains the relationship between the face value of debt and investment. In this curve, the section which has a positive slope characterizes a good section of the debt. In this section, the increase in debt levels is accompanied by higher levels of repayment capacity. But beyond a certain threshold limit, this relationship doesn't hold true. After this threshold limits the debt piles up to such an extent that the repayment capacity goes down.

B. Empirical Review

The association or the nature of the relation between the external debt on the accounts of a country and its economic growth has been studied in the past by various scholars in the context of different countries. One such study was conducted by Karagol, (2002) in the context of the Turkish Economy [6]. Karagol used multivariate cointegration techniques to study long term and short term relationships between economic growth and external debt. His model VAR (Vector Auto-Regressive) model showed that there existed one cointegrating equation. His findings concluded that in the long term the association between external debt service payments and economic growth is of negative correlation or inverse in nature. A research carried out by Malik, Hayat, and Hayat, (2010) in the context of Pakistani economy using econometric analysis of the time series data to find the relationship between economic growth and external debt showed that there existed a significant and a negative relationship between the two [7].

Research conducted by Audo, (2004) on the impact of external debt on the growth of the Nigerian economy using the Error Correction Model also showed that debt repayment has had an adverse impact on the economy [8]. It has hindered investment in the country and has acted contrary to the objective of achieving economic growth. Another research was conducted by Ogunmuyiwa, (2011) in the context of the Nigerian economy using the Vector Error Correction Model by employing the Johansen co-integration test [9]. His resulted concluded that there doesn't exist a long term causality between external debt and economic growth.

III. Research Methodology

A. Data Collection

We have tried to build upon the model used by Ogunmuyiwa, (2011) in the context of the Indian economy [10]. Our research tries to examine the impact of external debt on the GDP of India using 49 annual observations starting from the year 1970 to 2018. For data analysis, we have considered External debt (EXDT), Debt Service Payments (DSPT) and USD/INR Exchange Rates (EXR). Also, to represent the growth in the economy or economic development we have chosen the Gross Domestic Product (GDP). All of the data used in this research has been collected from the database of the World Bank.

B. Data Framework

Since our data is a time-series data, we will be using VECM or Vector Error Correction Model to study the impact of External debt on GDP. We will be performing a series of tests such as the Unit Root Test or Augmented Dickey-Fuller Test, Johansen's Cointegration Test and Wald's Test through Vector Error Correction Model (VECM). We will also be performing tests for checking Serial Correlation, Heteroskedasticity and Jarque-Bera Test to test Normality in error terms. We will be converting all our variables to a logarithmic scale in order to suppress the variations in data due to the effect of any shock in the economy. Hence, External Debt takes the form of LNEXDT, Debt Service Payment takes to LNDSPT, INR-USD Exchange Rates get converted LNEXR and LNGDP represents the natural log of GDP.

C. Augmented Dickey-Fuller Test

As the name suggests, the Augmented Dickey-Fuller Test used to check the existence of unit root in the time series or in general whether the series is stationary or not at various difference levels.
The equation for the Augmented Dickey-Fuller Test is as below -

$$\Delta Y_t = \gamma Y_{t-1} + \sum_{j=1}^{p} \delta_j \Delta Y_{t-j} + e_t$$

Where,

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Y – time series variable
t – time index
γ – coefficient of process root
e_t – error term/residual term
p – lag order

H_o – $\gamma=0$ or Time series is not stationary
H_a – $\gamma<0$ or Time series is stationary
We will perform this test for each time series variable i.e. GDP, External Debt, Debt Service Payment, and Exchange Rate.

