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DOES FISCAL SPENDING PROMOTE ECONOMIC GROWTH IN INDIA? AN APPLICATION OF TODA-YAMAMOTO CAUSAL APPROACH

After the 25 years of economic reform, a restless debate is still going on that is fiscal policy still has a major role to play in Indian economy or not ? This paper tries to find out the short run and long run relationship of fiscal spending with the growth of India. For estimation, we have applied Auto Regressive Distributed Lag (ARDL) model and augmented causality test of Toda-Yamamoto. Results reveal that Gross Fixed Capital Formation is positively related to growth in the long run. In the short run, military expenditure, tax revenue and inflation are negatively associated. The Causal analysis reveals that (i) Growth causes gross fixed capital formation, (ii) Military expenditure causes growth, (iii) Growth causes tax revenues and (iv) Inflation causes growth. Based on the results, suitable policy measures also discussed in the last section of the paper.
JEL: E62; O4

1. Introduction

Monetary and fiscal policies are the two major tool for the authorities and policy makers to regulate the economy. After the 25 years of economic reform, a restless debate is still going on that is fiscal policy still has a major role to play in Indian economy. The justification for fiscal regulation and policies are- the efficient allocation and proper distribution of resources. The role may be in relative or absolute term depending upon characteristics of economies (Asajwk et al., 2014). In stabilizing the economy, fiscal spending has become the pioneer instrument. But applicability only valid if the fiscal spending has any real effects and these effects Keynesian or non-Keynesian (Carmignani, 2010). Another prospect may be these spending are pro-cyclical (Abbott & Jones, 2011; Woo, 2009; Talvi & Vegh, Kaminsky et al., 2004; Lane 2003). According to Jha (2007), despite low tax-GDP ratio, developing countries should expand fiscal expenditure to enhance growth. Some opponents state that government policies are bureaucratic, biased and inefficient which hinder economic performance (M'amanja & Morrissey, 2005). Trending justification for negative impact is that government spending will lead to a rise in taxes and also borrowings (Landau, 1983; Easterly, 1993).

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Growth impacts and the particular mix of policies mostly depends upon country-specific conditions, nation's preferences and internal capacities. Level of development can also be a determinant factor in determining the association between fiscal measurements and growth (Easterly & Rebelo, 1993). On theoretical font, the development of endogenous growth theories laid down the foundation for policy variables to regulate the economic performance of a country. Fiscal and monetary Policy changes can affect the rate of capital accumulation (physical and human), research and innovation, government expenditure, the trade-off between labor-leisure and by that the growth (Romer, 1986; Lucas, 1988; Barro, 1990; King & Rebelo, 1990).

In the empirical literature, there is a large number of studies can be found in discussing the relationship between fiscal policies and growth. Long- term growth of government policy with growth is well studies by Dar and Amirkhal (1999). According to them, the government has three instruments- taxation, expenditure and budgetary balances to regulate the economy. Impact of fiscal policies can be studied in allocative efficiency and distributive efficiency perspective (Zee and Tanzi, 1999). Empirical studies of Ram (1986), Knight et al. (1993), Brasoveanu & Braso (2008), Ogbole et al. (2011), Abata et al. (2012), Gonder & Ozpence (2014) and Okafor & Shaibu (2016) have studied impact of fiscal variables on growth performance on various dimensions. In an aggregate macroeconomic and microeconomic picture, there is a general convention that government spending[2] leads to output expansion, employment creation and welfare generation (through increase efficiency and infrastructure). But theoretical and empirical debates stand in two banks. One line of studies shows that positive impact exists in fiscal spending, where other line argued that spending behaves negatively to the growth performance. Though this mix results solely correspond to the spending categorizations, context-specific and country-specific. Studies of Landau (1983), Grier & Tullock (1989) and Engen & Skiner (1992) have found a negative association of government spending with growth. Benos (2009a,b) in his disaggregate study found that spending on human capital and social welfare has not any significant impact on growth. But Kneller (1998) paper for OECD countries, reveals that productive spending enhances growth performance. A recent study of Rosoiu (2015) stated that government spending is more capable of explaining growth than to government revenue. Military expenditure also comes under productive spending and scholars like Abdullah (2000), Al-Yousif (2000) and Ranjan & Sharma (2008) studied this expenditure as protective functions of the government. Fiscal spending shocks also exhibit an impact on output growth. The seminal paper of Blanchard & Perotti (1999) with the SVAR approach has proved that positive fiscal spending shocks have positive effects on output growth. In the same line study, Fernandez and Cos (2006) also found similar results.

