CAUSAL NEXUS BETWEEN PUBLIC DEBT AND ECONOMIC GROWTH: THE CASE OF INDIA

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Master of Philosophy

In

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By

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DECLARATION

I, **NITYASUNDAR MANIK**, hereby declare that this research embodied in the present dissertation entitled **"Causal Nexus between Public Debt and Economic Growth: The Case of India"**, submitted by me under the guidance of **Dr Nasir Ahmed Khan** is a bonafide research work which is also free from plagiarism. I also declare that it has not been submitted previously in part or in full to this University or any other University or Institution for the award of any degree or diploma. I hereby agree that my dissertation can be deposited in Shodganga /INFLIBNET

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By

Nityasundar Manik

Dedicated

To

My sister

Late Jyotshnarani

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List of Abbreviations

ADB : Asian Development Bank

ADF : Augmented Dickey Fuller Test

CAD : Current Account Deficit

DD : Domestic Debt

ED : External Debt

FRBM : Fiscal Responsibility and Budget Management

GDP_{CP} : Gross Domestic Product at Current Price

GoI: Government of India

IBRD: International Bank for Reconstruction and Development

IMF: International Monetary Fund

LNDD: Logarithmic Form of Domestic Debt

LNED: Logarithmic Form of External Debt

LNGDP: Logarithmic Form of Gross Domestic Product

PP: Phillips Perron Test

RBI: Reserve Bank of India

SAARC: South Asian Association for Regional Cooperation

SPF: State Provident Fund

TPD: Total Public Debt

VECM: Vector Error Correction Model

WMA: Ways and Mean Advances

CHAPTER-1

INTRODUCTION

1.1 Meaning and Definition of Public Debt:

The concept of public debt has been playing an imperative and pertinent role in traditional as well as in modern or contemporary public finance subject. In a layman's perspective, public debt is the loan or liability of the people or government. Public debt, in a lucid manner, demonstrates loans raised by a government within the country or outside the country or in both attached with a repayment obligation within a stipulated period of time. As a part of the public revenue, public loans or debts are collected by the treasure or government from various sources with a corresponding commitment or promise of its redemption. It is mostly instigated or encouraged during the period of deficit in the treasury implying the government revenue falls short of its expenditure. To quote Prof. J.K. Mehta, "Public revenue, therefore, consists of the money that the government is not obliged to return to the very individual from whom it is obtained. Public debt, on the other hand, carries with it the obligation on the part of the government to pay back to the individuals from whom it has been obtained." Moreover, the credit goes to Prof. Findlay Shirras who defines public debt as "National debt is a debt which a state owes to its subject or to the nationals of other countries." In short, public debt, otherwise dubbed as national debt, refers to the reimbursed obligatory amount which the debtor country initiates from its subjects or from the subjects of the other countries.

1.2 Historical Evolution of Public Debt:

The system of public borrowing was first emerged during the medieval period. In this middle ages, the monarchs used to amass treasure in peace to be financed in the time of need. The king borrowed money on a personal credit or pledged his domain as security. The loans were obtained from the church or from foreign bankers. Moreover, during 17^{th} and 18^{th} century, the Dutch method of commerce and finance were began in Britain (also in France) and that came into existence as the English funded debt which became an instance to other economies.

In the 19^{th} century, under the pursuit of 'laissez faire' philosophy, the economic and political life & functions of the state were confined within the unavoidable and ineluctable minimum duties.

During that course of time, the role of the government was as minimum as possible and the state always tried to attain the balanced or managed budget; not the deficit one.

But in modern times, the changing nature of the economic and political institution has brought about the new portrait for the growth of public debt and thereby, the functioning of the state. So, it is quoted by the Prof. J.K. Mehta that, "Public debt is a comparatively modern phenomenon and has come into existence with the development of democratic form of the government in the world." Therefore, the growth of public debt is the consequence of changed economic and political circumstances all over the world. Now-a-days, borrowing by the government has turned into a normal feature of government finance along with the other sources of public finance like taxes, fees etc. In fact, it has been a skyrocketing phenomenon in almost all the countries in the material affluent world. And it is also true that the burden of these public debts start swelling continuously and alarmingly these days. India has also been experiencing this skyrocketing phenomenon with its swelling impact on the economy.

1.3 India's Fiscal Situation: A Brief Prelude

During the first 30 years of independence ranging from 1950 to 1980, the fiscal position of the central and state government was under control. In that period, the country witnessed some sort of revenue surplus. But, in1979-80, the revenue surplus turned into deficit and fiscal condition of both the central and state government went into a fiscal stress. The heavy automatic monetization of the fiscal deficit by RBI was accounted for that fiscal stress. Meanwhile, Indian economy featured the combined fiscal deficit of 7.20% of GDP and debt of 46.48% of GDP. However, the fiscal as well as the debt position of India degenerated slowly and reached at 9.5% of GDP and 65% of GDP in 1985-86 respectively .Then, the debt ratio rose to 70% of GDP in 1990-91 but fiscal deficit maintained its score in the same year. Besides, during late 1980s, the country also faced the depressionary situation with current account deficit (CAD) at 3% of GDP.

A plethora of fiscal policies like tax reforms, expenditure managements, institutional reforms, and financial sector reforms had been implemented during the period of 1991-97. As a result of which there was some improvement in fiscal balance (particularly debt perspective) in the same duration. The debt/GDP decreased from 73% in 1991 to about 64% of GDP in 1997. Along with debt, the fiscal deficit and CAD depicted good recovery. However, these improvements couldn't

be sustained during 1997 to 2003. Because the fiscal deficit and debt/GDP ratio exhibited the upward trend again. The reasons behind the reversal consequence might be industrial slowdown, poor public sector performance, Fifth Pay Commission award and lower performance of tax buoyancy etc. So, the debt to GDP ratio moved around 80% of GDP and stood at highest at 83.33% of GDP in 2003-04.

A sincere effort was made in 2003-04 in the field of fiscal discipline i.e. the introduction of Fiscal Responsibility and Budget Management (FRBM) act in 2003-04. It (FRBM) attempted to formalize and institutionalize the fiscal discipline by cutting down the fiscal deficits; keeping debt/GDP ratios under control; ensuring the revenue surplus. The act made the fiscal deficit decreased to 7.68% in 2013-14 from 9% in 2002-03. Though the debt perspective of the country enhanced, but there is still long way to go to achieve the fiscal goals and its sustainability in India.

1.4 Motivation and Debate on Public Debt and Economic Growth:

"What makes some countries rich and other poor? Economists have asked this question since the days of Adam Smith. Yet after more than two hundred years, the mystery of economic growth has not been solved." (Attributed to Elhanan Helpman, 2004)

The association between public debt and economic growth has earned the much debate since the classical days. For this, there is an encyclopedic of literatures available, debating on the said relationship in both developed, and developing countries like India.

Classical , Neo-classical and Neo-keynesian economist viewed public debt differently on the basis of their faith on the role of the government in the economy. Classical as well as Neo-classical economist considered debt as the degenerative aspects of the economic growth. Because the debt, which could have been used for productively, was spume offered for unproductive in an exaggerating manner. This was assisted by Diamond (1965), Saint-paul (1992) and Aizener et al (2007) in their literatures. Keynesian and Neo-keynesian economist purposed the positive impact of public debt on economic growth through reviving the macroeconomic indicators in a positive way. According to A .P .Learner (1948), an internal debt doesn't create any burden on the future generation because of the internal transfer of income from one group to another. So it is rightly remarked as "the right hand owes to the left hand". But in case of external debt, if used properly, is

no more burdens to the further generation rather a stimulus to the economic growth. Prof Buchanan holds an idea that the debt has a favourable impact on economic growth unless the voluntary debt subscription of debt in present turned into compulsory tax payment in future. By redefining the Buchanan's theory, Modigliani postulates that posterity will be no longer a burden if the debt finance could bequeath to the real income of future generation. In the Ricardian equivalence hypothesis, government debt doesn't affect the economy in anyway because acknowledgement of foresightedness of the tax payers brings equivalence between discounted sum of future taxes and thereby to current deficit.

Putunoi et al (2013) and Fincke et al (2014) determined the positive relationship between the public debt and economic growth through its potential impact on induced investment in growth enhancing public sectors like infrastructure. Lin (2000), Schclarek (2004) and Sheikh et al (2010) observed the negative coefficient between the said variable since negative impact of domestic debt servicing on economic growth is stronger than its positive impact. Checherita and rother(2010), Cecchetti et al (2011) realized a non-linear concave link with threshold at 90%-100% of GDP in developing countries. But,Reinhart and Rogoff (2010) and Kumar and Woo (2012 also admitted same threshold level for developed countries only.

Another contesting view is that of 'casual" relationship between debt variables and economic growth. The literatures like Butts(2009), Fereira(2009), Egbetunde (2012) inquired into the "cause and effect" nexus between public debt and economic growth in developing countries and stumbled on the bidirectioanal causality between them. But the research work of Karagol(2002) and Dritsai(2013) found unidirectional causality i.e. debt to growth and growth to debt respectively. Again choudhury(1994) and Tasos(2014) counted no causality between two concerned variables. In case of ED, the mix result was noticed by the scholars. Wadad(2012), Amoateg et al(1996) and Ahmed et al (2000) discovered the bi-directional and unidirectional (from ED to growth) and no feedback between ED and growth respectively.

In an Indian context, Singh (1999) investigated the link between the domestic debt and economic growth in India by exercising co-integration test and Grangar causality test for the period of 1959-1995.The study fortified the Ricardian Equivalence Hypothesis (neutral effect) between them. Barik (2012) determined the positive (indirect) relationship between the public debt and economic growth, in India, through its potential impact on induced investment covering

the time period of 1981-2011. Kour et al (2012) of GDP found threshold level at 61% of GDP beyond which growth was severely affected

1.5 Research Problems and Need for Study:

In the light of the above debates on the topic of public debt and economic growth nexus, this paper makes an attempt to analyze the casual relationship between the two variables in the context of India. In order to have better insight into the said relation, the present study does the test of causality between DD & ED with economic growth separately. So, this will analyze empirically how the economic growth influenced by DD & ED, and how the DD and ED influenced by economic growth in India. Accordingly, the following objectives are formulated.

1.6 Objectives of the Study:

1. To look into the trend and growth of public debt and economic growth in India
2. To investigate the casual relationship between domestic debt and economic growth
3. To examine the causal relationship between external debt and economic growth

1.7 Data Sources of the Study:

The present study is exclusively based on secondary source of annual time series data. These data on the variables GDP at current price, total public debt, domestic debt and external debt contain the time period of 1980-81 to 2013-14 for India. The data are collected from Budget Documents (GoI), Economic Survey (GoI), Hand Book of Statistics (RBI), Indianstat, Indian Public Finance Statistics and Planning Commission of India(GoI).

1.8 Methodology of the Study:

So far as the methodology to be applied in the current study is concerned, the simple descriptive statistics and simple time series trend methodology is employed in order to address the trend of the public debt and economic growth (referring to 1st objectives). In order to meet the 2nd and 3rd objectives, the work engages the econometric techniqueS like Augmented Dickey-Fuller (ADF) & Phillips-Perron (PP) test for scrutinizing the stationarity property of the data; Johansen and Juselius(JJ) cointegration test to identify the long run compatibility of the Variables; Vector

Error Correction (VEC) model to estimate both short run and long run relationship between domestic debt(DD), external debt(ED)and GDP; VEC Granger causality to check the casual nexus of the variables in question.

1.9 Scope and Limitation of the Study:

The present research is confined within the study of the casual relationship between the debt and economic growth in the lieu of DD and ED. For this, it takes the variables namely GDP, total public debt, DD and ED for the period of 1980-81 to 2013-14. The study doesn't include any instrumental variables explicitly to make an indirect relationship between the aforesaid variables. Further, it focusing on the fiscal policy operation doesn't incorporate the changes of monetary policy. Besides, the study doesn't take into account the comparative analysis of the centre and states with respect to debt-growth relationship.

1.10 Organization of the Study:

The paper has been organized in 5 chapters. Chapter-2 deals with review of literatures on the relationship between debt and economic growth. Chapter-3 analyses the theoretical issues of public debt and its impact on economic growth. Along with it, some description about the data sources and methodology inflicted in the paper are explained. Chapter-4 covers both descriptive and empirical analysis of the present study. Chapter-5 ends with the summery & concluding remarks and suggests certain policy implications from the present research.

CHAPTER-2

REVIEW OF LITERATURES

2.0 Introduction:

Being an indispensable constituent of the thesis or dissertation, a literature review is not merely a subjective description of what others have published in the form of a set of summaries, rather it is a text of a scholarly paper, which includes critical discussion, picturing insight, an awareness of different arguments, substantive findings, as well as theoretical and methodological contributions to a particular topic. It should be a queer synthesis of the relevant published works, not new or original experimental works; linked at all times to researcher's own purpose and rationale.

There are voluminous literatures available on the domestic debt (public debt generally) and its impact on economic growth. Some literatures focus on unidirectional or bidirectional or no causality between the domestic debt and economic growth. For the sake of the better understanding over the present reviews, I segregated the whole of my reviews into two broad categories, such as, theoretical literature review and empirical literature review. And also empirical review is, further, sundered into three sub-categories on the basis of the nature of the relationship (causal, linear and non-linear) existing between the public debt and economic growth.

2.1 Theoretical Literature Review:

Many classical economists like J. B. Say, Adam Smith, Ricardo, Malthus, J. S. Mill, Bastable, Paul Leroy-Beaulieu etc. viewed the public debt differently on the basis of their faith on the role of the government in the economy. They were of view that the state was wasteful and wanton. It borrowed the generative funds from private capitalists for the unproductive purposes. The debt amount, which could have been used for productive purposes, was squandered in a lethargic manner. As a result, the government borrowing made future financing more titanic by swelling the proportion of refinancing amount to the budget and by raising the amount of taxes for the borrowed amount to be refinanced too. Moreover, the burden of the debt could be shifted

to the future generation and would get them worse off. Hence, the classical considered debt as the degenerating aspect to the economic growth.[1]

Keynesian theory of public debt: - The economics of public debt in modern public finance was empathically dominated by the Keynesian Revolution. As a contradiction to the classical doctrine of public debt, Keynes expounded that the accumulation of public debt did not put any infliction on the path of the economic growth rather it boosted the tempo of economic growth. According to him, through debt creation, the government can stimulate saving streams, put the resources into mobilization, thus raise their productive use and then increase the national income. This surplus national income, in turn, facilitates the payment of taxes to treat the debt. Beside, at the time of deflationary pressure, leading towards unemployment, an increase in public debt stimulates savings, current capital formation, and then investments. Thus correcting the business cycle, encouraging the economics streams, as well as trimming the unemployment situation, the public debt paves the economic variables move towards the way of economic growth.

A.P. Lerner's view on public debt: - According to A. P. Lerner (1948), an internal debt doesn't create any burden on the future generation. Because when debt is paid off, there is a transfer of the income from one group of citizens (those who don't hold bonds) to another (bond holders). The future generation as a whole, however, is not worse off in the sense that its consumption level is the same as it would have been. So, it is rightly remarked as "the right hand owes to left hand". But the situation is quite different for the external debt. If the money borrowed from outside and is financed for the current consumption purposes, then it certainly puts pressure on the future generation. In consequence, their consumption level is reduced by an amount equal to the loan plus the accrued interest. On the other hand, if the borrowed amount is used for capital formation, then the outcome depends on the productivity of the project undertaken with the external debt. The debt accumulation makes the future generation better off if the marginal return of investment is greater than the marginal cost of fund obtained abroad and vice-versa. This betterment of future generation, hence, enhances the economic growth and vice-versa.[2]

Prof James Buchanan in his book "Public Principles of Public Debt" holds that the present generation of bond holders subscribe to the public debt voluntarily which denouements no

[1] See: shodhganga.inflibnet.ac.in:8080/jspui/bitstream/.../07_chapter%202

[2] Rosen,H. S., and T. Gayer(2012), "Public Finance",pp.468

burden upon them. But it is an encumbrance on the future generation who pay taxes compulsorily for the debt retirement and interest payments. So, the mishap of debt burden is contingent upon the individual attitude of voluntarity or compulsority. In short, public debt is the obstruction to growth as its burden can be shifted to the future generation.[3]

Modigliani (1961), redefining the contribution by Buchanan (1958), wrangled that the national debt is a burden for the next generation. Because debt financing will necessarily precedence to reduced capital stock with the future generation. In addition, the debt increase will commonly not be costless for the posterity despite being beneficial to the present generation. He illustrated that a situation, where the gross burden of national debt may be offset partly or completely, is when debt finances government expenditure that could bequeath to the real income of future generation, like productive public capital formation.