D. Johansen's Cointegration Test

Johansen's Cointegration Test forms the basis of checking whether there is a long term causality between the terms. Johansen's Cointegration Test builds upon the equation of Vector Auto-Regressive Model of order p, which is –

$$\mathbf{y}_t = \boldsymbol{\mu} + \mathbf{A}_1\mathbf{y}_{t-1} + \cdots + \mathbf{A}_p\mathbf{y}_{t-p} + \boldsymbol{\varepsilon}_t,$$

Where,
Y_t – 1st order column vector having n rows I(1)
p – lag length
μ – constant

This equation can be rewritten as –

$$\Delta\mathbf{y}_t = \boldsymbol{\mu} + \boldsymbol{\Pi}\mathbf{y}_{t-1} + \sum_{i=1}^{p-1}\boldsymbol{\Gamma}_i\Delta\mathbf{y}_{t-i} + \boldsymbol{\varepsilon}_t$$

Where,

$$\boldsymbol{\Pi} = \sum_{i=1}^{p}\mathbf{A}_i - \mathbf{I} \text{ and } \boldsymbol{\Gamma}_i = -\sum_{j=i+1}^{p}\mathbf{A}_j$$

Π, Γ – coefficient matrices

If the rank (r) of matrix Π is less than the number of rows (n) of column vector i.e. r<n then there are r cointegrating equations for the model and stationarity is present in matrices α and β such that Π = αβ′ and β'y_t.

The hypothesis for the test is –
H_o – No cointegration exists.
H_a – There is cointegration between the variables

IV. Data Analysis and Interpretation

A. Augmented Dickey-Fuller Test

Firstly, we will be using the Augmented Dickey-Fuller Test, as it is a commonly used statistical test to find the presence of stationarity in a time series.

H_o – Time series has a unit root i.e. time series is not stationary
H_a – Time series is stationary

Augmented Dickey-Fuller Test is applied at the level and then at the 1st Difference level. To obtain a stationary time series we need to reject the null hypothesis and for that, the p-value should be less than 0.05 at a 5% significance level.

Augmented Dickey-Fuller Test					
Variable	At Level		At 1st Difference		I(d)
	t-stat	p-value	t-stat	p-value	
lnDSPT	-0.7836	0.8145	-10.9043	0.0000	1(1)
lnEXDT	-0.8667	0.7901	-4.3360	0.0012	1(1)
lnEXR	-0.4395	0.8937	-4.6957	0.0004	1(1)
lnGDP	-0.0905	0.9445	-6.3643	0.0000	1(1)

Table 3: Unit Root test/Augmented Dickey-Fuller test
Source: Computed using Eviews10

B. Selecting lag length

Using the data from the table, we can select a lag of 1 as indicated by the Schwarz Info Criterion.

Lag Length Selection						
Lag	LogL	LR	FPE	AIC	SC	HQ
0	-60.01	NA	0.00	3.12	3.29	3.18
1	203.74	463.17	0.00	-8.96	-8.13	-8.66
2	220.31	25.87	0.00	-8.99	-7.49	-8.44
3	236.72	22.42	0.00	-9.01	-6.84	-8.22
4	259.87	27.10	0.00	-9.36	-6.52	-8.32

Table 4: Lag length Selection using SIC criterion
Source: Computed using Eviews10

C. Johansen's Cointegration Test

H_o – No cointegration exists.
H_a – There is cointegration between the variables

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Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.443683	50.77838	47.85613	0.0259
At most 1	0.278020	23.21677	29.79707	0.2356
At most 2	0.154062	7.906149	15.49471	0.4755
At most 3	0.000906	0.042609	3.841466	0.8364

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None	0.443683	27.56162	27.58434	0.0503
At most 1	0.278020	15.31062	21.13162	0.2677
At most 2	0.154062	7.863541	14.26460	0.3927
At most 3	0.000906	0.042609	3.841466	0.8364

Table 5: Johansen's Cointegration Test
Source: Computed using Eviews10

According to the above results based on Schwarz Info Criterion of Lag 1, we can make a conclusion that the null hypothesis can be rejected and we accept the alternate hypothesis. Hence, there exists a cointegration between the variables at 5% significance level. Using both Trace and Max-Eigen value criterion we see that there is long stochastic trend and we have 1 cointegrating equation. This means, in the short run our variables may show divergence from the long-run average but they will converge to long-run average in over a larger period of time.