Few studies for the case of India also have been found. According to Lahiri et al. (2016), fiscal policies in India are boosting the problem of macro-economic instability. Among the fiscal variables, fiscal deficit comes out to be contradictory variable for the growth of India (Trivedi and Rajmal, 2011) but capital expenditure affects differently for various Indian states but overall, it promotes the growth. Arguments of Kaushik Basu (2012) stated that higher efficiency in bureaucratic and governance can lead India to stable and long-run

[2] IMF Policy Paper, 2015.

growth. Our study will be a contribution to the existing literature in two ways (a) we have taken five fiscal spending dimensions – Military Expenditure (MEXPD), Final Consumption expenditure (CEXPD), Gross Fixed Capital Formation (GFCF), Net Lending (Lending) and Tax Revenue (TAX) in our study. And (b) Departure from usual Granger causality testing, we have applied Toda-Yamamoto (1995) augmented causality test for robust and reliable results.

Stylized Facts of Indian Economy

India becomes the fastest growing emerging market in the world. The transition of the Indian economy can be seen from a state dominated and industrialized oriented policies to market regulated economy. This transition mainly takes place after the economic reform of 1991. Growth rate and growth rate for different sectors of the economy has been increases after the reform (Neog, 2017a, 2017b). The foremost reason for India's economic reform was the fiscal crisis and balance of payment crisis. Therefore adoption liberalization policies become the last option rather than to a choice. These reforms are very much similar to the other reform that took place in other socialist countries (Ahluwalia, 1994).[3] But India follows a more gradual transitions process rather than implementing sudden shock to the economy. Many economist and policymakers still criticize this approach of transition. But this reform is not the only reform of Indian history that has to reclaim all the changes. Changed political attitude and policies in mid-1970 were providing a helpful hand to the reform of 1991. According to Bird (1993), every fiscal crisis is a detrimental factor in giving birth to new tax reforms. India is not an exceptional one. Tax Enquiry Committee (TEC) report of 1991 was the pioneer of changes in the Indian tax structure. Rao & Rao (2006) rightly said that more structured and sustainable tax reforms were implemented after the economic reform. Tax policies that were adopted in India after independence were ad-hoc in nature and contained short-run goals rather sustainable goals. Fruitful results can be seen in direct and indirect tax collections. Due to open up of the economy, Indian markets also become more volatile. Rapid expansion market economy, infrastructure, science and technology and population boost India's capital formations. As a democratic country, the government has to incur a huge welfare oriented expenditures. Data reveals that, despite the transformation of the economy, the government role is not eliminated at all. In appendix (A), I have presented a line graph of the studied variables. These graphs are helpful in knowing the historical trend of the data series. As discussed above, the GDP growth rate has experienced the worst growth in the period of 1978-1979 and then 1990's. The fluctuating trend can be seen after the 1990's also, but it is to be noted that India reaches to 7%-8% annual growth rate in the period of 2007-2008 and averaging around 6-7%. In a sectorial scenario, the expansion of the economy is mostly service sector driven. The service sector contributes around 53.66% to the nation's economy which was 39.6% during 1990-1991.[4] Tremendous performance of real state sector, finance and hotel & transport are the drivers of service sector expansions. In 2017, industry sector contributes 29.02% and

[3] Retrieved from his speech on, 'India's Economic Reforms'.
[4] See, Ministry of Statistics and Programme Implementation and Planning Commission, Government of India.

agriculture & allied activities contribute 17.32% to national income. If we look at the 2011-2012 prices, the composition of Agriculture & allied, Industry and Services sector are 15.11, 31.12, and 53.77%, respectively. Government current expenditure can be seen to gradually decline after the 2001-2002 period. Market domination and disinvestment of the government may be one of the reasons which reduce the government current expenditure.