Diamond (1965), in his literature "National Debt in a Neoclassical Growth Model", tries to make an examination on the relationship between the public debt and economic growth through the impact of taxes needed to finance the interest payment. For that, he differentiates between internal and external public debt and include the effect of taxes on the capital stock. He postulated that both types of public debts (internal and external) make the reduction in the available life time consumption of tax payers, as well as, their savings and thereby capital stock and lastly economic growth. This adverse impact would be more acute if the government debt is substituted for physical capital in individual portfolio.

In the **Ricardian Equivalence** or Ricardo-De Viti-Barro Equivalence theorem, the government debt is no more a burden on the economy. Because, according to this hypothesis, the government debt is contemplated as equivalent to future taxes. Acknowledging that the consumers are rational and far-sighted, the discounted sum of future taxes is correspondent and identical to the current deficit. The shift between taxes and deficit, thus, doesn't fetch any aggregate wealth effect and by that the increase in government debt doesn't affect consumption. To boot, the forward looking consumers facing current deficit save for future rise in taxes and, therefore, total

[3] Buchanan, J., and R. E. Wagner(1967), "Public Debt In The Democratic Society",American Enterprise Institute For Public Policy Research Washington DC.20036

saving in the economy is not disturbed i.e. a decrease in government dissaving is matched by increase in private saving. With regard to the unchanged saving in the economy, investment and interest rates are not altered and so also the national income.

Saint-Paul (1992) and Aizenman at al. (2007) have taken the level of public debt as proxy of the fiscal policy in order to analyze the impact of fiscal policy on the economic growth. They both took the Endogenous growth models and found the negative relationship between them.

Elmendorf and Mankiw (1999) noticed that an important channel through which public debt accumulation can affect growth was long term interest rates. As an supportive to the crowding–out hypothesis, higher long term interest rates, resulting from more debt financed government budget deficits, can crowd-out private investment, thus, dampening the potential economic growth.

Aschauer (2000) proposed public capital as an imperative channel in which public capital, extended to cover the impact of public debt, has a non –linear impact on the economic growth. This theory is of the view that an increase in the debt would have positive effects up to a certain threshold, if the government debt is used at least partly to finance productive public capital and negative effects beyond it.

Adam and Bevan (2005) tried to bring an interaction effects between deficits and debt shocks through exacerbating an adverse consequence of high deficit resulted from debt shocks. Their theoretical model integrated the government budget constraint and debt financing and found that an increase in productive government expenditure, financed out of a rise in the tax rate, would be growth propelling only if the level of domestic debt is adequately low.[4]

2.2 Empirical Literature Reviews:

The empirical literature reviews are, now, classified into three wings. These are the casual, linear and non-linear relationship between the public debt (including domestic debt) and economic growth.

[4] Adam, C.S. and D.L.Bevan (2005), "Fiscal deficits and growth in developing countries", , pp. 571-597.

2.2.1 Reviews on Causal Relationship:

Chowdhury (1994), by taking panel data for Bangladesh, Indonesia, Malaysia, Philippines, South Korea, Sri Lanka and Thailand for the period of 1970-1988, looked into the link between indebtedness and economic growth. It is empirically found that there is no causality from external debt to economic growth for five countries except Malaysia and Philippines (unidirectional).[5]

Amoateng et al (1996) tried to verify the 'cause and effect' relationship among export, external debt and economic growth for 35 African Countries employing Granger causality test. The result followed the unidirectional causal relationship between debt service and economic growth.[6]

Singh (1999) investigated the link between the domestic debt and economic growth in India by exercising co-integration test and Grangar causality test for the period of 1959-1995.The study noticed no causality between the concerned variables and supported the Ricardian Equivalence Hypothesis (neutral effect between them).[7]

Ahmed et al (2000) scrutinized the causality among export, external debt and economic growth for South and South-East Asian countries and reached at the finding that there is no joint feedback (no causality) among them.[8]

Karagol (2002), in order to test the short run and long run relationship between debt and growth for Turkey for the period of 1956-1996, used multivariate co-integration method and Granger causality test. The study found that there is the negative affiliation between debt and economic growth and unidirectional causality stretching from debt service to economic growth.[9]

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[5] Chowdhury, K.(1994), "A structural analysis of external debt and economic growth: some evidence from selected countries in Asia and the Pacific", *pp.*1121- 1131

4 Amoateng, K., and Amoako-Adu, B.,(1996), " Economic growth, export and external debt causality: the case of African countries"*pp.* 21-27.

5 Singh,Charan(1999), "Domestic Debt and Economic Growth In India", pp. 1445-1453

6 Ahmed, Q., Butt, M., Sabihuddin, M., and Shaista, A.(2000), "Economic growth, export and external debt causality: The case of Asian countries", *pp.*591-608

[9] Karagöl(2000), "The Causality Analysis of External Debt Service and GNP: The case of Turkey" *pp.*39-64.

Butts (2009) endeavored to investigate the nexus between debt and economic growth taking panel data of 27 Latin American countries and Caribbean countries for the period of 1970-2003. His research discovered that there is the evidence of Granger causality in half of these countries. He employed various panel data tools, panel granger causality etc to test the said relationship.

Focusing on the economic outlook of the OECD statistical compendium at annual frequencies of 20 countries for the period between 1988 and 2001, **Ferreira (2009)** searched for the Granger causal relationship between the growth of the real GDP per capita and the public debt, which is here proxy by the ratio of the current primary surplus/GDP. This paper appropriated the Levin, Lin, and Chu test as taking a balanced panel of 280 observations and ADF regression test with and without lag of the dependent variables for Granger causality implying the policy implications like public debt obstructing economic growth and economic growth influencing the evolution of public debt. Along with, the finding also followed a heterogeneous behavior across the different countries.[10]

Balassone et al. (2010), covering the time series data in Italy over 1961-2009, discovered a negative link between public debt and economic growth with threshold level at above 100% of debt-GDP ratio beyond which relation is enhanced and also found the stronger effects of foreign debt compared to domestic debt. The paper modeled the regression analysis on a standard production function for measuring the endogenous and exogenous impact of debt on growth. To boot, it used the perpetual inventory method for obtaining real stock of capital which was the crux variable of the analysis. The statistical and econometrics tools like descriptive statistics, regression analysis, Dickey- Fuller test for unit root, Johansen tests for co-integration, Granger causality tests and dummy variable were applied here. These followed or supported the hypothesis of negative relationship between debt and growth and thereby also helped in explaining the different reaction of per capita GDP growth to the debt ratio over 1890-1914

[10] Ferreira,Candida(2009), "Public Debt and Economic Growth: A Granger Causality Panel Data Approach", Working Paper (ISEG-UTL), ISS

(showing strong negative correlation) and 1985-2007 (when the correlation appears to break down).[11]

Egbe tunde (2012) inquired into the casual nexus between public debt and economic growth in Nigeria between 1970 and 2010. This paper made use of VAR model, ADF&PP tests, cointegration test, and Granger causality test for getting the intended results. The finding of this research showed that there is the presence of bidirectional and long run causality between the concerned variables.[12]

Wadad (2012) investigated the kinship among external debt, public debt, economic growth and exchange rate in Lebanon over the vintage of 1970-2010. The practices of VECM and Granger causality test have been performed. The result revealed that there exist both short run and long run attachment among these variables.[13]

Dritsaki (2013) examined the causal relationship between economic growth, exports and government debt for Greece over the period of 1960-2011. The author employed the unit root tests like DF, ADF and PP tests, Johanson cointegration test, VECM and lastly Granger causality technique for checking its objectives. The result depicted both short run and long run unidirectional causality running from economic growth to government debt.[14]

Tasos (2014) attempted to delve into whether the debt is promoting economic growth in Greece while the economy had been in teetering on the brink of bankruptcy and debt deepens. From the data 1980-2010, by applying the econometrics appliances like Phillips-Perron, Augment Dickey

9 Balassone, F. ,M.Francese and A. Pace(2010), " Public Debt and Economic Growth In Italy", Preliminary Version

[12] Egbe tune(2012)" Public Debt and Economic Growth in Nigeria: Evidence From Granger Causality",pp. 101-106

11 Wadad, Saad (2012),. "Causality between Economic Growth, Export, and External Debt Servicing: The Case of Lebanon",*pp.* 134-143

12 Dritsaki.c.(2013) "Casual Nexus Between Economic Growth, Exports, and Government Debt: The case of Greece", pp. 251-259

Fuller test, KPSS fitted regression model for time series analysis; testing the casual effects with Granger causality test; the author came to a conclusion that there are structural breaks in the economy of Greece but no causality between the variables.[15]

2.2.2 Reviews on Linear Relationship:

Lin (2000), in his literature "Government Debt and Economic Growth in an Overlapping Generations model" analyzed the effect of government debt on the real interest rate and on the growth rate of per capita output both in the steady state equilibrium and comparative steady state equilibrium framework. He examined the effect of government by developing a Diamond- type of overlapping generation model of endogenous growth where human capital over the generations is considered as the engine of economic growth. Author remarked that an emergence of government debt will increase the growth rate of per capita output i.e. positively related if the growth rate is greater than the real interest rate and, on the contrary, the government debt will reduce the growth rate if the growth rate is less than the real interest rate.

Schclarek (2004) tried to run down both the linear and non-linear relationship between public debt and economic growth in 59 developing countries and 24 industrial countries for the time horizon of 1970-2002. He took the simple regression analysis for his empirical study of 413 panel observation of developing and 168 panel observation of industrial countries. They found a negative linear and significant relationship between public debts (external public debt, not external private debt) for the developing countries. But the study exhibited robust result for the industrial countries.

Mohamed (2005) envisaged the adverse relation between public debt (particularly external debt) indebtedness and economic growth for Sudan, manipulating annual data from 1978 to 2002. The empirical analysis revealed the existence of debt overhang problems in Sudan and concluded that inflation deter economic growth while export earning has positive influence on growth. The study recommended that adaptation of export led growth strategy, encouraging domestic saving would help in restoring debt sustainability.

[15] Tasos, S.(2014), "Debt and Economic Growth: Is There Any Casual Effect? An Empirical Analysis with structural breaks and Granger Casuality For Greece", pp. 51-62

Concentrating on six Pacific Island countries for the vintage of 1998-2004, **Jayaraman et al. (2008)**, reached at the conclusion that there exists a significant positive relationship between debt and GDP and also exists an inverse relationship between growth and higher fiscal deficit.

Sheikh et al. (2010) studied the impact of domestic debt on economic growth in Pakistan, for the period of 1972 to 2009, with the help of OLS technique. This study observed that the negative impact of domestic debt servicing on economic growth is stronger than its positive impact.

Akram (2011) did an empirical study on debt and economic growth in Pakistan for the vintage of 1972-2009 and found that public debt (internal and external) and debt servicing treated the economic growth and investment adversely which points to the "debt overhang" and "crowding out" effect. Econometrics instruments like Auto Regressive Distributive Lagged model (ARDL) and ADF test have been practiced. Moreover, his pragmatic work (2013) also investigated the said nexus for the period of 1975-2011 and got same results. The both results suggested that the dependence on debt for economic growth is not a safe option rather country needs to reduce the twin deficits, increasing tax base and productive use of resources.

Barik (2012) determined the indirect and positive relationship between the public debt and economic growth, in India, through its potential impact on induced investment. He analyzed the annual data series of 1981-2011 with the time series tools like Unit Root Test, Augmented Dickey Fuller Test and PP Test for stationary test and with the regression analysis for examining the coefficients. The empiric resulted that, on an average, one percent point increase in debt is associated with an increase in real GDP of around 0.08 percent point per year. Moreover, the present study is also empirically tested by using an Augmented Solow (1956) neoclassical model of economic growth that permits for both direct and indirect effects of public debt and economic growth.[16]

The thesis of **Georgiev (2012)** took an ambitious look at long run nexus between public debt and economic growth through the system of crowding out and crowding in nature of investment in a European context, special reference to Italy and Portugal. The panel data of the study included 17 European countries, noticed across more than 30 tears spanning 1980 to 2012.The analysis presided by the descriptive statistics, panel data regression, granger causality tests and other statistical tests

[16] Barik. Anirudha ,(2012), "Government Debt and Economic Growth in India", Panjab University Paper

accomplished a negative, significant, and indirect link between the concerned variables through the instrument of crowding out investment due to higher interest rate and higher debt servicing cost. This paper also dealt with the Augmented Solow Growth model.

The paper written by **Rais et al. (2012)** is about public debt and economic growth in Pakistan. It applies simple OLS estimation technique and data base is from 1972 to 2010. It is seen that Pakistan surrounded with serious socio-economic impediments, has to rely on both limited assessable external capital flow and easily approachable domestic capital flow due to low tax base and twin deficit. This reliance puts the Pakistan economy in such a place where income per capita is lower than per citizen indebtedness. Looking at the empirical results, both domestic and external debts have negative and statistical significant bearing on the economic growth. With regard to the policy prescription, this paper suggests that debts should be used exclusively for desideratum & extremity destinations and should keep the economy away from the grip of corrupt people and IMF debt obligations because it is unhealthy for debtor economy.

Putunoi et al. (2013) put the prominence on inquisition of the relationship between domestic debt and economic growth in Kenya. In order to give an empirical touch to their study advanced econometric techniques like Jacque Bera (JB) for normality testing, ADF test for unit root test and error correction model for capturing short run dynamics, were preliminarily applied on the quarterly time series data encompassing 2000 to 2010. In addition, a man oeuvre of Engle-Granger residual based and Johannes VAR based co integration test, have been entertained to judge the long run impact of debt on economic growth. The study depicted that an expansion of domestic debt had a positive and significant effect on economic growth. Keeping this in mind, the present study prescribes that the Kenyan government should go for sustainable domestic borrowing subject to productive fund utilization.

Fincke and Greiner (2014), based on eight countries' balanced panel dataset from 1980-2012, studied the relationship between public debt and economic growth in eight selected emerging market economies, characterized with higher economic growth, like Brazil, India, Indonesia, Malaysia, Mexico, South Africa, Thailand and Turkey. The consequence revealed a significantly small positive correlation between the debts to GDP ratio counted both 3 years and 5-years subsequent economic intervals. This result was so because the emerging market economies are on the transition path of high growth rates due to heavy public investment in growth enhancing

public sectors like infrastructure. Moreover, the outcomes followed that population and investment also put a significant positive influence on the subsequent growth at 1% of confidence interval, whereas initial real GDP had significant negative impact. The impact of other variables like inflation rate, the trade balance or exchange rate didn't have any significant effect on growth through debt. The empirical work entertained the fixed effect model and random effect model.

Bal and Rath (2015) examined the both short run and long run effect of public debt on economic growth in India during1980-2011. With the engagement of the autoregressive distributed lag (ARDL) model, the paper attempted to tap a long-run equilibrium relationship between public debt and economic growth. Being consistent to the authors' priori expectation, the empirical work done with the error correction model (ECM) determined the short run ascendancy of the central government debt, total factor productivity and debt service on economic growth. It has recommended that, in order to bring stabilization in debt to GDP ratio after the financial crisis, the government should escort the objective of inter-generational equity in financial management over long term.[17]

2.2.3. Reviews on Non-Linear Relationship:

The research work of **Pattillo et al. (2004)** on the channels of debt affecting economic growth encountered a non-linear relationship between public debt and economic growth due to its (public debt) impact on the physical capital accumulation or on total factor productivity growth. The result implied that, at the high level of debt, doubling of any initial debt or debt beyond threshold level will reduce the per capita growth by about 1% point on average, whereas, at the lower level, there is the positive effect but it is often not significant. This paper accounted Simple OLS, 2SLS, FE (Fixed Effect), differentiated and system GMM and applied these methods on a large panel data set of 61 developing countries over the period of 1969-1998. So far as the contribution to growth is concerned, the effect of public debt via physical capital accumulation and via total factor productivity determined through C-D production function were 1/3 and 2/3 respectively. The findings were compatible with a simultaneous significant effect on growth.

[17] Bal,D.P., and B.N. Rath(2014), " Public Debt and Economic Growth In India: A Reassessment", pp. 292-300

Checherita and Rother (2010) constituted an empirical study on the average impact of the government debt on per capita GDP growth in 123 Euro area countries over a period of about 40 years of 1970 to 2008. It got a non-linear concave relationship between the said variables with a turning point beyond which the growth rate would experience a deleterious repercussion of raising debt at about 90-100 percent of GDP. In this study, to address the problem of assessing the statistical uncertainty surrounding at the turning point estimates, the "Delta method and Bootstrapping method" were appreciated. In order to know the impact of government debt on potential trend of GDP growth, Annual growth rate, and 5-year non-overlapping growth rates were employed. The empirical regression analysis revealed the result that government debt (level or change) put the negative impact on the economic growth rate through (i) private saving with turning point between 82 percent and 91 percent, (ii) through public investment with turning point between 45% to 68% of GDP,(iii) through total factor productivity with turning point beyond 100% of GDP and (iv) through sovereign long-term nominal and real interest rates with statistical insignificant 0.07 coefficient.