1 Cointegrating Equation(s): Log likelihood 233.2438

Normalized cointegrating coefficients (standard error in parentheses)

LNGDP	LNDSPT	LNEXDT	LNEXR
1.000000	0.497825	-1.562771	0.154487
	(0.16931)	(0.17720)	(0.16390)

Adjustment coefficients (standard error in parentheses)

D(LNGDP)	0.142444
	(0.06162)
D(LNDSPT)	-0.242023
	(0.21638)
D(LNEXDT)	0.171637
	(0.04979)
D(LNEXR)	-0.132931
	(0.04892)

Table 6: Normalized Cointegrating Equation
Source: Computed using Eviews10
Note: While interpreting we need to reverse the sign of coefficients

We use the above results to further interpret the relationship between variables in the long run. We find that at Ceteris Paribus, out of the three exogenous variables the coefficient of LNDSPT is negative and is significant since t-stat is greater than 2 i.e. critical value of t-stat at a significance level of 5% and 48 degrees of freedom. Similarly, we find that the coefficient of LNEXDT is positive and is also significant, whereas the coefficient of LNEXR is negative and is also not significant since t-stat is less than the critical value.

D. *VECM Model – Long Run Causality*

Dependent Variable: D(LNGDP)
Method: Least Squares (Gauss-Newton / Marquardt steps)
Date: 03/23/20 Time: 13:45
Sample (adjusted): 3 49
Included observations: 47 after adjustments
D(LNGDP) = C(1)*(LNGDP(-1) + 0.497824743135*LNDSPT(-1) - 1.56277117683*LNEXDT(-1) + 0.154487136688*LNEXR(-1) + 0.60432399677) + C(2)*D(LNGDP(-1)) + C(3)*D(LNDSPT(-1)) + C(4) *D(LNEXDT(-1)) + C(5)*D(LNEXR(-1)) + C(6)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.142444	0.061618	2.311720	0.0259
C(2)	0.038887	0.269486	0.144301	0.8860
C(3)	-0.058603	0.035620	-1.645207	0.1076
C(4)	-0.054675	0.163569	-0.334264	0.7399
C(5)	0.277187	0.362815	0.763990	0.4492
C(6)	0.072133	0.036477	1.977485	0.0547

R-squared	0.155916	Mean dependent var	0.078681
Adjusted R-squared	0.052979	S.D. dependent var	0.076510
S.E. of regression	0.074456	Akaike info criterion	-2.238477
Sum squared resid	0.227291	Schwarz criterion	-2.002288
Log likelihood	58.60421	Hannan-Quinn criter.	-2.149597
F-statistic	1.514672	Durbin-Watson stat	2.068756
Prob(F-statistic)	0.206410		

Table 7: VECM test
Source: Computed using Eviews10

Here we see that C(1) which is the coefficient of Error Correction Term and also represents the speed of adjustment towards equilibrium position is significant but not negative. Hence, we can say that the long-run causality between LNDSPT, LNEXDT, and LNEXR does not exist.
The value of Adj. R-squared is 0.053 which is very low and Prob(F-stat) is 0.2 which is greater than 0.05. Hence, we can conclude that our model is having a poor fit.

E. Wald's Test – Short Run Causality

H_o – There is no short-term causality
H_a – There is short term causality

Short Run Causality between from LNDSPT to LNGDP

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Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
t-statistic	-1.645207	41	0.1076
F-statistic	2.706706	(1, 41)	0.1076
Chi-square	2.706706	1	0.0999

Null Hypothesis: C(3)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(3)	-0.058603	0.035620

Table 8: Wald's test on LNDSPT to LNGDP
Source: Computed using Eviews10

Since the p-value of the chi-square test is 0.0999 which is greater than .05 we conclude that there is no short-term causality from LNDSPT to LNGDP

Short Run Causality between from LNEXDT to LNGDP

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
t-statistic	-0.334264	41	0.7399
F-statistic	0.111732	(1, 41)	0.7399
Chi-square	0.111732	1	0.7382

Null Hypothesis: C(4)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(4)	-0.054675	0.163569

Table 9: Wald's test on LNEXDT to LNGDP
Source: Computed using Eviews10

Since the p-value of the chi-square test is 0.7392 which is greater than .05 we conclude that there is no short-term causality from LNEXDT to LNGDP

Short Run Causality between from LNEXR to LNGDP

Wald Test:
Equation: Untitled

Test Statistic	Value	df	Probability
t-statistic	0.763990	41	0.4492
F-statistic	0.583681	(1, 41)	0.4492
Chi-square	0.583681	1	0.4449