Gross Fixed Capital Formation representing the domestic fixed investment. In the figure (A.1), the trend line shows that the fixed investment continuously increases, especially 2003-04. The high growth rate of the aggregate economy in the same period and escalation of urbanization leads to a rise in the fixed investment of the government. Service sector growth is also a vital factor in raising gross capital formation. But these share of capital formation to GDP is falling after 2012-13. Inflation is often termed as a measure of macroeconomic stability. It is clear from the figure that, in the early 1980s and in the early 1990s, there are spikes in the inflation rate. The economic crisis in both the periods may be explaining factors for these rise in inflation in India. Again the rise in inflation can be seen in the period of 2009-10. But as close to 2015, inflation tends to decrease. If we look at the trend of net lending in India, it is continuously declining. Net lending also indicating the outcome of the transaction in financial assets and liabilities. Somewhat spikes can be seen in the period of global financial crisis 2007-08. Military expenditure as a % of GDP is also showing decreasing trends. A high share of 3.9% is achieved in the period 1986-87, then decline till 1998. After the Kargil war, India's military expenditure again reached 3% of GDP. In the recent sphere of time, military expenditure ranging in between 2.8% to 2.5% to GDP. Due to several structured tax reforms, Indian tax revenues are showing very good performance especially after 1997-98. In this year, marginal tax rates are reduced to 10, 20 & 30%. Reduced marginal tax rates and more information technologies, India's tax compliance and tax base are drastically increased. Corporation tax rates are also reduced to 35% in the year 1997-98 from 50%. Therefore direct tax revenues were showing a very positive change after this period. The overall tax revenues as % of GDP also trend upward after 2002-2003. In the state level tax system, the introduction of Value Added Tax (VAT) in 2005 is known to be a major policy change. VAT eliminated many drawbacks related to the other sales tax adopted by the Indian States.

2. Data and Methodology

Data has been taken from the World Development Indicators for the period 1974 to 2015. We have taken Military Expenditure (MEXPD), Final Consumption expenditure (CEXPD), Gross Fixed Capital Formation (GFCF), Net Lending (Lending) and Tax Revenue (TAX) as fiscal expenditure variable. Inflation (INF) is taken as an additional variable in the study as a proxy for economic stability. Based on the recent debates, Inflation is very much influencing other macroeconomic activity. All variables are as % of GDP. Our dependent variable is the Average Annual Growth Rate of GDP. In order to investigate the short run and long-run relationships between government spending and growth, we have developed the following model.

$$\text{Growth} = \alpha 0 + \alpha 1\ \text{CEXPD} + \alpha 2\ \text{GFCF} + \alpha 3\ \text{Lending} + \alpha 4\ \text{MEXPD} + \alpha 5\ \text{TAX} + \alpha 6\ \text{INF} \quad (1)$$

Descriptive Statistics

Before going for any econometrical treatment with our variables, we have calculated the descriptive statistics. Results are presented in the table (1) in appendix (A). Mean values are maximum for GFCF (25.62), CEXPD (10.84) and TAX (9.79). Maximum values represent the maximum values that each variable have taken. The maximum values for GFCF (35.57) and CEXPD (12.45). The Maximum inflation rate for India is recorded at 16.66% and the minimum inflation rate was 1.64%. As on the same notation, minimum values are also noted in the table. Top minimum values are seen for LENDING (-5.5), GDP growth (-5.23). Standard deviation indicating the variance in the data series. The maximum deviation can be found for GDFCF (5.42), INF (3.56) and GDP (2.90). On the other hand, the minimum deviation is found for MEXPD (0.35), CEXPD (.85) and TAX (0.94).

As our data series are in annual form, so we have applied time series methodologies for checking unit root in the data.

2.1 Unit Root Test: for checking unit root in the data series, we have applied Augmented Dicky-Fuller (ADF) (1979, 1981) and Phillips-Perron (P-P) (1990) test. ADF test assumes that the error term may be correlated to each other. Based on the τ (tau) statistics and its probability, we have tested unit root in data. ADF is the extended version of Dicky Fuller (DF) test by augmenting lag dependent variable in the explanatory variables. The null hypothesis is made for ADF test is that the series has a unit root. With respect to the tau statistics, if series become stationary at the level then we call it integrated at order 0, i.e. I (0). On the other hand, if series become stationary at the level then we call it an order of integration is 1, i.e. I (1).

$$\Delta Y_t = \beta 1 + \beta 2t + \delta Y_{t-1} + \Sigma\ \alpha_i \Delta Y_{t-I} + u_t \qquad (2)$$