Carmen Reinhart and Kenneth Rogoff (2010) (hereafter RR), in their famous article "Growth-In-Debt" exhibited that average post World War-2 economic growth was dramatically declining in advanced economies, once the debt to GDP ratio was above a 90% threshold level prescribed as the ultimate guide for policy recommendation and policy making. Taking the historical data of 1946-2009 into empirical analysis, they uncovered that the median growth rate failed considerably more for debt- GDP ratio, above the threshold level. The non-linear effect of debt on growth was contemplated to be evocative of "Debt Intolerance" resulting in non-linear response of market interest rates when debt tolerance level was reached. But RR never did any research on the effect of public debt on economic growth with below and above 90% of debt and also ignored the statistical importance of declining in the economic growth with every increase in debt ratio.[18]

Kumar and Woo (2010), explored the inverse relationship between high initial debt and subsequent long run growth on the foundation of their study on 38 Advanced and emerging economies with a population of over 5 million for almost four decades ranging from 1970-2007.

[18] Reinhart, C. and K. Rogoff. 2010. "Growth in a Time of Debt". AmericanEconomic Review*:* Papers & Proceedings, Vol. 100, No.2

The analysis comprised of a broad range of determinants of growth; various estimation issues like reverse causality and simultaneity basis (endogeneity problem); examination of non-linearity, threshold effect; and difference between the developed and emerging market economies; a wide range of econometric tools like Pooled OLS, robust regression, Between Estimators (BE), Fixed Effect (FE), Panel regression, and System GMM (SGMM) dynamic panel regression. The empirical work suggested that, on an average, a 10 percent point increase in the initial debt-to-GDP ratio was associated with a slowdown in annual real per capita GDP growth around 0.2 percent point per year, with impact being smaller (around 0.15 percent point) in advanced economies. There was some evidence of non-linearity, with only high (above 90 percent of GDP) levels of debt having a proportionately significant negative effect on subsequent growth. In addition, a standard Neo-classical growth framework using a Cobb-Douglas Production Function depicted that the adverse effect largely reflected a slowdown in labor productivity growth, mainly due to reduced investment and slower growth of capital stock.

Cecchetti, Mohanty and Zampolli (2011), practicing the new dataset on debt levels in 18 OECD countries from 1980 to 2010 based on flow of funds data, came by a non-linear relationship between public debt and economic growth with a threshold beyond which long-term growth was severely affected. This data analyzed the appulse of household, non-financial corporate, and government debt, separately. Authors empirically determined the threshold level of debt ratio at 85% of GDP for government debt, at 90% of GDP for corporate debt and at 85% of GDP for household debt. Prudence dictated that the governments should aim towards stabilizing their debt by keeping their debt well below the estimated threshold.

Kaur et al. (2012), by taking two objectives, the assessability of the sustainable public debt and scrutinization of the public debt and economic growth relationship in the Indian context, searched that the debt position in India was sustainable in long run as well as there was a statistically significant non-linear relationship between public debt and economic growth in India implying its negative impact on economic growth at higher level. The study found the threshold level of general government debt-GDP ratio for India is 61 percent i.e. 61percent of GDP to be liquated for government debt. The empirical analysis, particularly case of sustainability, was contingent upon the assessment of Inter temporal budget constraint and fiscal policy response function at general level for the period of 1980-81 to 2012-13.The study ascertained many

econometrics techniques like the dummy variables for the smoothening of the time series data to be stationary, Augmented Dickey Fuller unit root test for stationarity of the data, Breusch-Godfrey LM- statistics for testing residual serial correlation and OLS estimation method.[19]

On the basis of the castigation of RR findings, **Minea and Parent (2012)**, reconnoitered a non-linear relationship between public debt and economic growth using the data set of 1890-2009 which conjointly covers the RR data set of 1945-2009. The finding showed an endogenously estimated threshold around a debt to GDP ratio of 115%, beyond which the relationship changes the sign i.e. raising public debt can increase the economic growth. The modern econometric techniques like Panel Smooth Threshold Regression (PSTR) method recently coined by Gonzaler are entertained. The authors, in their paper, suggested some policy recommendations regarding growth effects of fiscal policy in a high debt regime.

The study of **Panizza et al. (2012)** revealed a negative correlation between debt and economic growth, in a sample of OECD countries, by adopting an Instrumental variable Approach[1] and this relationship becomes stronger when debt approaches 100 percent of GDP (RR,2010a,b; Checherita and Rathor,2010). The point estimation OLS regression suggested that a 10 percent point increase in the debt-GDP ratio is associated with an 18 basis point reduction of average growth. This coefficient of public debt is statistically significant at the one percent confidence level. Further, Placebo regression test and Non-Overlapping growth spells also appreciated the aforesaid results. However, the relationship between debt and economic growth vanishes once the debt with a variable that captures valuation effect brought about by the interaction between foreign currency debt and exchange rate volatility was instrumented. But due to the failure of instrument in high-debt countries, the alternative strategy, based on Fisher's covariance restriction (1966) was used. This resulted in statistically significant negative correlation between debt and growth in high-debt countries. The study found threshold that yields the best fit of 92 percent of GDP with 90 percent confidence interval of 80-98.

[19] Kaur, Baldir and A. Mukherjee(2012), "Threshold level of Debt and Public Debt Sustainability: The Indian Experience", Reserve Bank of India Occasional Papeers,

The study appreciated by **Calderon et al. (2013)** had two objectives: firstly whether public debt obstructs growth and secondly, whether economic policy ameliorates this effect. A large panel data of countries for 1970-2010 illustrated a negative, non-monotonic and robust relationship between the ratio of public debt to GDP and economic growth. To boot, the empirical work was in favour of the finding that the adverse impact of public debt on growth was reduced by strong and qualitative institutions, domestic policies and outward oriented policies. This means a more conservative scenario that considers a simultaneous increase in the quality of policies and a reduction of public debt lowers the detrimental effect of public debt on growth.

Herndon et al. (2013) replicated RR (2010a and 2010b) and unearthed that coding errors, selective exclusion of available data & data gap, and conventional weighting of summery statistics gave rise to serious errors that inaccurately reflected the relationship between public debt and economic growth among 20 advanced economies in the post-war periods. The regression analysis noticed the existence of the non-linear relationship between them across zero to 30% of debt to GDP. The result also implied that average GDP growth falls somewhat when the public debt to GDP ratio increases towards 120%, but there is less sharp turning point. Moreover, contrary to RR, their findings show that average GDP growth at the ratio over 90% is not dramatically different than when the ratio is below 30% of GDP because average real growth rate with public debt to GDP ratio of over 905 is actually 202%, not -0.1% as given by RR.

Kourtellos et al. (2013), with paying his research focus on the long run effects of public debt towards the presence of parameter heterogeneity in the cross country growth process, studied the non-positive (both negative and neutral) threshold effects of public debt on growth taking the quality of country's democratic institutions as the threshold variable. This paper employed a balanced 10 years period panel dataset covering 82 countries in 1980-89, 1990-99 and 2000-09 in order to average out business cycle effects. The empirical methodology comprised of the Augmented Solow growth regression model for determining the effects of debt on growth and also of threshold Solow growth model, viewed as the simple regression framework of Hansen (2000) and Caner and Hansen (2004) for allowing of the endogeneity of the threshold variable and regime specific heteroskedasticity. The investigation suggested that countries with lower quality institution have the negative coefficient to public debt to economic growth and

coefficient is strongly significant at the one percent level. And countries with higher quality institutions have neutral effect of public debt.

Arai et al. (2014) drew attention to the mixed evidence, supported by empirical analysis, of the connection between the accumulation of public debt (particularly domestic debt) and economic growth by discussing the liquidity effect of public debt in a financial constrained economy through the mechanism of crowding-out and crowding-in of private investment. Authors advanced a dynamic general equilibrium model with infinitely lived agents (government) and detected an inverted 'U' shaped relationship between them accompanied with a threshold level. At this junction, the growth enhancing crowding in effect is equivalent to the growth retarding crowding out effect and the economic growth rate is maximized. When the public debt-to-GDP ratio is below the doorway (threshold) level, the crowding-in effect dominates the crowding-out effect and, thereby, the accumulation of debt is an incentive to growth. On the other way, the accumulation of public debt starts trimming the economic growth after the concerned ratio crosses the brink level and crowding-out effect tyrannizes the crowding-in effect. This paper abandons the Ricardian Equivalence Hypothesis.

Veiga et al. (2014) anatomized the ascendancy of public debt on economic growth and on inflation in a group of 52 African economies between the years of 1950 to 2012. The result resembled that the high level of public debt was reflected in diluted rate of economic growth; and found an inverted 'U' shape relation between them. Along with, the higher public debt was associated with higher inflation rate implying positively related. The threshold level of debt to GDP ratio was discovered at 60% of GDP and its corresponding average inflation rate was 8.2%. If the ratio dropped between 60%-90% of real GDP, then the growth rate reduced by 1.32p.p. And if ratio increased beyond 90%, then the growth rate went on reducing up to 1.64p.p. So far as geographical area is concerned, then the threshold levels in North-African countries and in sub-Saharan countries between 60%-90% were same at 30% of GDP and along with 5.33% of inflation rate. For South African countries, it was below 30% and average of inflation rate was 11%. Briefly, the high level of public debt is string along reduced rate of economic growth and increasing level of inflation.

2.3 Summary:

In this chapter, we have come across many literatures on the casual, linear and non-linear relationship between public debt and economic growth for different countries for different periods .After discussing both theoretical and empirical literatures, we reached at the conclusion that there is no concrete link between the concerned variables rather it differs with the different countries, time periods, instrumental variables(socio-political, institutional and economic variables) taken in the literatures etc.

CHAPTER-3

THEORETICAL BACKGROUND AND METHODOLOGY

The chapter-3 of my dissertation consists of two sections viz first section for the theoretical background of public debt, and second section for the description about the econometrics methodologies and tests. The first section deals with the various theoretical concepts of public debt in general and DD & ED in particular. The next section is associated with the different time series methodologies and testing supposed to be applied for empirical analysis.

SECTION-1

3.1. Meaning and Definition of Public Debt:

Public debt, in general language, resorts to the loans raised by the public authority within or outside the country. In other words, it is nothing but the borrowings incurred by the government sourcing from either inside the country or outside the country or both. To quote Prof. P.E. Taylor "The debt is the form of promises by the treasury to pay to the holders of these promises a principal sum and in the most instances interest on that principal. Borrowing is restored to in order to provide funds for financing current deficit." In short, public debt, otherwise dubbed as national debt, refers to the reimbursed obligatory amount which the debtor country initiates from its subjects or from the subjects of the other country. Now-a-days, the public debt is embodied as the common method of government finance likewise other sources of finance, for instance taxes, fees, fines etc. In most of the countries, the debt has depicted its upward tendency and its intensity has been severe in less developed countries and emerging countries like India, Greece, and Italy etc.

The followings are the fundamental concepts of public debt deemed to be relevant to understand the casual amalgamation and casual transition mechanism of public debt and economic growth.

3.2. Distinction between Public Debt and Private Debt[20]:

[20] Kennedy, M. Maria John (2013), "Public Finance",pp199-200

Though my study is restricted only to the analysis of public debt and thereby domestic debt, but it is instrumental to know how the public debt is different from that of private debt. The under scriptures are the main differences between these concepts.

3.2.1. Compulsion: The government can coercion its subjects to lend money to it in case of extraordinary circumstances such as war, economic crises or natural calamities and national emergencies etc., but, no private individual can force another individual to lend them.

3.2.2. Repudiation: The government can repudiate the repayment of public debt under certain abnormal situations, whereas an individual under no circumstances says no to the repayment of loan without inviting legal action.

3.2.3. Durability: Since the government is a permanent institution and their subject have the firm faith on it, it can raise the fund from the public for a long period of time. On the other hand, the private debt is only for short period of time.

3.2.4. Nature of spending: Mostly, the shell out of the public debt is unproductive in nature, while private debt may be squandered both for productive and unproductive uses.

3.2.5. Sources: The Government may borrow both from internal and external sources. Moreover, it can borrow from itself through printing new currency, whereas it is very difficult for an opponent to make his/her debt from outside sources,

3.2.6. Rate of interest: Rate of interest paid by the Government is very low as compared to the interest rate paid by the private borrower. Moreover, the Government has the capability of changing (reducing) the prefixed interest rate, while the opposite has not. Objectives: The main intention of disbursement of public debt is to promote the collective (including the lenders') welfare. On the reverse, the private debt is for personal gains or profit motives only.

3.2.7. Economic effect: The public debt makes its effect on the production and distribution of wealth and income in the economy. But, the economic ascendancy of the private debt is very meager due to its small amount.

3.2.8. Trustworthiness: The credit of the government is very huge and it is plausible for it to borrow the amount at cheaper rates. But, for the private person, it is too cumbersome to be as trustworthy as the government is.

3.2.9. Mode of Repayment: The government can repay its loan by dint of taxing the people. On the contrary, the private individual has to repay its loan either out of its personal savings or out of his priori accumulated assets by borrowing from others.

3.3 Objectives and Importance of Public Debt[21]:

The dynamic transformation of the government functions over the years has made the public borrowing as a sine-qua-non part and parcel of the instrument of fiscal policy for the economic development of underdeveloped countries as well as of developed countries. The followings are the pertinent objectives and importances of debt.

- Abbreviation of gulf between public expenditure and public revenue
- Fighting against depression by raising loans from idle sources and by increasing the public expenditure which, in turn, pokes to more investment, employment, and income
- To curb inflation by impoverishing the additional purchasing power from the public via raising public debt
- Catering to economic development through reducing socio-economic impediments and boosting growth enhancing parameters
- Aim to meet unprecedented expenses and natural calamities
- To put a check on cyclical fluctuation and its manifold disastrous consequences
- Creation of and expansion of socio-economic overheads for facilitating economic development in future
- Unpopularity of taxation among tax payers
- Ensuring the better and equitable allocation and distribution of the resources
- To finance the unforeseen wars

3.4. Why Debt Not Tax[22]?

[21] Lekhi,R.K.(2012), "Public Finance',(18th edition),pp.267-274
[22] Rosen,H. S., and T. Gayer(2012), "Public Finance",pp.472-475

One most important question comes to our mind that why government saddles with debt finance, rather than tax finance. Several approaches have been developed to answer the question.

3.4.1. Benefit received principle: - The independent normative principle states that to the extent that the government programme creates benefits for the future generations, likely it is appropriate to switch over the burden to them.

3.4.2. Intergenerational equity: - It deals with the principle that why should not transfer the burden of debt obligation to future generation if the government projects undertaken with the debt finance makes them richer than present generation.

3.4.3. Efficiency consideration: - From efficiency stand point; the question is whether debt or tax finance generates a higher excess burden. This principle proposes that two small taxes required to repay debts are more preferred to one big tax because of quadratic relationship between excess burden and the tax rate. This is confined to the income point of view. But while considering the crowding out issue, then tax finance will be more prescribed than its counterpart. Thus, debt finance may be more efficient from income side point of view while it is inefficient from the side of capital allocation decision.

3.4.4. Macroeconomic consideration: - This points to the principle of functional finance where taxes and deficits are used so as to attain short run equilibrium without worrying about balancing budget. In the Keynesian standard macroeconomic model, when unemployment is very low, extra government spending might lead to inflation. So, it is necessary to siphon off some spending power from the private sector via tax imposition. Conversely, when unemployment is high, running with a deficit is a sensible way to encourage the demand. However, it was criticized by Barro and others.

3.4.5. Moral consideration: - Some economists assert that choosing of tax or debt is a moral issue. It was remarkably said by Thomas Jeffeerson in 1813 that, "I trust that …… we shall all consider ourselves unauthorized to saddle posterity with our debts, and morally bound to pay them ourselves". So, it is implicitly says that debts and deficits are immoral. But the positive proves that sometimes borrowing is the morally right thing to do.

3.4.6. Political consideration: - A, perhaps, more compelling non-economic argument against deficit government is apolitical process tends to underestimate the costs of government spending and to

overestimate the benefits derived from the spending. To weight cost and benefit in an equal scale, Milton Friedman recommended a politically tolerable deficit. So, government deficit shouldn't go beyond said level.

2.4.7. Unpopularity of taxation: - People generally don't like to pay taxes (either new or old). So, to get over the opposition, debt finance is more suitable than other.

3.5. Classification of Debt[23]:

Public debt may be classified into various categories on the basis of the nature i.e. purpose of spending and duration of debt.

3.5.1. Voluntary debt and compulsory debt: - A debt is said to be voluntary if it is raised by the government without putting any force or coercion on debt subscribers. While in case of the compulsory debt, the government compels the people to purchase debt during national emergency and war.

3.5.2. Funded debt and unfunded debt: - It is a kind of long-term or definite period debt. The interest rate to be paid with terms and conditions are cited in the debt instrument. A fund is maintained by the government to secure money and thereafter to pay it back. Unfunded debt, on the other hand, is a type of debt for short time, and for an indefinite period. It needs no special fund for its repayment.