Null Hypothesis: C(5)=0
Null Hypothesis Summary:

Normalized Restriction (= 0)	Value	Std. Err.
C(5)	0.277187	0.362815

Table 10: Wald's test on LNEXR to LNGDP
Source: Computed using Eviews10

Since the p-value of the chi-square test is 0.4449 which is greater than .05 we conclude that there is no short-term causality from LNEXR to LNGDP

Checking for Serial Correlation

Breusch-Godfrey Serial Correlation LM Test:
Null hypothesis: No serial correlation at up to 2 lags

F-statistic	0.655301	Prob. F(2,39)	0.5249
Obs*R-squared	1.528092	Prob. Chi-Square(2)	0.4658

Table 11: Serial Correlation LM Test
Source: Computed using Eviews10

H_o – There is no serial correlation
H_a – There is serial correlation

Since, the Prob – Chi-Square is .4658 hence we cannot reject the null hypothesis. Hence, our model does not have any serial correlation between variables which is desirable.

Checking for Heteroskedasticity

Heteroskedasticity Test: Breusch-Pagan-Godfrey
Null hypothesis: Homoskedasticity

F-statistic	1.201998	Prob. F(8,38)	0.3239
Obs*R-squared	9.491589	Prob. Chi-Square(8)	0.3025
Scaled explained SS	6.903735	Prob. Chi-Square(8)	0.5471

Table 12: Heteroskedasticity Test
Source: Computed using Eviews10

H_o – There is no heteroskedasticity
H_a – There is heteroskedasticity

Since the Prob – Chi-Square is .3025 hence we cannot reject the null hypothesis. Hence, our model

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does not have any heteroskedasticity between variables which is desirable.

Checking for Normality of Residuals

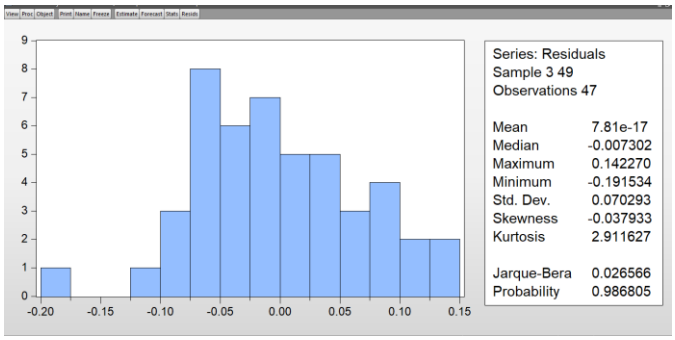

Figure 1: Jarque-Bera Test
Source: Computed using Eviews10

H_o – The residuals are normally distributed
H_a – The residuals are not normally distributed

Since the p-value is .9868 hence we cannot reject the null hypothesis. Hence, the residuals in our model are normally distributed which is desirable.

V. Discussion of Findings

We have tried to find the impact of external debt on economic growth in the context of the Indian economy over a period from the year 1970 to the year 2018 by observing the long term and short-term causality using the Vector Error Correction Model.

Our study shows that:

1) The model is desirable as it is free from a serial correlation between the terms and its own lagged version as determined by LM correlation test
2) The terms do not have heteroskedasticity and the error terms are constant when monitored over a period of time.
3) The residual terms or error terms are also normally distributed as determined by the Jarque-Bera test and which is also desirable for the model.
4) Even though the model shows a significant relationship with the control variables external debt, debt service payments, and exchange rate but since the coefficient is positive, we don't have a long-run relationship with the GDP of the country.
5) Also, using Wald's test we found out there is no short-term relationship between the control variables external debt, debt service payments and exchange rate and the GDP of the country.

VI. Conclusion

Our model doesn't support the various studies conducted earlier in the context of other economies that there is a significant relationship between external debt and economic growth. This means that Indian governments over the years have controlled the debt from spiraling out of control and lead to a situation of debt overhang. Also, the study concludes that external debt doesn't show any positive long-run relationship with economic growth in the Indian context.

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