Phillips and Perron (1988) proposed an alternative unit root test by controlling the serial correlation in the error terms. In the empirical literature, the Phillips-Perron (PP) test is known to be a non-parametric test. Tau statistics are adjusted and serial correlation does not affect the asymptotic distribution of the data series.

$$T_a\hat{} = t_a \left(\frac{\lambda 0}{f\,0}\right)^{1/2} \frac{T(f\,0-\lambda 0)(SE(\alpha\hat{}))}{2f\,0\frac{\hat{}}{\sigma}s} \qquad (3)$$

Here aˆ is the estimate and *t*a the t-ratio of α. coefficient standard error represented with the term se (αˆ) and *s* is the standard error of the regression. In addition, λ0 is a consistent estimate of the error variance that we will get from equation (2). At frequency zero, the residual spectrum term presented through f0. The testing procedure is the same as the ADF test.

2.2 ARDL Cointegration: classical cointegration and Vector Error Correction model for evaluating long run and short run relationship require data series to be I(0) or I(1). Development of Auto-Regressive Distributed Lag (ARDL) model break this restriction and providing us with a very essential tool in the study I(0) and I(1) series jointly. This model mainly developed by Pearson & Pearson (1997) and Pearson et al. (2001). Another issue with our analysis that, our data are in the annual series which is not a very big sample in size. Another argument provided by Pearson and Shin (1999) that the ARDL model is most

suitable when data size is small. Therefore, we have developed following the ARDL model for our study.

$$\Delta Growth = \alpha 0 + \sum_{i=1}^{p} \alpha 1 \Delta Growth_{t-i} + \sum_{i=1}^{p} \alpha 2 \Delta CEXPD_{t-i} + \sum_{i=1}^{p} \alpha 3 \Delta GFCF_{t-i} + \sum_{i=1}^{p} \alpha 4 \Delta Lending_{t-i} +$$

$$\sum_{i=1}^{p} \alpha 5 \Delta TAX_{t-i} + \sum_{i=1}^{p} \alpha 6 \Delta INF_{t-i} + \beta 1 Growth_{t-1} + \beta 2\, CEXPD_{t-1} + \beta 3 GFCF_{t-1} +$$

$$\beta 4 Lending_{t-1} + \beta 5 TAX_{t-1} + \beta 6 INF_{t-1} \quad (4)$$

Here Δ is the difference operator. Difference variables capture the short-run dynamics and other variables capture the long run dynamics. The null hypothesis for the non-existence of long-run relationship in equation (3) is $\beta 1=\beta 2=\beta 3=\beta 4=\beta 5=\beta 6=0$. P is the optimal number of lag which will be selected on the basis of on Akaike Information Criterion (AIC) (Akaike 1974). Secondly, F bound test is employed to test the existence of a long-run relation given by Pearson et al. (2001).

2.3 Causality Analysis: We have used modified Wald statistics (MWALD) of Toda-Yamamoto (TDYM) (1995), popularly known to be augmented Granger causality (1969) test in our study to check the direction of causality. Augmented in the sense that it incorporates data series without considering its possible non-stationarity and cointegration. Traditional Granger causality test suffers from misspecification in identifying the order of integration which can be minimized through TDYM approach. Also, Granger test may provide incorrect regression result which has time lags on integrated variables (see, Dritsaki 2017). Therefore TDYM causality test has certain advantages over the traditional Granger causality test procedure.

Testing requires to develop a VAR with lag (k) plus the maximum order of integration (d*max*). According to Mavrotas & Kelly (2001), the new VAR model k+d*max* order will have an asymptotic □2 distribution of Wald-statistics and it will minimize the risk of wrong selection of the order of integration. But in final Wald test requires not to include additional lag variables in the test (Zapata & Rambaldi 1997). Following system is the representation of Toda- Yamamoto version of causality test.

$$\Omega t = \alpha_0 + \sum_{i=1}^{k} \alpha_{1i} \Omega_{t-i} + \sum_{j=k+1}^{dmax} \alpha_{2i} \Omega_{t-j} + \sum_{i=1}^{k} \beta_{1i} \Pi_{t-i} + \sum_{j=k+1}^{dmax} \beta_{2i} \Pi_{t-j} + u_{1t} \quad (5)$$

$$\Pi t = \gamma_0 + \sum_{i=1}^{k} \gamma_{1i} \Pi_{t-i} + \sum_{j=k+1}^{dmax} \gamma_{2i} \Pi_{t-j} + \sum_{i=1}^{k} \tau_{1i} \Omega_{t-i} + \sum_{j=k+1}^{dmax} \tau_{2i} \Omega_{t-j} + u_{2t} \quad (6)$$