3.5.3. Productive debt and unproductive debt: - If the investment yields an income which will both meet periodically interest payments of the debt and helps in repaying the principal over long run, then this debt is dubbed as productive debt. But, unproductive debt has no capability of generating any income in future. That's why it is otherwise known as deadweight debt.

3.5.4. Redeemable debt and irredeemable debt: - Redeemable debt shows that the principal amount of which is repaid by the government after a pre-determined period of time. The government regularly pays interest rate on this debt. Conversely, debt which is not redeemed by the government is termed as irredeemable debt.

[23] Kennedy, M. Maria John (2013), "Public Finance",pp202-204

3.5.5. Internal debt and external debt: - A loan raised by the government within its own country is called as internal debt. On the counterpart, a debt is named as external debt once it is made through external sources or outside the country.

3.5.6. Short term and long term debt: - A debt may be entitled to be short-term when it matures within a period roughly 3 to 9 months. On the contrary, the debt whose longitivity of maturity lies above 10 years is considered as the long term debt.

3.5.7. Marketable and non-marketable debt:- Marketable debt is one in which the securities are arbitrated in the open market while non-marketable debt is that where securities can't be sold in the stock exchange markets.

3.5.8. Gross and net debt: - Gross debt comprises the whole amount of debt outstanding at anytime. But, net debt is the difference between the gross debt and sinking funds or other assets earmarked for repayment of debt.

3.6. Meaning of Domestic Debt:

The dictionary meaning of Domestic Debt (DD), otherwise termed as National Debt, refers to a debt which patronizes its creation and its repayment to the residents of a definite domestic territory of the country. It implies 'debt owes to creditors resident in the same country as debtors'. Moreover, it illustrates the loans or borrowings raised by the public authorities within the legal jurisdiction of the economy. DD is not only composed of internal debt but also of small savings, provident funds & other accounts and reserve funds & deposits. So, it is incarnated as the amplified concept to internal debt. This debt (DD) of the government is computed from the debt of the central as well as the state governments.

3.7. Sources Domestic Debt[24]:

The main internal sources from which the government can amass funds are as follows.

3.7.1. Borrowing from individual:-

When individuals buy government bonds, they are diverting funds from the private use to the government use. If the purchasing of the government is voluntary, then there will be very meager

[24] Bhatia, H. L.(2009), "Public Finance",pp. 198-217

direct effect on the curtailment of private consumption expenditure and of business expansion. To a large measure, the bonds will be absorbed out of funds which would have been lying idle or would have been expensed to purchase other securities.

3.7.2. Borrowing from Non-banking Financial Institutions:-

This is considered as one of the sources of internal public debt. The non-banking financial institution such as insurance companies, investment trusts, mutual saving banks etc are indulged in reducing their idle cash balances with an investment in government bond while they are purchasing these bonds. By enjoying the distinguished characteristics like free of credit-risk, high negotiability and liquidity, these bonds attract more funds from these non-banking institutes. The rate of interest paid on the government bonds is, however, relatively low. Consequently, in bank cases, financial institutions prefer to invest in high-risk, high-return fetching securities, particularly in the equity shares of companies under the management of the familiar and experienced industrialists. When the non-banking financial institutions purchase government bonds, they follow the same procedure to trimmer their cash holdings.

3.7.3. Borrowing from commercial banks:-

Commercial banks can create credits many times of their excess reserves. As such, they may buy an amount of government securities much larger than their excess reserves. This doesn't put forward any contractionary effect, because the purchase of these securities is done out of extra created money and not through reduction of loan targets of the banks.

3.7.4. Borrowing from central bank:-

By following the similar system of creating purchasing power by the commercial banks, the central bank of the country has the power to subscribe government bonds. When government draws upon the loan balances, there cannot be any contractionary effect. On the other hand, it swells the reserves of commercial banks and consequently the lending capacity of commercial banks increases.

3.8. Composition of Domestic Debt[25]:

[25] Singh, Charan(2005), "Public Debt in India: The Need to Separate Debt From Monetary Management".pp.6-29

Being an indispensable constituent of fiscal policy, the study of the composition of domestic debt becomes inevitable to discuss about the implication of the upward obligations. The major constituents are internal debt, small savings, provident funds, and reserve funds and deposits. Internal debt of the Government is guarded under the Consolidated Fund of India in case of the Central Government and that of the States in the case of the State Governments. But, the other components of the domestic debt (DD) are not defended under the Consolidated Fund of India.

Composition of Domestic Debt of the Government

Internal Debt	Small Savings	Provident Funds and Other Accounts	Reserve Fund and Deposits
a) Market Loans And Bonds	a) Deposits	a) State Provident funds	a) Interest Bearing
b) Treasury Bills	b) Certificates	b) Public Provident Funds	b)Non- Interest Bearing
c) Special Securities Issued to RBI		c) Other Accounts	
d) Special Floating and Other Loans			
e) Ways and Means Advances			
f) Loans from Banks and Other Institutions			

Source: Reserve Bank of India

3.8.1. Internal Debt:

The major ingredients of internal debt are market loans and bonds, Treasury bills and Special securities issued to RBI. The RBI plays a role as the debt manager for marketable internal debt, for the Central government as a responsibility and for the State Governments by an agreement,

under the RBI Act, 1934. RBI makes a decision about the maturity pattern, details of borrowings, instrument design and other related issues in consultation with the central government.

3.8.1.1. Market Loans and Bonds:

The market loans, otherwise known as rupee loans, comprises of three types of commitments. These are loan floated by the government, loans issued by the government in exchange for the ad hoc treasury bills outstanding with the RBI and lastly compensation & other bonds. The borrowings, under this head, are done through government bonds (with their nominal denomination).

3.8.1.2. Treasury Bills:

Treasury Bills are viewed as the most short-term issues of the central government. In India, it is of different forms viz. 91-days Treasury Bills (introduced in India in 1917), 182-days Treasury Bills (1986), 364-days Treasury Bills (1992) and 14-days Treasury Bills (1997). But 182v and 14-days Treasury Bills were called off in 2001.

3.8.1.3. Special Securities Issued to RBI:

The conversion of funding of ad hoc Treasury Bills (91 days) into perpetual securities only to be held by RBI is called as Special Securities, Issued to RBI. Until the converted securities are turned into Government of India dated securities, these securities yield interest equivalent to the discount rate on the ad hoc bills.

3.8.1.4. Special Floating and Other Loans:

These demonstrates non-negotiable, non-interest bearing rupee securities issued to International Financial Institutions to face certain international obligations.

3.8.1.5. Ways and Means Advances (WMA):

The RBI fetches WMA to the government to manage the ad hoc financial imbalances. Since1997, under this category, the RBI provides certain agreed financial resources annually to the central government at the bank rate. If the required amount is greater than the agreed amount,

then there is the provision of overdraft facility for maximum of 10 consecutive working days at a negotiated penal rate. WMA facilities are also available for the state government since 1937.

3.8.1.6. Loan from Banks and Other Institutions:

Loan from banks and other institutions allude to the state government borrowing exclusively. The state governments are authorized to take loan from the banks and other institutions for the purpose of providing public provisional facilities like PDS and capital expenditure.

3.8.2. Small Savings:

Small savings like postal savings are of special significance of gathering the savings of the public directly without any financial intermediation. Therefore, Government of India has been conducting various policies, like tax concessions, for encouraging small savings.

3.8.3. Provident Funds and Other Accounts:

Provident funds and other accounts are basically concerned with the social security funds. This account exclusively pertains to the employees in the organized sector of the economy. The share of State Provident Funds (SPF) mainly belongs to government employees.

3.8.4. Reserve Funds and Deposits:

Reserve funds and deposits are of two type viz. interest bearing and non interest bearing. It constitutes departmental and judicial deposits, depreciation and reserve fund of government departments, deposits of local funds and civil deposits etc.

3.9. Meaning of External Debt:

A debt is said to be external debt (ED) if/when loan is floted outside the country. In a different language, ED refers to the loan obligation of a country to the foreign financial institutions, foreign governments, and foreign multinationals and international organization such as IMF, IBRD, ADB and SAARC. To quote Frindlay Shirras, "External debt means the transfer of wealth from the lending to the borrowing exists when the loan is made, and a transfer in the reverse direction when the interest is periodically paid or when the principal is repaid."

3.10. Sources of External Debt:

3.10.1External sources stands more or less same place on which the internal sources stands in sourcing public debt. Government may borrow from other economies too. These borrowing can be used to finance the war expenditure, or to procure defense equipment, or to pay for development projects, or to pay off adverse balance of payments. Though the funds raised through internal sources can be used for these aforesaid purposes, the role of external sources of borrowing is relevant in recent years.

3.10.2. International financial institution, viz. I.M.F., the I.D.A. and the I.F.C., which provide loans for short-term for overcoming temporary balance of payments difficulties and for long term development purposes.

3.10.3.Government assistant generally for development projects. For developing countries like India, external sources of borrowing are becoming considerably important in recent years.

3.11. Composition of External Debt:

By composition, ED includes government debt (borrowings from agencies, IMF on a multilateral or bilateral basis), trade deficit, commercial borrowings, short-term debt, non-governmental borrowing and deposits (NRID and FCBOD) with maturity more than one year.

3.12. Domestic Debt and External Debt[26]:

There is close interrelationship between DD and ED from the domestic rate and export-import point of view. Firstly, if there is the high domestic rate, it encourages foreign borrowings and thereby, ED. Contrary, low domestic rate encourages the local borrowing and hence, increases local investments. Secondly, from the export-import purview, low DD directs to the export strategy and high DD ways to import strategy. When the economy is running through low DD, it indicates that the country yields the hard currency through exports. So, more resources will be available within the economy. On the other hand, high DD means that the country must import needed items. Hence, there is a flight of money from domestic economy to the foreign country in the form of debt services and it results in the reduction of available economic resources in the economy. So, there is the explicit link between DD and ED.

[26] See: http://www.ehow.com/info_7803516_internal-vs-external-debt.html

3.13. Domestic Debt Vs External Debt[27]:

3.13.1. Sources: DD is picked up from the internal sources like non-banking financial institutions, commercial banks, and central bank. But in case of external debt, it is made from the world Bank, IMF, foreign financial institutions.

3.13.2. Borrower and lender: In case of the DD, both are the residents of the same country. But, for the ED, borrower and lender belong to different country.

3.13.3. External Shocks: For external debt, the domestic borrowers are very much thrall to foreign power because foreign interest rates will directly affect the economy of the borrower. But no such external thrall is there in DD.

3.13.4. Currency: In the currency perspective, the main distinction between DD and ED is the currency in which the debt is contracted. Local currency is easier for local financial institutions and government to control than foreign currency.

3.13.5. Sovereignty: The economic sovereignty is better praised by DD rather than ED.

3.13.6. Burden: DD follows Adam Smith philosophy of debt "left hand owes to right hand". It means the repayment of DD is just transfer of income between the residents of the same country. It is less burdensome than ED from income distributional prospective.

3.14 Nexus between DD and Economic Growth[28]:

The role of the public domestic debt (hereafter DD) in Low-Income Countries (LDCs) and Emerging Markets (EMs) towards the economic growth remains a problematical issue in academic and policy making circles. It has been seen that LICs and EMs are expanding their scope for DD by following external debt reduction initiatives and an upsurge in foreign portfolio interest in local currency bonds. In this section, we will be focusing on the theoretical casual relationship between DD and economic growth in the lieu of heterogeneous economic strategic variables. To grasp the better understanding about the transmission mechanism of causality, it is sine-qua-non to do the discussion on certain pros and cons of DD.

[27] http://www.ehow.com/info_7803516_internal-vs-external-debt.html

[28] Abbas S.M.A. and J.E. Christensen(2007), "The Role Of Domestic Debt Markets in Economic Growth: An empirical Investigation for Low-Income Countries and Emerging Markets", IMF Working Paper

3.14.1. Disadvantageous Mechanism of DD:

Some critics of DD are engaged with the explanation of the negative repercussions of DD on private sector lending, fiscal and debt sustainability, deepening bank efficiency and inflation risks.

3.14.1.1. DD vs. Crowding Out Effect:

When government rises fund domestically through borrowing. It will take away the domestic private saving which could have been otherwise available for the private sector lending. In turn, the small residual of loanable funds in the market increases the cost of the capital for private borrowers, cuts down the private investment demand and, thereby, retards economic growth. In another way, when government expenses the debt amount in the economy, it goes up the real interest rate of the economy. An increase in interest rate will bring dearness in accessing capital borrowing for the private investors. As a result of which they (private investors) either withdraw their investment from the main stream or will not go for further investment or both. This kind of activities, famously known as crowding out effect, put a strain on the path of potential economic growth.

3.14.1.2. DD vs. Fiscal and Debt Sustainability:

One of the prominent concerns about DD is its repercussion on fiscal and debt sustainability. DD is considered as more costly than concessionary external financing. The interest burden of DD may absorb the significant portion of the government revenue and, as a result, diverse the growth propelling financing. Furthermore, more dependence on DD may cause delay in tax mobilization effect which is necessary buy politically expensive. Due to the short term structure of the domestic portfolios, government may experience a certain liquidity problem in transacting huge amount of debt. This liquidity problem has a negative impact on maintenance of the sustainability of debt.

3.14.1.3. DD vs. Inflationary Risks:

When the state is in the grip of weak (direct) tax collection, it is instrumental for the state to move on for monetization of the deficit in fiscal discipline and net domestic financing fund.

These processes of financing generate seigniorage[29] and, reduce the real encumbrance of current DD. Under these existing circumstances, the government meets a classical time inconsistency problem i.e. inflationary risk. Therefore, the government either cannot issue any nominal debt or has to pay a huge amount of inflationary risk premium to the investors facing unforeseen inflation.

3.14.1.4. DD vs. Bank Efficiency:

As government DD is associated with high-yielding returns, DD kept by banks can make them complacent about the costs and diversify their deposits and funds from private sector projects. The desireness of these banks to provide credit to the private sector is weakening by a poor credit atmosphere. In addition, the DD is less risky and provides constant flow of returns, so these banks have less incitement to amplify credit to riskier private borrowers. Though the banks' decision to hold DD may be economically efficient from risk-diversification perspective, but it will be less efficient from overall growth perspective.

3.14.2. Advantageous Mechanism of DD:

As oppose to demerits of the DD mechanisms to economic growth, DD has a positive impact on accelerating variables of economic growth. This part of discussion deals with the favorable causal amenability between DD and economic growth.

3.14.2.1. DD and Money & Financial Market:

Firstly, the government securities are an exuberant tool for the conduct of indirect monetary policy operations and collateralized lending in interbank markets. These functioning of DD help banks managing their own liquidity more effectively by abbreviating the requirement for frequent central bank interventions like credit ceilings, strategic rate control and high reserve requirements. Secondly, returns of the government securities are treated as a pricing benchmark for long term private debts issued by banks or enterprises and, hence, encourage development of a corporate bond market which, in conclusion, augments competition in the banking sector. Thirdly, from the money and financial market perspective, the possible benefits from the availability of DD are to decelerate the capital flight to outside economies, shorten the size of

[29] Seigniorage refers to profit made by a government by issuing currency, especially the difference between the face value of coins and their production costs.

black money, widen tax base, loom financial depth, de-dollarization and reduction of countries' financial depth.

3.14.2.2. DD and Volume & Efficiency of Investment:

DD can also improve and influence the volume as well as the efficiency of the investment in LDCs and EMs. Because of an inherently risky and unpredictable business environment, the banks in these countries are reluctant to engage themselves with the private sectors. This implies the limited role of the banking sector in providing longer term financing to important strategic sectors like infrastructure, agriculture etc and incline towards financing consumption related trade activities. The collateral function of DD may degrade the aforesaid problem and bring greater efficiency in the pro-growth investments.

3.14.2.3. DD and Political Accountability:

In the long term, nominal debt agreements sour the political accountability and favor the government building a way to access international capital market. And an augmenting reliance on DD may be more helpful in mitigating the impediments of external borrowing with desirable policy initiatives for accessing sound international capital market.

3.14.2.4. DD and Cost Effective Deficit Financing:

It has been empirically concluded that market-based DD issuance to be the least costly method of financing the budget deficit as oppose to the external debt financing and seigniorage. This cost effective method of financing applause national saving (private saving + government saving), controls inflation and, in out-product, adds fuel to the tempo of economic growth in LDCs and EMs.

3.14.2.5. DD and Total Factor Productivity:

The positive spill-over effect emanating from DD to the broader capital markets may support better allocation of capital to productive sectors. The better allocation will certainly raise total factor productivity of the economy in particular and expands the economy's production possibility frontier in general.

3.14.2.6. DD and Institutional Environment:

Better institution plays a very crucial role in modeling competent policy framework, infrastructural development, optimal utilization of fiscal resources for provision of public services, keeping law & order and protection of property rights. This may implicitly have positive impact over growth.