Here Ωt represents growth and Πt represents fiscal spending variables. From the equation (5), if $\beta_{1i} \neq 0$, i= 1……k implies causality runs from Π_t to Ω_t. Similarly in equation (6), if $\tau_{1i} \neq 0$, i= 1…..k, then causality also runs from Ω_t to Π_t.

3. Empirical Results and Discussion

We have applied both ADF and P-P test for testing unit root in our variables. Amongst the variables, growth rate, lending and inflation are stationary at level. Their t statistics for the ADF test and adjusted t statistics for the P-P test are significant at 1% level. That means, their order on integration is 0, i.e. I (0). On the other hand consumption expenditure, Military expenditure, Gross Fixed Capital Formation and Tax Revenue are stationary at the 1st difference. Their order integration is I (1). In the table 1, we can see the summary statistics for unit root analysis. We have tested unit root for three models, i.e. at none, with intercept and with intercept and trend. We have taken the model with a constant term as this model is uniform for all the variables.

Table 1

Unit Root Test Summary

Panel (a) ADF Test Statistics

Variables	I(d)	None	Constant	Trend & Intercept
Growth	0	-0.991627	-6.640179*	-7.850032*
CEXP	1	-5.023338*	-4.944927*	-4.960130*
GFCF	1	-5.508024*	-5.690562*	-5.793087*
Lending	0	0.355884	-2.344609	-3.950465*
MEXPD	1	-4.882636*	-4.886381*	-4.807314*
TAX	1	-6.138184*	-6.106923*	-6.036050*
Inflation	0	-2.388824*	-5.476885*	-2.491660
Panel (b) Phillip- Perron Test Statistics				
Growth	0	-1.408455	-6.630300*	-8.769719*
CEXP	1	-5.032765*	-4.955864*	-4.965316*
GFCF	1	-5.632875*	-5.755560*	-5.850656*
Lending	0	0.058953	-2.036662	-3.803809*
MEXPD	1	-4.799788*	-4.800567*	-4.691748*
TAX	1	-6.138214*	-6.120068*	-6.045830*
Inflation	0	-2.355268*	-5.787131*	-5.896555*

** indicating significant at 1% level of significance.*

Most of the macroeconomic indicators contain break point in their performance. It is a detrimental factor which may affect test results of traditional unit root tests. ADF and PP test is unable to capture the breakpoint in the data series in their tests. Therefore we have applied Minimize Diky-Fuller t-statistics in our study for more robust unit root results. Unit root has been checked in both Additive Outlier (AO) and Innovative Outlier (IO) assumptions. In the following table (3), we have only reported test results with AO assumptions as test results are consistent with IO procedure also.

Results are displayed in table 2. With the presence of a single break point, all the test results are consistent with the results of traditional ADF & PP test.

Table 2

Summary of Minimize Diky-Fuller t-statistics. (Based A-O assumption)

Variable	I(d)	t-stat(Intercept)	Break	t-stat(Intercept & Trend)	Break
Growth	I(0)	-8.503767*	1979	-9.260718*	1979
CEXPD	I(1)	-5.669545*	1998	-7.572324*	2004
GFCF	I(1)	-7.023646*	2007	-9.506621*	2003
Lending	I(0)	-5.030410	1990	-5.030410**	1990
MEXPD	I(1)	-5.895262*	1985	-6.004166*	1986
TAX	I(1)	-6.841174*	2009	-7.062800*	2007
Inflation	I(0)	-6.547871*	1998	-7.232054*	1996

*Note: *&** indicating statistically significant at 1% & 10% level.*

The selection of optimal lag for developing the ARDL model is a very crucial one. The selection of the optimal lag structure is very much affecting the long run relationship between variables (Bahmani-Oskooee and Bohal, 2000). For testing long-run relationship in between studied variables, we are testing F bound test. The critical values for F bound test are taken from Pesaran *et al.* (2001a).