3.15. Casual Nexus between External Debt and Economic Growth[30]:

Now-a-days, the study of impact of ED on economic growth allures the critical consideration of the policy makers and academicians. This part deals with the question of how the excess ED affects the economic growth through its transitive mechanisms.

3.15.1 ED vs Debt Overhang:-

Literally, debt overhang resorts to a situation when a country's debt level is supposed to overlap its repayment capability or when the new debt is made to repay the interest of the old debts. When the economy haves the colossal amount of ED, the major part of returns generated from the investment in the domestic economy is washed away in the form of the debt repayment and debt services. Thus, debt overhang demoralizes the economic growth.

3.15.2. ED vs Growth Uncertainty:-

As the stock of the ED increases, there is growing uncertainty about government's initiative to execute the structural and fiscal reforms. Furthermore, oversize public debt increases the burden of its repayment on country's treasury and this repayment is supposed to finance by the distortionary policy measures like heavy taxation. The distortionary actions make the potential investors reluctant to invest in long-term and high risk projects. Besides, the heavy ED can also result in some short of capital flight private investors with a fear of menacing devaluation and rise in taxation in future. So, economic uncertainty created by ED reduces the growth potential of the economy.

[30] Clements,B., R. Bhatacharya, and T. Q. Nguyen (2003), "External Debt, Public Investment, and Growth in Low-Income Countries", IMF Working Paper,WP/03/249

3.15.3. ED vs Physical Capital Accumulation & Total Factor Productivity:

The abrupt accumulation of ED can be linked with the expectation of dampening economic growth through their negative impact on physical capital accumulation and total factor productivity. This is due to the fact that when the huge amount of income is channelized to meet the debt repayment obligations, then very less amount of resources would be remain for enhancing the productivity of the factors of the production in the economy.

3.15.4. ED vs Crowding out of investment & change in the composition of public spending:-

Higher the ED leads to higher debt service repayments. This can affect the composition of the public spending negatively by contrasting the amount of resources available for developmental and social welfare activities. So, the heavy ED has an adverse impact on economic growth

3.16. Management of Public Debt[31]:

The management of public debt is the plethora of debt operations meant in maintaining and in manipulating a national debt. More to say, it is the combination of formulation and implementation of debt policy to keep the interest cost to the minimum possible (traditional view) and to attain various socio-economic objective with minimum debt opportunity cost (modern welfare view).

Principles:-

- The cost of creating and redeeming the debt (debt service) should be maintained as minimum as possible.
- Since there is a direct and close relationship between the number of securities and administrative cost associated with debt, the government should make desired efforts to minimize the aforesaid cost with larger number of securities.
- To achieve economic growth with stability causing by public debt, it is very instrumental to bring good co-ordination between fiscal policy and monetary policy.
- Satisfaction of the investors: - It (debt management) should cater to the needs of the investors with regard to the types of issues. It should create such a harmonious environment congenial for more investment.

[31] Bhatia, H. L.(2009), "Public Finance",pp. 198-217

SECTION-2

3.17.0 Causality and Cointegration: Theoritical Issues and Tests:

The causal judgments are important for prediction and control purposes. Hence, causality tests have gathered more popularity now-a-days. In the same line, co-integration test is helpful for dealing with non-stationarity properties of time series data and also verifies the long run relationship (cause and effect) between variables. This section of the chapter is associated with the heterogeneous theoretical issues and tests of the different methodologies appreciated for the present study. This section starts with the discussion of a set of definitions conferred by Granger (1969, 1980a). Then, various tests like unit root tests, co-integration and causality are discussed in this section.

3.17 Unit Root Tests:

For testing cointegration, it is mandatory to ascertain that the concerned series are not I(0) and the order of integration of the series should be the same. In the time series concepts, there are both formal and informal tests of stationarity. The informal time series test follows the time series plots and correlogram. And formal tests are the Dickey-Fuller (DF), Augmented Dickey-Fuller (ADF), Phillips-Perron (PP), and Kwiatkowski unit root tests which are employed to identify the order of integration of the underlying series.

3.17.1. Dickey-Fuller (DF) and Augmented Dickey-Fuller (ADF) Tests:

The Dickey-Fuller unit root test procedure requires the estimation of the following equation,

$$\Delta X_t = \Upsilon + \alpha X_{t-1} + \sum_{i=1}^{k} \beta i \Delta X_{t-I} + \varepsilon_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (1)$$

Where,

k is that value which ensures ε_t white noise series,

Δ is difference operator,

α and β are parameters.

The t-statistics α is the Dickey-Fuller 'test statistics' though under the null hypothesis of $H_0 : X_t$ is I(1). It does not follow the usual t-distribution. The test rejects the null hypothesis against its alternative (H_1: X_t is I(0) if the test statistics is significantly negative. This test procedure is also known as Augmented Dickey-Fuller (ADF) Tests. The DF test is contemplated as the special case of the Augmented Dickey-Fuller (ADF) Tests when k=0.

3.17.2 Phillips-Perron (PP) Test:

The Phillips-Perron unit root test requires the estimation of the following equation (without trend)

$$X_t = \Upsilon + \alpha X_{t-1} + u_t \qquad \text{.....(2)}$$

Where, t=1,2,3,…..T.

The t-statistic of α is $\hat{\alpha}$ and $\hat{\alpha} = [\hat{\alpha} - \alpha] \{ \sum (X_{t-1} - \bar{X}_{-1}) 2 \}^{1/2} \hat{S}^{-1}$

Where, $\hat{S}$ is the standard error of the regression eqn(2)

This $\hat{\alpha}$ is used as DF test-statistic. PP has transformed this conventional t-statistics to provide an alternative test statistics which is robust to a wide variety of serial correlation and time dependent heteroskedasticity.

3.18. Cointegration and Error-Correction:

Cointegration is ameliorated with non-stationarity in the data and verifies the long run linkage between the variables. Error correction method, on contrary, can hold the level of information of the data and confers short run dynamics and also defines the temporal causal kin and kid. The data of cointegration was attributed by Granger and error correction mechanism by Sargan (1964) and other.

The concept of integrated series is sine-qua-non to define cointegration. A series X_t is termed to be integrated of order of d, encrypted by I(d) if the series requires differencing d times to be stationary. Considering a pair of series X_t,, Y_t and each of which is of I(d). A linear combination of the series say, $Z_t = X_t - AY_t$, is another I(0). However, the concept of cointegration is to search for the linear combination which by itself will be stationary, that is Z_t is I(0). The relationship

$X_t = AY_t$ is conceived as the long run equilibrium relationship, with A as the cointegrating parameter. In the absence of a Z_t which is I(0), it may be deduced that X_t and Y_t have no tendency to move together over time.

3.18.1. Tests for Cointegration:

After confirming that the given series are not I(0), the cointegration tests are applied to see whether the given series (pair-wise) move together over the long period of time. For accessing miscellaneous tests of cointegration, it is necessary to estimate a coingration regression equation which is of the form,

$$X_t = B + AY_t + u_t \qquad \text{.....(3)}$$

Where, A and B are constants. The residual, which satisfy the white noise property, can be obtained by using OLS. The various testing procedures are discussed as follows.

3.18.1.1. Cointegration Regression; Durbin-Watson (CRDW) Test:

After estimating the cointegration regression {eqn(3)}, Durbib-Watson (DW) statistic is checked to detect cointegration. A low DW indicates non-stationarity of residuals. The test rejects the null hypothesis of cointegration in favour of the alternative of cointegration if DW is very large.

3.18.1.2. Dickey-Fuller (DF) Test:

This test requires the estimation of the following regression equation,

$$\Delta\hat{u}_t = \alpha\hat{u}_{t-1} + e_t \qquad \text{.....(4)}$$

Where $\hat{u}$ is the estimated residual obtained from eqn (4). Then the rest of the procedure is similar with the DF test.

3.18.1.3. Augmented Dickey-Fuller (ADF) Test:

In this test, the residual series $\hat{u}$ from the eqn (4) is subject to check whether it follows I(0). For that purpose the following regression is estimated using OLS.

$$\Delta\hat{u}_t = \alpha\hat{u}_{t-1} + \sum_{i=0}^{k} \beta i\, \Delta\hat{u}\, t - i + e_t \qquad \text{.....(5)}$$

Here the t-statistic of α is ADF statistic. Then the rest of the procedure is similar with ADF Test.

3.19. Error Correction Models:

Once cointegration is confirmed, one should look for proper error correction model. The 'Granger Representation Theorem' states that if a set of variables are cointegrated, there exists a valid error correction representation of the data and the reverse is also true. For a bivariate setup (X_t, Y_t), an error correction model consists of the following two equations,

$$\Delta X_t = £_1 \hat{u}_{t-1} + \sum_{i=1}^{p1} \alpha i \, \Delta X_{t-i} + \sum_{j=1}^{k1} \beta j \, \Delta Y_{t-j} + u_{1t} \quad \text{.....(6)}$$

$$\Delta Y_t = £_2 \hat{u}_{t-1} + \sum_{i=1}^{p2} ai \, \Delta X_{t-i} + \sum_{j=1}^{k2} bj \, \Delta Y_{t-j} + u_{2t} \quad \text{.....(7)}$$

Where $\hat{u}_{t-1}$ is the lagged error series obtained from cointegration regression {in eqn(3)}, p1, p2, k1, k2 are optimal lag values in these equation and $£_1, £_2$ are the parameters such that one of them must be non zero.

Granger suggested that if X_t, Y_t are I(1) and cointegrated, there must be causality between them at least in one equation which improve forecastability of at least one of X_t, Y_t.

3.20. Definitions of Granger's Causality:

It can't be said that there is the existence of causality or the directional influence, once a relationship exists between the variables. To have a better understanding over the definition of causality, let us consider the relationship between two variables X and Y.

Specification of Granger's Causality

i. Variables X and Y are assumed to be stationary.
ii. If X_t and Y_t are two stationary process, $\overline{U}_t$ is the information set pertaining to all the information up to time t-1
iii. $\overline{U - X}$ is the information set excluding X and δ^2 is the error variance,

Then Granger provides the following five definitions of the causality:

A. Unidirectional Causality: $X \rightarrow Y$

Unidirectional causality from X to Y is indicated,

If $\delta^2 (Yt | \bar{U}_t) < \delta^2 (Yt | U_t - \overline{Ut - Xt})$

B. Bi-directional Causality: $X \leftrightarrow Y$

Bi-directional causality is said to occur

When /if,

$\delta^2 (Yt | \bar{U}_t) < \delta^2 (Yt | U_t - \overline{Ut - Xt})$ and

$\delta^2 (Xt | \bar{U}_t) < \delta^2 (Xt | Ut - \overline{Ut - Yt})$

C. Instantaneous Causality:

If $\delta^2 (Yt | \bar{U}_t, \bar{\bar{X}}_t) < \delta^2 (Yt | \bar{U}_t)$,

Then, there is said to be instantaneous causality from X to Y and vice-versa.

Here,

= denotes current value of the concerned variable.

D. Causality With a Lag:

If Xt is cause to Yt, then we say the causality lag m to be the least value of K such that,

$\delta^2 \{ Yt | Ut - X_t (K) \} < \delta^2 \{ Yt | U_t - X_t (k + 1) \}$

Where,

$Xt (K)$ represents the data set $\{ Y_t, t = K, K + 1, \ldots \}$

$Ut - Xt (k)$ is all the information excluding $X_t (K)$

E. Independence:

X_t and Y_t are termed to be independent, if

$\delta^2 (Yt | \bar{U}_t) = \delta^2 (Yt | U_t - \overline{Ut - Xt}) = \delta^2 (Yt | \bar{U}_t, \bar{\bar{X}}_t)$ and

$\delta^2 (Xt | \bar{U}_t) = \delta^2 (Xt | Ut - \overline{Ut - Yt}) = \delta^2 (Xt | \bar{U}_t, \bar{\bar{Y}}_t)$

Then three more concepts of causality namely, probabilities causality, mean causality and full causality are proposed further by Granger (1980a). They are as follows:

F. Probabilistic Causality:

It was the view of Granger that the probability causality assures three basic axioms, firstly, the cause must precede the effect in time; secondly the cause contains some unique information about effect on the future and lastly, while the strength of casual relations may vary over time, their existence and direction are time invariant. This causality is said to be present from X_t to Y_{t+j}

$$F(Y_{t+j} | U_t) = F(Y_{t+j} | U_t - X_t)$$

Where,

F denotes the conditional probability distribution.

U_t is the universal information set including all information up to period t.

Xt contains all past and present values of variable X.

G. Mean Causality:

Granger defines mean and full causality in order to make his general definition useful with data and operational. For it, he substitutes a more restrictive information set (I_t) in place of universal (U_t). So,

If / when,

$E(Y_{t+J} | I_t) = E(Y_t | I_t - X_t)$, then X_t causes Y_{t+j} in mean

H. Full Causality:

A causality is dubbed to be full causality from X to Y, if / when the addition of X to an information set (I_t) improves the forecast of distribution of future Y. The condition is:

$$F(Y_{t+j} | I_t) = F(Y_{t+j} | I_t - X_t)$$

3.20.1. TESTS OF CAUSALITY[32]:

So far I have written about the definitions of Granger causality. Now we move on to some of the fundamental tests which are supposed to be included in my research work, are to be described below.

[32] Gujurati, Porter and Gunasekhar , "Basic Econometrics", PP.820-851

3.20.2.1. Granger Causality Test:

This test assumes X_t and Y_t are two stationary time series with zero mean and also assumes the presence of no instantaneous causality between them. This test involves estimation of the following regression.

$$Y_t = \sum_{i=0}^{n} ai\ X_{t-i} + \sum_{j=0}^{m} bj\ Y_{t-j} + u_{1t} \quad \text{.....(8)}$$

$$Xt = \sum_{i=0}^{m} ci\ X_{t-I} + \sum_{j=0}^{n} dj\ Y_{t-j} + u_{2t} \quad \text{.....(9)}$$

Here cor(u_{1t} ,u_{2t}) = 0 and both error terms are white noise error term. Here, m and n can be infinite period but, in practice, m and n are deduced to be finite and their sum not exceeding the given time series due to the finite lag length of the available data. Eqn (8) reveals that current Y is related to the past values of itself as well as the values of Xs. Eqn (9) also shows the similar behavior for X.

In order to test the patterns of causality written above, it is obligatory to estimate eqn (8) and eqn (9), then test the null hypothesis that,

H_0^1: $\sum a_i=0$ or X does not Granger cause Y.

H_1^1: Not all a_s are zero simultaneously or X does Granger cause Y

H_0^2: $\sum d_j=0$ or Y doesn't granger cause X

H_1^2: Not all d_S are zero simultaneously or Y does Granger cause X

Acceptance of the null hypothesis implies lack of casual relationship between X and Y. In other words, there is no causal link between X and y. On the contrary, rejection of null hypothesis depicts the presence of the causality between the variables.

3.20.2.2. Sim's Test of Causality:

Sim's test of causality is primarily founded on the fact that future can't cause the present. For this, let's consider the regression,

$$Y_t = a + b_kX_{t-k} + b_{k-1}X_{t-k-1} + \ldots b_1X_{t-1} + b_0X_{t-1} + cX_{t+1} + C_2X_{t+2} + \ldots\ldots c_mX_{t+m} + u_t$$

……(10)

The eqn (10) comprises of lagged, current and future value of the regressor X. In this equation, there exist 'k' lagged and 'm' leads parameters. If X is cause to Y, then $\sum c_s = 0$ (statistically). A similar regression of X on past, present and future Y can be estimated to test whether lead value of Y causes X. To avoid the serial correlation among the residuals, the process of pre-filtering of the series is supposed to done in Sim's test of causality prior to estimation of the equations.

3.21. SUMMERY:

In the first section of this chapter discussed about the different theoretical concepts of Domestic Debt & External Debt and their theoretical nexus with economic growth through various strategic economic variables. The second section sheds light on the heterogeneous time series methodologies and tests which are to be employed to give an empirical touch to the theoretical nexus of the interested variables.

CHAPTER-4

EMPIRICAL ANALYSIS

4.0 DATA BASE AND ITS SOURCES:

The present study exercises annual time series data on the variables of Domestic Debt (DD), External Debt(ED) and Economic Growth (proxy by GDP) .The data set have been sourced from the secondary sources namely Economic Survey (GoI), Hand Book of Statistics (RBI), Budget Documents (GoI), Indiastat, and Indian Public Finance Statistics. The data comprises of the time period of 1980-81 to 2013-14 for India. The data series in the logarithmic form is entertained in empirical analysis with an intention to alleviate the problem of heteroskedasticity.

4.1. SECTION-1

The section-1 of this chapter has an association with the first objective of the study which is to look into the trend, pattern and growth of GDP and public debt of India over the period of 1980-81 to 2013-14. To address the first objective, the engagement of the data analysis and descriptive statistics like tabulated description, graphical description and statistical commentary are admired.