Following table 3 showing the results of F bound test results. Our F-statistics if 4.75, and it is higher than critical values for upper bound I (1) at 2.5% and 5% level of significance. By rule of thumb, if the calculated F-statistics is higher than to critical values of upper bound i.e. I (1), we can say that there is a long run relationship in between the variables (Pesaran *et al.,* 2001b). Our results are also indicating that six explanatory variables with growth rate showing a long run relation in our studied period 1974 to 2015.

Table 3

F-Bound test Results

5%		2.5%		F-Statistics	k
I(0)	*I*(1)	*I*(0)	*I*(1)		
2.45	3.61	2.75	3.99	4.7591	6

Selection of optimal lag is sensitive issue ARDL modelling and various test are available for the selection of optimal lag. We have applied the Akaike Information Criteria (AIC) (Akaike 1974) for selecting the optimal lag structure. ARDL (3, 3, 1, 1, 1, 2, 1) has been selected on the basis of the AIC criterion. Every test should be tested further for its appropriateness, and we have also followed some diagnostic test for checking our model appropriateness.

Table 4

Diagnostic Tests

Diagnostic Test	Test Statistics	Prob. Value
Breaush-Godfrey LM (a)	3.022117	0.3882*
Jarque-Bera (b)	0.799562	0.670467*
Breaush-Pagan-Godfrey (c)	15.09143	0.6557*

*Note: Null Hypothesis (H0) for (a): No-serial Correlation. (b): Normally Distributed. & (c): Homoscedasticity. *Indicating non- rejection of Null hypotheses.*

For the stability test, we have employed CUSUM and CUSUM square test, and the following figure (1.a) & (1.b) showing that our model is stable.

Figure 1.a

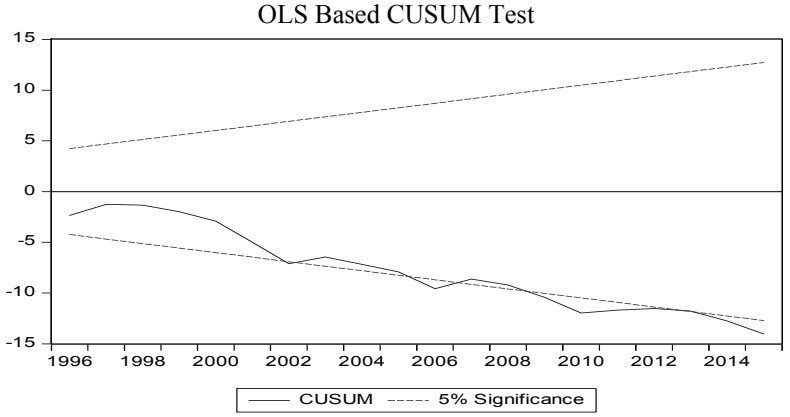
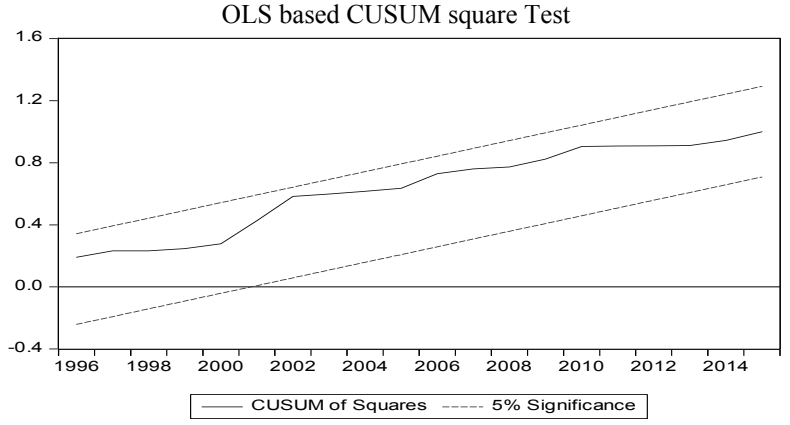


Figure 1.b



After checking all the traditional test for suitable ARDL model formulation, now we have extracted the long run statistics of the model. Table 5 represents our results. Only Gross Fixed Capital Formation is statistically significant at 1% level. It implies that, in long run dynamics, GFCF is positively related to the growth of India. As our variables are in % form, therefore 1% increase in GFCF will increase growth rate by 0.48 percent. All other long-run coefficients become statistically insignificant in our study. The speed of adjustment is very much high as our error correction term becomes significant at the 1% level. The sign of the ECT is negative and the value is 0.85, which indicates the speed of adjustment is very much drastic.