In the table-1, the variables of GDP at current price, growth rate of GDP, total public debt (TPD),TPD/GDP, domestic debt(DD),DD/GDP, external debt (ED) and ED/GDP are shown. The table contains the time series data of the aforesaid variables spanning from 1980-81 to 2013-14. With the help of these data, we will track the trend, pattern and growth of GDP, TPD (in general) and DD & ED (in particular). To have a better and comprehensive understanding over the relationship between public debt and economic growth, we shall do the analysis in a phase wise. These are

1st Phase: Pre-economic reforms (1980-81 to 1990-91)

2nd Phase: Post-economic reforms but Pre-FRBM Act (1991-92 to2003-04)

3rd Phase: Post-economic reforms and Post-FRBM Act (2004-05 to 2013-14)

TABLE-1 (RsCrores

year	GDPCP	GROWTH GDP	TOTAL PUBLIC DEBT	DEBT/GDP	DOMESTIC DEBT	DD/GDP	EXTERNAL DEBT(ED)	ED/GDP
1980-81	149,642	19.02	69552	46.48	58254	38.93	11298	7.55
1981-82	175,805	17.48	80753	45.93	68425	38.93	12328	7.00
1982-83	196,644	11.85	98261	49.97	84579	43.01	13682	6.96
1983-84	229,021	16.47	111456	48.67	96336	42.06	15120	6.61
1984-85	256,611	12.05	143571	55.95	116933	45.57	26638	10.38
1985-86	289,524	12.83	175186	60.51	142874	49.35	32312	11.16
1986-87	323,949	11.89	210066	64.85	173488	53.55	36578	11.30
1987-88	368,211	13.66	250949	68.15	204111	55.43	46838	12.72
1988-89	436,893	18.65	295783	67.7	241683	55.31	54100	12.39
1989-90	501,928	14.89	351666	70.06	285649	56.91	66017	13.15
1990-91	586,212	16.79	403613	68.85	337299	57.54	66314	11.31
1991-92	673,875	14.95	491157	72.89	381480	56.6	109677	16.29
1992-93	774,545	14.94	557745	72.01	436766	56.39	120979	15.62
1993-94	891,355	15.08	645259	72.39	517461	58.05	127798	14.34
1994-95	1,045,590	17.30	732381	70.04	589867	56.41	142514	13.63
1995-96	1,226,725	17.32	825357	67.28	676959	55.18	148398	12.10
1996-97	1,419,277	15.70	913531	64.36	763967	53.83	149564	10.53
1997-98	1,572,394	10.79	1042316	66.29	880898	56.02	161418	10.27
1998-99	1,803,378	14.69	1210191	67.11	1032257	57.24	177934	9.87
1999-00	2,012,198	12.19	1425734	70.85	1238943	61.57	186791	9.28
2000-01	2,168,652	7.63	1604103	73.97	1414113	65.21	189990	8.76
2001-02	2,348,330	8.19	1856183	79.04	1656544	70.54	199639	8.50
2002-03	2,530,663	7.66	2101668	83.05	1905601	75.3	196067	7.75
2003-04	2,837,900	12.03	2364945	83.33	2180768	76.84	184177	6.49
2004-05	3,242,209	14.10	2662898	82.13	2471716	76.24	191182	5.89
2005-06	3,693,369	13.92	2920400	79.07	2726330	73.82	194070	5.25
2006-07	4,294,706	16.28	3206535	74.66	3005336	69.98	201182	4.68
2007-08	4,987,090	16.12	3562826	71.44	3352740	67.23	210086	4.21
2008-09	5,630,063	12.89	4065564	72.21	3801502	67.52	264062	4.69
2009-10	6,477,827	15.06	4573609	70.6	4324303	66.76	249306	3.84
2010-11	7,795,313	20.34	5106565	65.51	4827688	61.93	278877	3.58
2011-12	8,974,947	15.58	5870555	64.41	5547658	61.81	322897	2.60
2012-13	10,159,884	12.25	6564436	64.61	6232431	61.34	332005	3.27
2013-14	11,355,073	11.76	7499192	66.04	7124698	62.74	374494	3.30

Sources: Reserve Bank of India. Planning commission of India, and Indianstat

4.1.1. Trend and Growth Analysis of GDP:

The trade and growth rate of the GDP is illustrated with the help of Figure-1 and Figure-2 respectively.

Figure-1: GDP

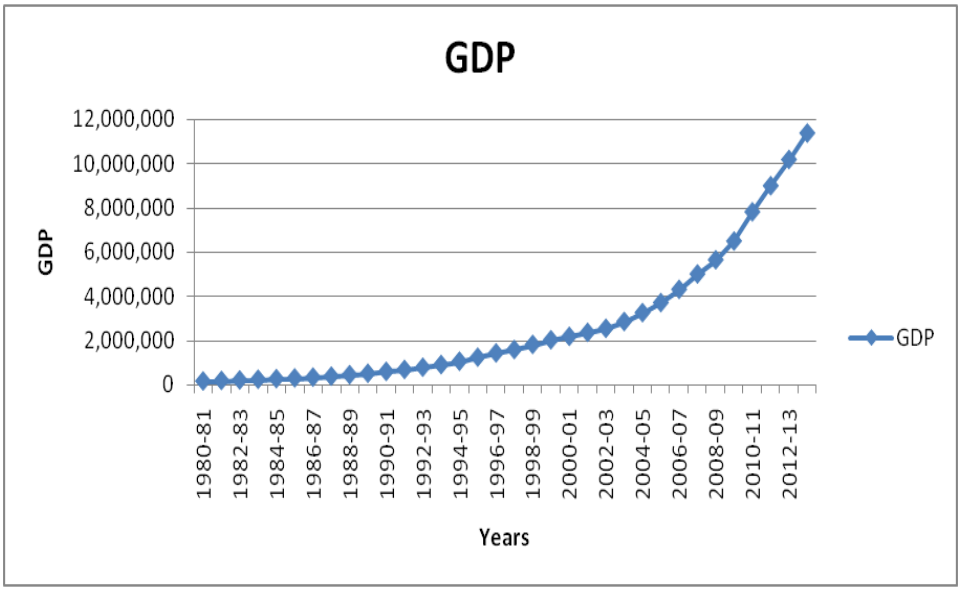
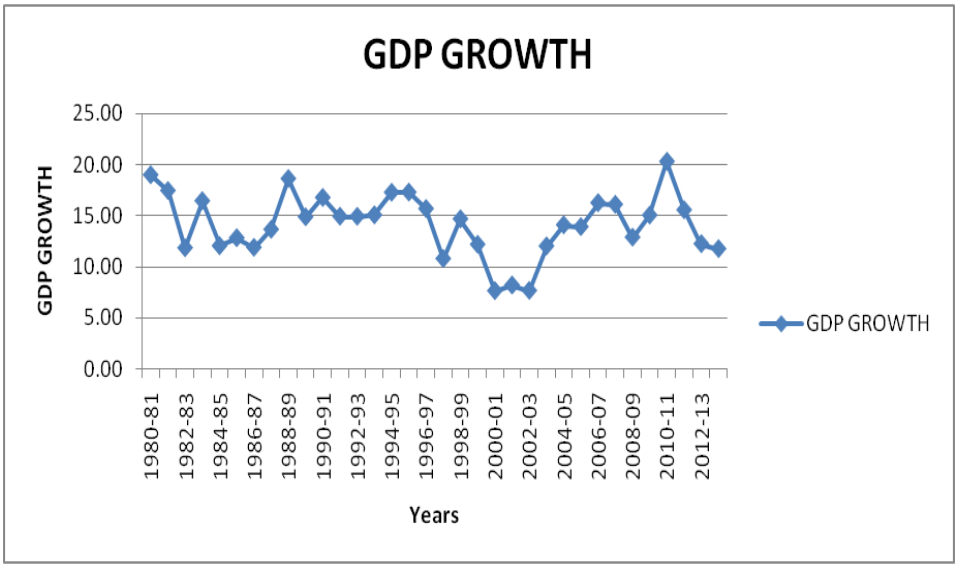


Figure-2: GDP Growth



The Figure-1 and Figure-2 related with the trend and growth of the GDP at current prices pictures that the volume of GDP increased from Rs 149642 crores in

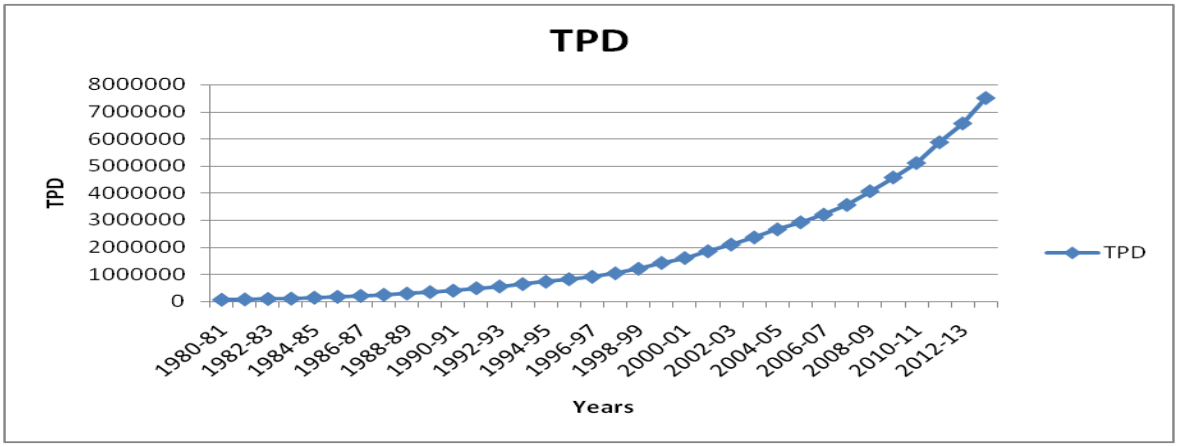
1980-81 to Rs 586212 crores in 1990-91. During the same period i.e. 1st phase, the growth followed a zic-zak process. Initially, the growth fell to 11.85% in 1982-83 from about 19.02% in 1980-81. Then, it rose to 16.47% in 1984-85 and decreased in next period. Then, it maintained stagnancy at 11% to 12% before it increased to 18.65% in 1988-89 and stood at 16.79% in 1990-91. The reasons of the steady extension of the volume of GDP and the heavy fluctuation in growth rate goes to heavy monetization of fiscal deficits high primary deficit with the primary deficit-GDP ratio at about 6% over this phase [kour: 2012]. Moreover, the larger fiscal deficit and its monetization had some spillover effect on external sector with higher current account deficit(CAD) and had the bad impact on the macroeconomic structural and stabilization programme comprising of trade, industry, investment and exchange rate etc [Y.V. Ready:2008].

The second phase of post-economic reforms but pre-FRBM started the favorable momentum with above2 digit in the GDP growth rates before deteriorated to 7% to 8 % during the starting of the21th century. The economic reforms with its three illustrious policies namely Liberalization, Privatization, and Globalization (LPG) gave rise to prosperous ascendancy over the macroeconomic variables which resulted in rise in the volume and growth rate of GDP. Along with LPG, a plethora of fiscal reforms like simplification of tax procedures, stimulus to strengthen the contribution of direct tax to the total tax revenue, conversion of excise into a VAT and improvement in tax administration etc [Rao &Rao:2006]. However, this improvement could not be sustained, as the growth rate deteriorated sharply thereafter. This degeneration of economic growth due to fiscal imbalances leads to the establishment of FRBM act in 2003-04.

Again looking at the Figure-1 and Figure-2, it can be seen that the 3rd phase experienced a sharp amplification in the volume as well as the growth rate of GDP. Before de-escalating to 12.89% in 2008-09 because of economic crisis in European Union countries, the growth rate maintained the rising trend and attained highest 20.34% in the 2010-11. Though the growth spiral became squeezed further but economic growth was very much impressive. In addition, the volume of GDP extended to Rs 11355073 crores from Rs 3693369 in 2004-05 implying more than 3 times increment. The cause of this kind situation owed to the FRBM act which brought the formalization in the fiscal discipline through the mechanism of slashing down the deficit in fiscal indicators and thereby maintaining the sustainability and transparency in fiscal discipline [Rao&Rao:2006; Kaur:2012; Suprio:2012].

4.1.2. Trend and Growth of Total Public Debt:

Figure-3: Total Public Debt



The figure-3 concerns with the volume of the TPD over the period of 1980-81 to 2013-14. The figure evidences that there was a very steady increase in the volume of the TPD during the pre-reforms periods. But in the second phase, its volume grew somehow faster than 1st period which can be seen from the more than 3 fold widening of its volume i.e. from Rs491157 crores in 1991 to Rs2364945 crores in 2004. In the third phase, the volume accentuated to Rs 7499192 crores from Rs 2662898 crores. Though, the swelling of the volume during this phase showed an increasing trend, but its growth rate presented a different picture of TPD.

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Figure-4: Growth of TPD

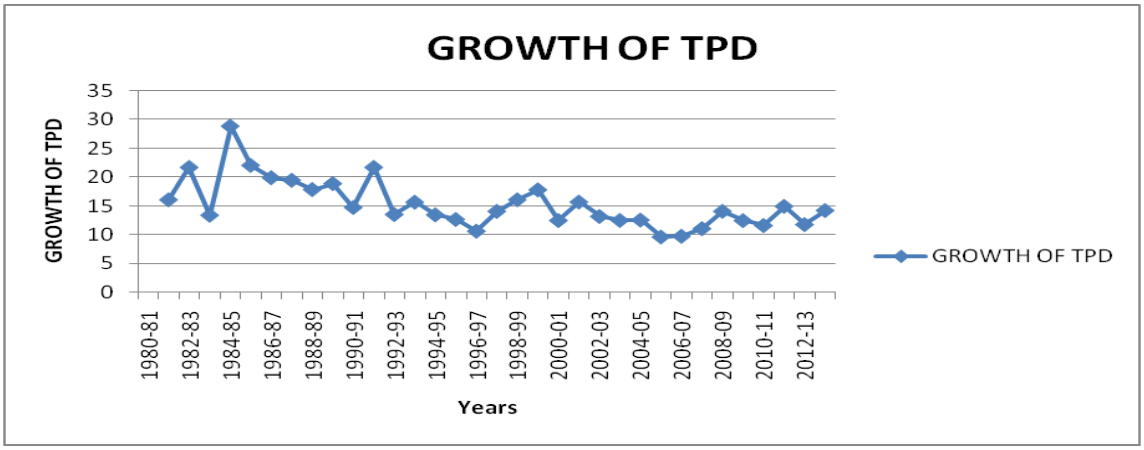
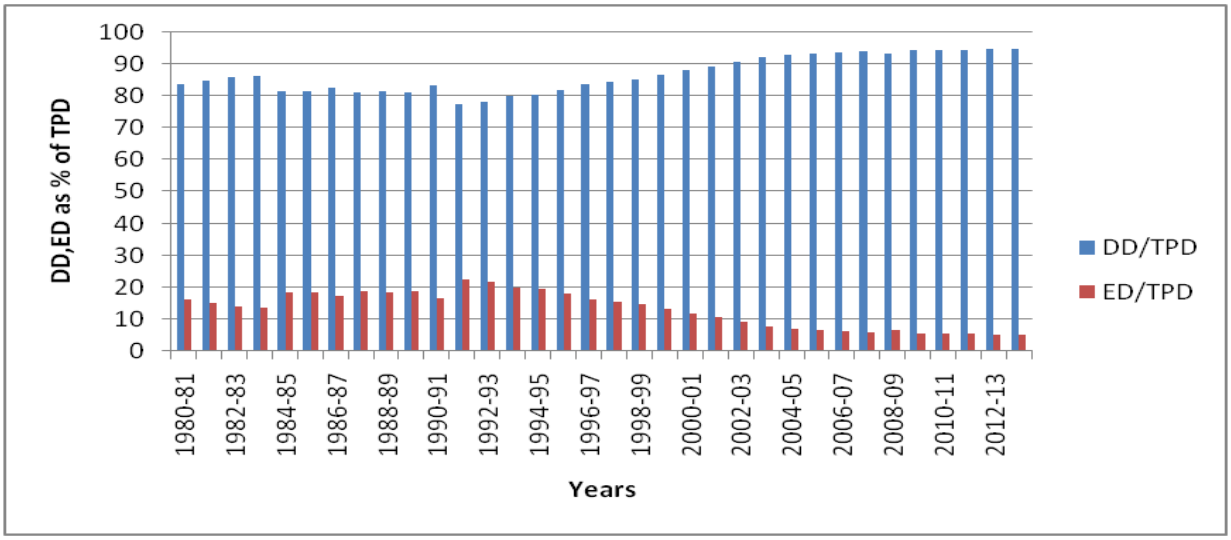


Figure-4 represents a concept of the growth of TPD spreading over 34 years under study. However, it can be viewed that the growth spiral of TDP in the 1st phase was higher due to the heavy fiscal deficits and primary deficits in the fiscal discipline. But, in the 2nd and 3rd phase, the growth to the ranges of 10% to 15% and stayed at more or less stagnant growth.