Table 5

ARDL Long Run Results with Error Correction Term, Dependent Variable *d*Growth

Variables	Coefficient	Standard Error	t-Statistics
CEXPD	-2.168598	1.538417	-1.409630
GFCF	0.350055	0.141850	2.467777**
Lending	-0.510170	0.761343	-0.670092
MEXPD	3.422571	2.477753	1.381320
TAX	-0.850762	0.849992	-1.000906
INF	-0.229212	0.140075	-1.636355
ECT (-1)	-0.850972	0.145170	-5.861900*

*Note: * & **indicating statistically significant at 1% & 5% level.*
d represents difference operator.

In the table 6, we have discussed the short run results of ARDL model. The positive short-run impact has been found between dGFCF, and dTAX (-1) with growth. Negative short-run impact has come from dgrowth(-2), dMEXPD, dTAX and dINF. Impact of GFCF on growth performance is consistent in both the short-run as well as long-run dynamics. Though other variables are not related to growth in the long run, we have found several short-run relationships. The difference in tax revenue showing a negative relationship. As it is the burden for the people, which reduces present consumption and investments. But lag tax revenues are showing a positive relation to growth. Lag tax revenue is used to finance the present expenditure of the government. Expenditure is useful in creating output and employment in the economy. In our study coefficient value for dTAX(-1) is 0.92.

Table 6

Short Run Results, Dependent Variable d(growth)

Variables	Coefficient	Standard Error	t-Statistics
Constant	16.06723	2.741651	5.860422*
dgrowth(-1)	0.146979	0.113790	1.291666
dgrowth (-2)	-0.130944	0.067269	-1.946581**
dCEXPD	-1.312658	0.737416	-1.780078
dCEXPD(-1)	4.170084	0.642454	6.490865*
dCEXPD(-2)	-1.373102	0.497279	-2.761231*
dGFCF	0.820163	0.175638	4.669633*
dLending	0.484241	0.302175	1.602519
dMEXPD	-5.109561	2.044685	-2.498948**
dTAX	-1.813254	0.448167	-4.045932*
dTAX(-1)	0.925473	0.393780	2.350228**
dINF	-0.781794	0.069389	-11.26689*

*Note: *, ** & *** indicating statistically significant at 1%, 5% & 10% level of significance.*
R^2=0.944525, Adj. R^2= 0.918922, DW=2.124733

On the other hand, the inflation variable is negatively associated with the growth. Inflation creates negative externalities in the economy and heavily impact investment decisions. Our works support the results of Barro (1995) & Ball & Romer (1993). In the Indian case,

military expenditure negatively affects growth performance in the short-run. According to Ahed & Dar (2017), by financing huge expenditure on defence, a country has fewer resources for other productive works which ultimately reduces growth performance. Similar kind of results also has been found by Tongur & Elveren (2017), Shahbaz et al. (2013) and Enimola & Akole (2011). CEXP (-1) and CEXP (-2) both are statistically significant and negatively associated with growth. Unproductive consumption expenditure in lag periods may become harmful for present growth performance.

Till now we have discussed the individual short-run impact of variables on growth. We have also applied the Wald coefficient test for examining short-run causality in between explanatory variables with growth. Only tax revenues (contemporaneous and lag jointly) has shown short-run causality to present growth rate.

The ARDL model dynamics is showing the long run and short run relationship between studied variables. But the ARDL model is not capable to study the directions causality in between dependent and independent variables. For the direction of causality, we have analysed the Toda-Yamamoto causality test results. Before the test, we have developed 6 VAR models for our study. Lag selection criteria for VAR's models are based on the Akaike Information Criterion (AIC). OLS based CUSUM test and Portmanteau Test has been applied for testing stability of the VAR's and the existence of autocorrelation. CUSUM test results are given in figure (2) in appendix (A), and all our VAR models are stable. Portmanteau Test for autocorrelation is showing that there is no autocorrelation in the error term in all models. CUSUM and Portmanteau test results are reported in appendix (A) and (B).