4.1.3. Share of Domestic Debt (DD) and External Debt(ED) in TPD:

The contribution of DD and ED to TPD can be realized from the figure-5 drawn below.

Figure-5: DD, ED as % of TPD



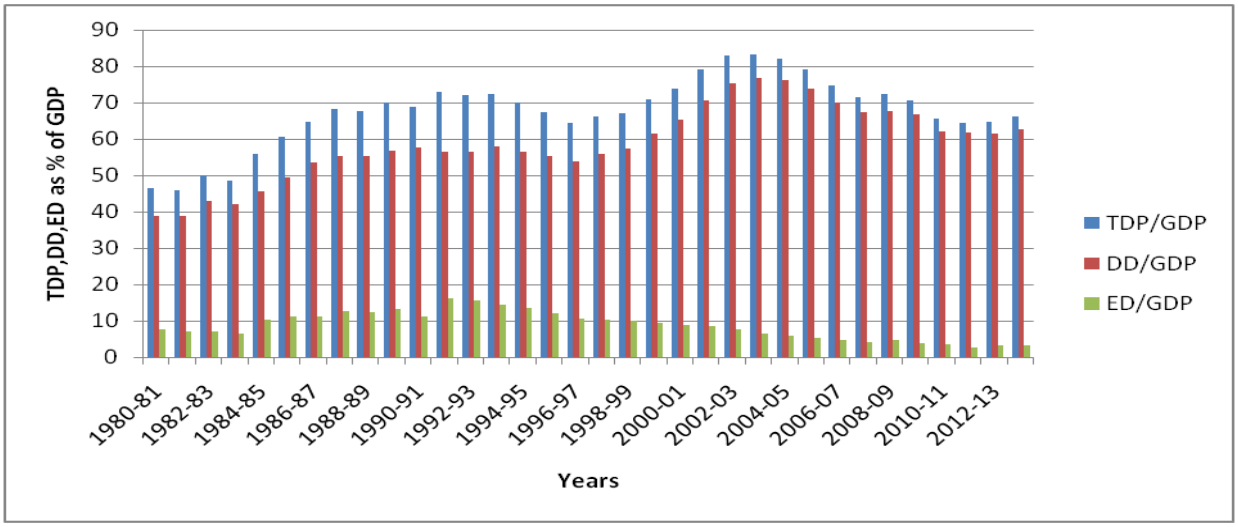
The figure-5 is endowed with the information about domestic as well as the external sources of raising TDP in India for 34 years under study. Up to 1990-91, the proportion of the ED ranged between 15%to20% of TDP (counterpart DD had 80% to 85% of contribution). But 1st year in second phase witnessed the highest share of ED i.e. 22.33% of TDP. The reason behind was the huge current account deficit which depleted Indian foreign currency assets rapidly to the extent that it could barely finance just 2 to 3 weeks of imports [Y.V. Ready:2008; Suprio:2012]. Then, after the emergence of LPG policies and mainly the full convertibility of current account made a reduction in the external sourcing of the TDP. Moreover, an impressive monetary policies relating to Means &Ways Allowances (MWA),provident fund, national

savings initiative, market loans, treasury bills etc [Singh:2004] and praising fiscal policies like simplification of tax procedures, adaptation of 3 slaps of taxation like 10%,20% and 30% etc made the share of DD to TDP increased. This impetus became severe after FRBM act which was evidenced from the sharp decrease in ED to less than 5% in 2013-14. This signifies the more domestication of TPD with a lesser repayment obligation to the foreign economies.

4.1.4. Share of TPD, DD and ED to GDP:

The scaling of TPD, DD and ED with respect to GDP demonstrates the percentage of GDP to be liquidated for meeting the repayment obligation of the corresponding debts. This scaling of debts provides the true picture of India's debt position which is exposed in the figure-6.

Figure-6: TPD, DD, ED as % of GDP



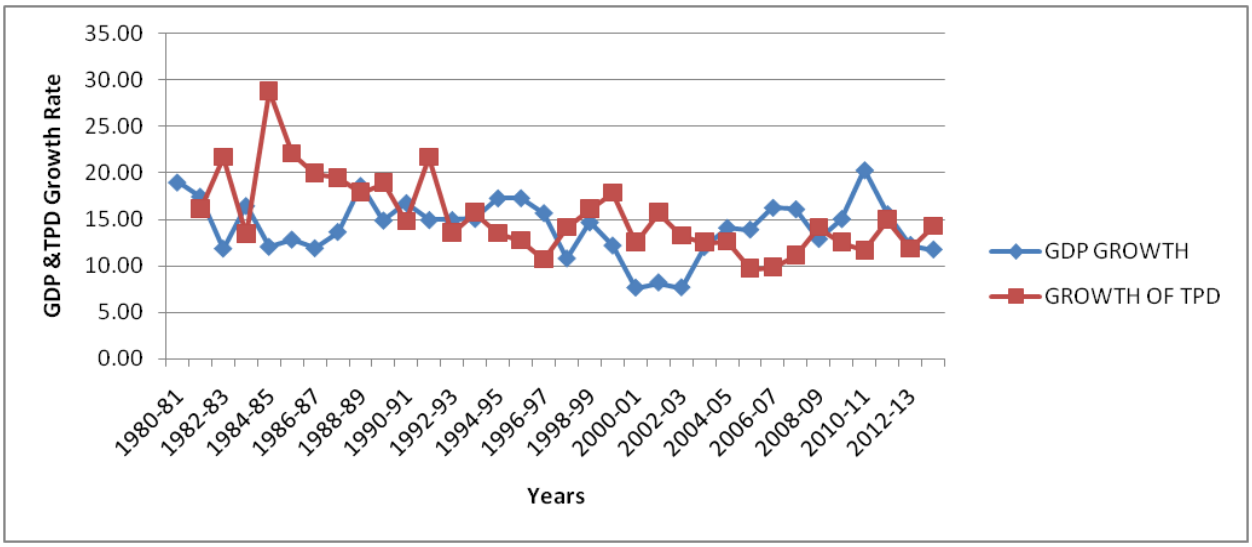
The TPD, which is averaged at 52% of GDP in the early 1980s, increased to an average of more than 65% of GDP because of fiscal imbalances and lethargic CAD. Meanwhile, the ratio of DD to GDP and ED to GDP climbed to average 55% of GDP and average of 14% of GDP than previously occupied 42% of GDP and 8% of GDP respectively. Here, the ratio of D/GDP exhibited an upward trend and stood highest at 16.29% of GDP in 1991-92. Though the

external sourcing of public debt to GDP got down continuously throughout the rest of the periods under study, but the ratio of TPD to GDP illustrated a different picture of its changing. During the second phase, TPD/GDP stayed highest at 83.05% in 2002-03 (next year 83.33%) before itt wondered average at 70% of GDP. But the introduction of FRBM policy brought a sharp reduction in these ratios in the next period. The present TPD ratio to GDP is 66.04 which is still higher than the threshold level of 61% [determined by Kaur: 2012]. This necessitates greater focus on a credible fiscal consolidation to protect against adverse debt dynamics.

4.1.5. Growth rate of GDP vs Growth Rate of TPD:

Withstanding with the above critical analysis of GDP and TPD, we are now able to detect the relationship between GDP growth rate and growth rate of TPD intuitively. This is shown below.

Figure-7: Relationship between GDP Growth Rate &TPD Growth Rate



From figure-7, it is visible that the growth rate of GDP and TPD have been moving in an opposite direction excepts the years 1997 to 2001. During this period, both growth rates changed in a unidirectional way. Without paying any consideration to these exceptional years, a negative relationship is found between GDP and TPD. This finding is in confinement

with the views of classical economists (who advocated high public debt is detrimental to economic growth) and Paul Krugman (who said that low growth rate called for high public debt).

4.1.6. Descriptive Statistics:

The study of statistics is fragmented into two types. These are descriptive statistics and inferential statistics. Descriptive statistics are applied to describe the basic features of the raw data in our study. It helps describe, illustrate or summarize data in such a way that the trend, pattern might emerge from the data. It not only provides the average or overall picture of the data but also shows how the data are spread over the distribution. It may be of two types i.e. measure of central tendency (analyzing the central position of data) and measure of dispersion (revealing how spread out the data are).

Table-2: Descriptive Statistics

	LNDOMESTIC_DEBT	LNEXTERNAL	LNGDP
Mean	5.8892	5.0194	6.1251
Median	5.9140	5.1913	6.1743
Maximum	6.8527	5.5734	7.0551
Minimum	4.7653	4.0530	5.1750
Std. Dev.	0.6254	0.4435	0.5608
Skewness	-0.1855	-0.9463	-0.0492
Kurtosis	1.8463	2.6860	1.8463
Jarque-Bera	2.0804	5.2149	1.8993
Probability	0.3533	0.0737	0.3868
Sum	200.2338	170.6613	208.2555
Sum.Sq. Dev.	12.9108	6.4934	10.3793
Observations	34	34	34

Note: Author's estimation

We will start our descriptive analysis of the variable LNDD. The Mean and Median of LNDD is 5.8892 and 5.9140 respectively. The minimum and maximum value is 4.7653 and 6.8527. The comparison of these extreme values with their central values identifies the no possible outliers or no data-entry errors in the present data. Furthermore, N =34 implies no

missing data in the taken observations. In case of measure of dispersion of data LNDD, the whole distribution is negatively skewed (-0.1855) i.e. presence of non-symetricness in the data. The lower the value of Kurtosis (1.8463) to 3(fixed by property of Kurtosis) indicates that the distribution is decorated with lighter tails with flatter peak than normal distribution. Both non-zero skewness and lesser Kurtosis makes the Jarque-Bera value 2.0804 higher. This envisages that the distribution of the data LNDD mismatches with a normal distribution.

Second descriptive discussion is on the variable LNED. The juxtaposition of the central value mean (5.0194) and median (5.1913) with maximum (5.5734) and minimum value (4.0530) acquiesces that there is no outlier observation in the series. The absent of the outlier conforms that there is no structural breaks in the data series. Further, looking at the nature of distribution of the series, we can say that the distribution is negatively skewed with flatter peak values. In addition to this, the higher the J-B value resembles that the series is not normally distributed.

Imitating the previous description, we can say that the series includes all the observation (as N=34) and doesn't carry any outlier values since their extreme values are quite deviated from the central values. More to say, the J-B value (1.8993) resulting from negative skewness (-0.0492) and kurtosis (1.8463< 3) conveys an idea of absence of normal distribution.

By discussing the overall descriptive feature of the involved variables, it can be said that all series doesn't follow the normal distribution. And their corresponding standard deviation shows that the distribution of LNDD and LNGDP is more volatile than LNED.

4.1.7. Correlation Matrix:

Correlation, as the measure of linear association between two variables, is considered as one of the most common statistical forms of the data analysis. The principal objective of correlation is to find out how well there exists as linear association between two variables. A measure of degree to which two variables are related, is given by the simple correlation coefficient. But correlation matrix refers to the symmetrical matrix whose each element depicts the degree of existence of linear relationship between the related variables.

Table-3 Correlation Matrix

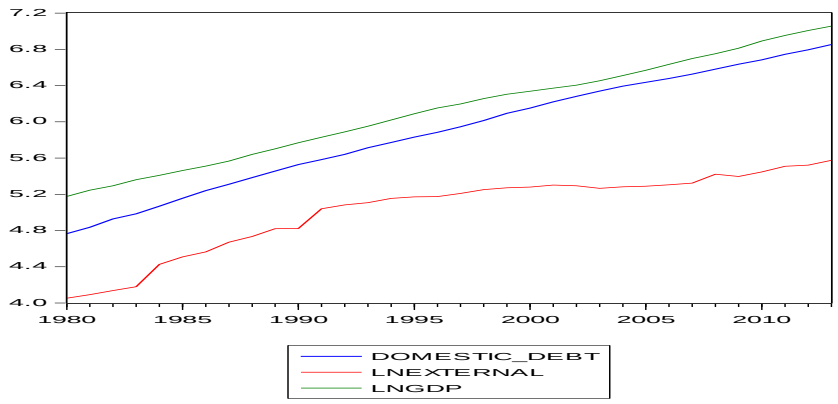
	LNDOMESTIC_DEBT	LNEXTERNAL	LNGDP
LNDOMESTIC_DEBT	1.0000	0.9487	0.9972
LNEXTERNAL	0.9487	1.0000	0.9379
LNGDP	0.9972	0.9379	1.0000

Note: Author's estimation

In the table-3, the principal diagonal terms are one since the correlation between the same variable is one. For instance:- cor(LNDD,LNDD)= cor (LNEX,LNEX)= cor (LNGDP,LNGDP)=1. Cor(LNDD,LNED)=0.9487 implies positive linear relationship between them. And positive sign alludes to the equal directional of change of variables.Graph of LNDD,

4.1.8. LNDD, LNED and LNGDP:

Figure-8: Trend of GDP, DD and ED



The figure-8 envisages the upward trend of the concerned variables of LNGDP, LNDD and LNED implying the continuous increase in their volume over the passage of years. One thing is here to notice that the fluctuation within the variable is very less in LNDD and LNGDP there to LNED. Then, it can be behold that there is no structural breaks in any one of the variables. So far as the compatibility with the GDP is concerned; it can intuitively say that LNED has the lesser compatibility with LNGDP than LNDD.

4.2. SECTION-2

4.2.0. ECONOMETRICS ANALYSIS AND RESULTS:

In order to empirically test the casual relationship of DD with GDP and ED with GDP, the annual time series data of India for the period of1980-81 to 2013-14 have been worked out. The current analysis employs the econometrics techniques like ADF and PP test for checking the stationarity property of the data; Johansen and Juselius(JJ) cointegration test to tap the long run compatibility of the Variables; Vector Error Correction (VEC) model to estimate both short run and long run relationship between DD and GDP; Granger casuality to check the casual nexus of the variables.

4.2.1. Unit Root Test & Result:

The preliminary step in the analysis is to identify the degree of integration of LNDomestic Debt (LNDD), LNExternal Debt (LNED) and LNGDP individually. For this purpose, the engagement of two traditional unit root tests such as Augmented Dickey-Fuller (ADF) & Phillips-Perron (PP) test are exercised. Both ADF and PP tests are evaluated for three concerned variables by taking null hypothesis as “presence of Unit root” (implying non-stationary of data) against the alternative hypothesis “Series is Stationary”. The appraisal of the unit root tests are demonstrated in Table no-4.

Table-4: Results of Augmentede Dickey Fuller and Phillips-Perron Tests

	Augmented Dickey-Fuller		Phillips-Perron	
Series	Level	First Difference	Level	First Difference
LNDomestic Debt	-0.9131 (0.7709)	-9.4976* (0.0000)	-0.9483 (0.7597)	-29.1613* (0.0001)
Test Critical Values				
1% level 5% level 10% level	-3.6537 -2.9571 -2.6174	-3.6537 -2.9571 -2.6174	-3.6463 -2.9540 -2.6158	-3.6537 -2.9571 -2.6174
LNExternal Debt	-2.9135 (0.0545)	-5.0898* (0.0002)	-3.1011** (0.0362)	-5.2813* (0.0001)
Test Critical Values				
1% level 5% level 10% level	-3.6463 -2.9540 -2.6158	-3.6537 -2.9571 -2.6174	-3.6463 -2.9540 -2.6158	-3.6537 -2.9571 -2.6174
LNGDP	-0.1619 (0.9336)	-3.4112** (0.0179)	-0.4735 (0.8841)	-3.4611** (0.0159)
Test Critical Values				
1% level 5% level 10% level	-3.6537 -2.9571 -2.6174	-3.6537 -2.9571 -2.6174	-3.6463 -2.9540 -2.6158	-3.6537 -2.9571 -2.6174

Note: * and ** indicate significance at 1% and 5% level of respectively. Figures in the parenthesis show MacKinnon (1996) one-sided p-values. Source: Author's estimation

In the above Table no-4, for LNDD, the tests follow the null hypothesis that LNDD follows a unit root process. But at the level case, we can't reject the null hypothesis since its approximate P-value of ADF test (0.7709) and PP (0.7597) stands greater than the conventional significance level of 0.01(1%), 0.05(5%) and 0.1(10%). Hence, the testing of data will be processed at its first difference in both ADF and PP tests. Here the MacKinnon (1996)

one-sided p-values of ADF test (0.0000) and PP test (0.0001) lies below the 1% level of significance implying rejection of the null hypothesis that the series data on LNDD is stationary at its first difference. In addition to this explanation, the higher t- statistics in both tests ADF (-9.4976) and PP(-29.1613) than 1% level of critical value(-3.6537) place t-value in the critical region. Therefore, we conclude that LNDD is stationary at first difference and at 1% of level of significance.

Likewise the explanation of LNDD, putting a critical look at the stationary idiosyncrasy of the variable LNED, it can be seen that at level case, the ADF statistic (-2.9135) is lower than its critical values. Along with that its MacKinnon (1996) p-value stands at (0.0545). So, at level case, the rejection of null hypothesis is under-evidenced.it implies the non stationarity of the variable. So, the variable is gone for the first difference to be tested for stationary. At the first difference, LNED attains the stationarity with higher statistic value of -5.0898 than critical value (-3.6537) and lower p-value (0.0002) than (0.01). But, in case of PP test, at level the null hypothesis rejected at the 5% of level of significance because of lower p-value(0.0362) as well as statistic value (-3.1011) lying above its critical value(-2.9540). Thus, the variable LNED is found to be stationary at level in case of PP test at 5% level of significance and at 1st difference in case of ADF test at 1% level of significance.

Similar elaboration will be accompanied with the testing of "presence of unit root" in data of LNGDP variable. In case of LNGDP at level case, the value of the t-statistics of ADF (-0.1619) and PP (-0.4735) is so meager than their corresponding critical values. So, there is no evidence of rejecting the null hypothesis. More to say, the approximate p-value of ADF (0.9336) and PP (0.7597) is higher than its strategic level of significance values. This necessitates the process of taking first difference of the series. The first difference makes the t-statistics of ADF (-3.4112) and PP(-3.4611) larger so that these(t-statistics) are located in the critical region at 5% level of significance. In another angle, the approximate probability vale viz. (0.0179 for ADF) and (0.0159 for PP) is undersized at 5% level of significance.

The testing of the unit root property in the series reached at the conclusion that both LNDD and LNGDP are integrated at their first difference as well as at 1% and 5% level of significance respectively with the help of ADF test and PP test. But, the variable LNED is

stationary at first difference in ADF test at 1% of level of significance and in PP test; it is at level with 5% level of significance.

4.2.2. Johansen and Juselius(JJ) Cointegration Test and Results:

After affirmed the order of integration (depicting stationarity of the time series) of LNDD and LNGDP, the cointegration test is used operating Johansen and Juselius(JJ) technique. There are two tests, attributed by them, to detect the number of cointegrating vectors; the Trace test and the Maximum Likelyhood test. The current analysis exploited these cointegrating tests and results are tabulated in Table 5.

Table-5: Results of Johansen Cointegration Test

Null Hypothesis	Eigen Value	Statistics		5% Critical Value	
LN DD,LNEX,LNGDP (K=3)		Trace Test	Max-Eigen	Trace Test	Max-Eigen
$r^{**} = 0$	0.4963	32.6467(0.0229)	21.9508(0.0383)	29.7970	21.1316
$r \leq 1$	0.2818	10.6959(0.2309)	10.5903(0.1758)	15.4947	14.2646
$r \leq 2$	0.0032	0.1029(0.7483)	0.1029(0.7483)	3.8414	3.8414

Note: ** indicates rejection of null hypothesis at 5% level of significance. Figures in the parenthesis show MacKinnon-Haug-Michelis (1999) p-values. Source: Author's estimation

Empirical results from Table no-5 reveals that at r=0, both the trace statistics (32.6467) and max-eigen statistics (21.9508) exceed their corresponding critical vales of 29.7970 and 21.1316. The result conform the rejection of the null hypothesis of no cointegrating equations. The rejection is also supported by the MacKinnon-Haug-Michelis (1999) p-values of trace test (0.0229) and max-eigen test (0.0383) which is smaller than 0.05(5%level of significance).

Then, at $r \leq 1$, both the tests have their values shorter than their counterpart critical values at 5% level of significance. Moreover, the p-values (0.2309) for trace test and (0.max-eigen is ample than 0.05. Therefore, we can't reject the null hypothesis that there is one or fewer cointegrating equations. Similar explanation can be referred for $r \leq 2$. So, both tests

indicate one cointegrating equation at0.05 level. Thus, it can be reckoned that the long run relationship exists between DD, ED and Economic Growth.

4.2.3. Vector Error Correction (VEC) Model:

Once the determination of number of cointegrating equations is accomplished, and if a set of variables are found to have one or more cointegrating vectors, then VEC model is the suitable estimation technique to track the both short and long run association between the variables and also ascertain the rate of adjustment of deviations to the equilibrium. In our analysis, as cointegrating equation is one, the utilization of VEC model is inevitable. The Table no-6 is representing the VEC estimation of LNDD, LNED and LNGDP.

Table-6: Results of Vector Error Correction Estimates

Error Correction:	D(DOMESTIC_DEBT)	D(LNEXTERNAL)	D(LNGDP)
CointEq1	-0.2754 (0.2269) [-1.2138]	0.1605 (0.0481) [3.3316]	0.0070 (0.0106) [0.6648]
D(DOMESTIC_DEBT(-1))	-0.4793 (0.2450) [-1.9559]	-0.0879 (0.0520) [-1.6906]	-0.0123 (0.0115) [-1.0725]
D(DOMESTIC_DEBT(-2))	-0.2462 (0.2055) [-1.1980]	0.0022 (0.0436) [0.0515]	-0.0128 (0.0096) [-1.3286]
D(LNEXTERNAL(-1))	0.2882 (0.8184) [0.3522]	-0.0997 (0.1738) [-0.5741]	-0.0033 (0.0384) [-0.0881]
D(LNEXTERNAL(-2))	0.8210 (0.7427) [1.1054]	-0.0014 (0.1577) [-0.0092]	0.0017 (0.0348) [0.0514]
D(LNGDP(-1))	-0.7748 (4.2165) [-0.1837]	2.4277 (0.8954) [2.7112]	0.4722 (0.1978) [2.3868]

D(LNGDP(-2))	1.4832 (4.5020) [0.3294]	-0.5710 (0.9560) [-0.5973]	0.1121 (0.2112) [0.5309]
C	0.0152 (0.2507) [0.0607]	-0.0487 (0.0532) [-0.9159]	0.0252 (0.0117) [2.1430]

Note:- Sample (adjusted) : 1983-2013 , Standard Error in () and t-Statistics in [].Source: Author's estimation

It is empirically evidenced from VEC model that there exists the long run relationship between domestic debt and its lagged value, DD with ED, ED with GDP and GDP with its lagged value. And also there is the short run association between ED and GDP.

4.2.4. VEC Granger Causality/Block Exogeneity Wald Tests:

VEC Granger causality test, as a statistical hypothesis test for forecasting the time series from another series, is applied in our study to determine the 'Cause and Effect' nexus among DD, ED and economic growth (GDP) in the VEC environment. Here, testing of casual relationship will be made between one dependent variable with an independent variable combinely with its current as well as its laggedvalue. Having conformed to the stationarity and presence of co integration among LNDD, LNED and LNGDP, it is said that there must exist causal relationship in at least one direction. Let's have an empirical look on VEC Granger Causality/Block Exogeneity Wald Tests and result from Table no-7.

Table-7: Results of VEC Granger Causality/Block Exogeneity Wald Tests

Dependent variable:	Excluded	Chi-sq	df	Prob.
D(DOMESTIC_DEBT)	D(LNEXTERNAL)	1.3135	2	0.5185
	D(LNGDP)	0.1099	2	0.9465
D(LNEXTERNAL)	D(DOMESTIC_DEBT)	4.7313	2	0.0939
	D(LNGDP)	7.8681	2	0.0196**

D(LNGDP)	D(DOMESTIC_DEBT)	1.8742	2	0.3918
	D(LNEXTERNAL)	0.0108	2	0.9946

Note: Sample consists of 1980-2013. Included observations are 31. ** Indicate 5% of level of significance. Source: Author's Estimation

The explanation begins with the casual analysis of the involved variables D(LNDD) as dependent variable with D(LNED) and D(LNGDP) as independent variables. Dealing with the first null hypothesis "D(LNEXTERNAL) does not Granger Cause D9DOMESTIC_DEBT)", it can be observed that the prob. Value is 0.5185 which is larger than 0.05 i.e. 5% level of significance. Along with the corresponding chi-sq value (1.3135) is very small. So the result infers that the null hypothesis can't be rejected. Thus, D(LNED) has no casual relationship with D(LNDD). On the other hand, looking at the second null hypothesis "D(LNGDP) does not Granger Cause D(DOMESTIC_DEBT)", the test of this hypothesis holds prob. Value0.9465 implying 94.65% chance of rejecting null hypothesis. Thus, it can be deduced that D(LNGDP) is not the granger cause to D(LNDD).

Secondly, an attempt has been made to detect the granger causality of the dependent variable D(LNED) with the independent variables D(LNDD) and D(LNGDP). The rejection of the null hypothesis "D(DOMESTIC_DEBT) does not Granger Cause D(LNGDP)" can't be possible in an empirical ground since its prob. enjoys the value of 0.0936 larger than 0.05 (fixed by level of significance). So, it can be concluded thatD(LNDD) doesn't granger cause to D(LNED). But, another null hypothesis "D(LNGDP) does not Granger Cause D(LNEXTERNAL)" is rejected at 5% level of significance. In this case, the estimation is based by the prob. value of (0.0196) which is less than 0.05. This implies there is less than 5% chance of considering the said null hypothesis as true. Here the corresponding chi-sq value (7.8681) shows the good estimation. Thus, it can be said that D(LNGDP) is the granger cause to D(LNED).

The last part of VEC granger causality test has a bearing with the explanation of the causality of D(LNGDP) with other D(LNDD) and D(LNED) separately. The prob. of first null hypothesis "D(DOMESTIC_DEBT) does not Granger Cause D(LNGDP)", is 0.3918. Being a higher to 0.05, it implies that the acceptance of null hypothesis as true can't be denied. Thus,

D(LNDD) has no causality to D(LNGDP). Then, the rejection of next null hypothesis of "D(LNEXTERNAL) does not Granger Cause D(LNGDP)" is done due to having prob. Value 0.9946 bigger to 0.05. Thus, the outcome reveals that there is no "cause and effect" relationship between D(LNED) and(LNGDP).

So, lastly, the result of Granger causality test deduced an inference that there is the unidirectional causality from economic growth D(LNGDP) to external debt D(LNED) and no casualty exist between economic growth and domestic debt and also between domestic debt and external debt. Our finding is in confinement with the findings of Singh (1999) i.e. no joint feedback between domestic debt and economic growth. Moreover, our result of unidirectional causality from economic growth to external debt is supported by the findings of the literatures of Choudhury(1994), Amoateng et al (1996), and Karagol(2002).

4.3 SUMMARY:

The data analysis deduces that all the variables like GDP, TPD, DD and ED had the upward trend in their volume over the vintage of 1980 to 2013. The analysis auxilarily advocates the raising share of DD to TPD and to GDP in comparison to ED. The finding of the descriptive analysis revealed skewed symmetric distribution of the all the distribution and also identified no structural breaks in the series. The finding of unit root test demonstrates that both LNDD and LNGDP are integrated at their first difference as well as at 1% and 5% level of significance respectively with the help of ADF test and PP test The result of Johansen test unveils that the long run relationship exists between DD, ED and Economic Growth since both tests have at least one co integrating equations. The finding obtained through VEC model displays the existence of the long run relationship between domestic debt and its lagged value, DD with ED, ED with GDP and GDP with its lagged value. The results of VEC Granger causality test resembles that there is the unidirectional causality from economic growth (LNGDP) to external debt (LNDD) and no casualty exist between economic growth and domestic debt and also between domestic debt and external debt.

CHAPTER-5

SUMMARY AND CONCLUDING REMARKS

This paper tried to examine the casual relationship between DD & ED with the economic growth separately in India by taking the variables of GDP, TPD, DD and ED for the period of 34 years spanning from1980-81 to 2013-14. In addition to this examination of causality, it also attempted to consider about the trend and growth pattern of these variables over the same periods. The outcomes of the chapters in this research works are as follows.

From chapter-2, we got the theoretical and intellectual support from the different literatures pertaining to the casual, linear, and non-linear inter linkage between public debt and economic growth. After gone through the literatures, we got to know the conclusion that there is no solid link between the concerned variables rather it differs with the different countries, time periods, instrumental variables (socio-political, institutional and economic variables) taken in the literatures etc.

The first section of the chapter-3 deals with the fundamental theoretical concepts of the DD &ED specifically and public debt generally. It (first section) is resorted to the discussion of the heterogeneous strategic economic variables through which the casual nexus between the DD& ED with economic growth is established. Then, the next section of this chapter sheds light on the different time series methodologies and tests like unit root tests, Johansen cointegration tests, VEC model and VEC Granger causality tests.

The chapter-4 has an association with data analysis, descriptive & empirical analysis of the objectives taken in the present literature. The data analysis deduces that all the variables like GDP, TPD, DD and ED had the upward trend in their volume over the vintage of 1980 to 2013. The analysis auxilarily advocates the raising share of DD to TPD and to GDP in comparison to ED. The period wise viz pre-reforms; post-reforms and post-FRBM explanation became helpful to grasp the better essence of the trend and pattern of the public debt and economic growth.

The descriptive analysis discusses about the descriptive features of the in the time series data. The finding of the descriptive analysis revealed skewed symmetric distribution of the all the

distribution and also identified no structural breaks in the series. Nevertheless, it noticed the more variability of the series of LNGDP and LNDD in comparison to series of LNED.

The empirical investigation begins with applying unit root tests to examine the time series nature of the data series. The finding of tests demonstrates that both LNDD and LNGDP are integrated at their first difference as well as at 1% and 5% level of significance respectively with the help of ADF test and PP test. But, the variable LNED is stationary at first difference in ADF test at 1% of level of significance and in PP test; it is at level with 5% level of significance.

In the second stage of empirical investigation, Cointegration tests are employed to trace the the long term association between the interested variables. Co integration tests like the Trace test and the Maximum Likelyhood test, are used. The result unveils that the long run relationship exists between DD, ED and Economic Growth since both tests have at least one co integrating equations.

After examination of the co integration tests is confirmed, the error correction model is also tested. The findings obtained through this channel display there exists the long run relationship between domestic debt and its lagged value, DD with ED, ED with GDP and GDP with its lagged value. And also there is the short run association between DD and GDP.

Since the main purpose of this study is to scrutinize the casual relationship DD & ED with economic growth, The VEC Granger causality tests are entertained in this paper. The results resembles that there is the unidirectional causality from economic growth (LNGDP) to External debt (LNED) and no casualty exist between economic growth and domestic debt and also between domestic debt and external debt.

Our finding is in confinement with the findings of Singh (1999) i.e. no joint feedback between domestic debt and economic growth. Moreover, our result of unidirectional causality from economic growth to external debt is supported by the findings of the literatures of Choudhury(1994), Amoateng et al (1996), and Karagol(2002).

After come across the empirical results, we just can say that we don't have any evidence that "high public debt dampens the tempo of economic growth in India". So, instead of stating that there is no certification of 'debt has an influence on the economic growth', rather we could say

that there is the evidence 'debt has no influence on economic growth in India'. It doesn't mean that Indian economy can sustain any level of public debt. There is the level of unsustainable debt where an additional debt accumulation retards economic growth through its distortionary effects on macroeconomic variables. More to say, causality running from economic growth to external debt refers to the circumstances where either higher economic growth leads to lower the need for external debt accumulation(negative relationship) or higher growth encourages the higher ED for the strategic investment within the country.

Policy Implication:

On the basis of the results obtained in the present study, the following policy implications recommended below have emerged.

1. The Indian government should source debt with in the economy so that its repayment will treat as a crowding-in-effect which will further stimulate economic growth in turn. To boot, by following the domestication of the public debt, the problem of debt overhang and crowding out effect can be avoided.
2. The government of India should opt for the better reimbursement policy which can ensure the productive use of the resources generated through debt. Besides, the debt should be utilized to meet the capital expenditure not to treat the revenue expenditure. These actions could lead the India economy to a path of self-propelling & self-sustained economic growth.
3. Systematic thing and comprehensive analysis is crucial in the time acquiring both DD and ED to finance deficits in fiscal indictors. In addition, one caveat should be followed that the reliance on debt (either DD or ED) for financing deficits shouldn't be considered as a risk-free option. So, it necessitates a good national policy for opting debt as an instrument to finance deficits in fiscal accounts.
4. It can be recommended that, in order to bring stabilization in debt to GDP ratio after the financial crisis, the government should escort the objective of inter-generational equity in financial management over long term.
5. Though debt has some positive impact on the economic growth through its favorable mechanism of competitive money & financial market, efficiency of investment, cost effectiveness of deficit financing, total factor productivity etc, but its negative impact of

debt overhang, growth uncertainty, crowding out effect, debt and fiscal instability, inflationary pressure, intergenerational inequality can't be neglected. So, both fiscal and monetary authority should take care of debt accumulation and its productive utilization, so that the debt accumulation paves a path of economic growth rather than dampens the tempo of economic growth.

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