Table 7

Toda-Yamamoto Causality (MOWALD) Test Summary

H0	p (lag)	□2	Prob. Value	Decision
CEXPD – Growth	3	1.6	0.44	Accept
Growth – CEXPD	3	2.5	0.29	Accept
Lending – Growth	1	0.42	0.52	Accept
Growth – Lending	1	0.58	0.44	Accept
GFCF – Growth	2	1.2	0.28	Accept
Growth – GFCF	2	2.9	0.087	Reject
MEXPD – Growth	3	7.4	0.025	Reject
Growth –MEXPD	3	3.4	0.18	Accept
TAX – Growth	2	0.21	0.65	Accept
Growth – TAX	2	3.6	0.058	Reject
INF – Growth	1	4.3	0.038	Reject
Growth– INF	1	0.58	0.45	Accept

Form the above table, we have found four unidirectional causal relationships. They are- (i) Growth causes gross fixed capital formation, (ii) Military expenditure causes growth, (iii) growth causes tax revenues and (iv) inflation causes growth. The □2 values for all other variables are not significant at any level. Therefore their direction of causality cannot be explained.

4. Conclusions

This paper tries to investigate short run and long run relationship in between government spending and growth performance. ARDL cointegration test implies that there is a long run relationship between variables. In the long run, only Gross Fixed Capital Formation is positively related to the growth. Our results follow Solow (1956), Swan (1955) and Bond et al. (2011) arguments that capital accumulation is vital to growth. In the short run, analysis has shown a mixture of positive and negative impacts. Error correction term showing a very rapid speed of adjustment towards long-run equilibrium. The lag of tax revenue is positively related. As we have taken tax revenue with the assumption that these revenues are used to finance government expenditure. Revenue generated in the previous year is used in present expenditure through the budget process. Our significant positive lag tax revenue is proving the same thing. Negative relations of military expenditure to growth in the short run has two aspects - (a) heavy military expenditure creates an excessive burden to the government which ultimately increases debt requirements and (b) increase in the military budget may create negative externalities which can degrade foreign relations with other countries. Negative relation of inflation with growth is very much expected. Rising inflation creates an environment of negative externalities. In our short-run analysis, inflation is negatively associated with the growth rate. As to examine the causal relationship between variables, we have applied the Toda-Yamamoto non-linear model. We have found four unidirectional causal relationships. They are- (i) Growth causes gross fixed capital formation, (ii) Military expenditure causes growth, (iii) growth causes tax revenues and (iv) inflation causes growth. Unidirectional causality between growth to Gross Fixed Capital Formation and tax revenue exhibit positive enlighten for the policymakers. Because both these two variables are positively related to the growth of India. On the other side, other two unidirectional causalities termed a serious policy concern. In the short run, they negatively affect the growth.

Despite the necessities of defence expenditure, India should tighten its relationship with the other countries, especially with the neighbouring countries. Military and arms race will not push the Indian economy, without creating healthy trade and diplomatic relationships with other countries. Inflation targeting policies are much needed for the Indian economy. Central bank and government of India should take this issue seriously. The existence of high inequality in India, rapid inflation directly affect the poorer section of the society which in a way lower down the overall productivity of the economy.

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Appendix A

Table 1

Descriptive Statistics of the Variables (1974 to 2015)

Variable	Mean	Median	Maximum	Minimum	S.D.	Skewness	Kurtosis	Sum	Sum Square Dev.	Obs.
GDP	5.895029	6.095310	10.25996	-5.238183	2.904832	-1.353606	6.397311	247.5912	345.9601	42
GFCF	25.62151	24.89912	35.57031	16.16089	5.426588	0.281980	2.103185	1076.103	1207.362	42
CEXPD	10.84248	10.68005	12.45597	8.839228	0.854300	-0.025037	2.377579	455.3843	29.92299	42
Lending	-2.590806	-2.894491	0.187069	-5.588271	1.545764	0.289831	2.214050	-108.8139	97.96481	42
MEXPD	2.957109	2.933792	3.948814	2.405128	0.358495	0.857967	3.707050	124.1986	5.269266	42
TAX	9.798765	9.566288	12.26585	8.188687	0.949029	0.387859	2.619660	411.5481	36.92686	42
INF	7.321333	7.749126	16.66752	-1.648682	3.561272	0.283944	3.779471	307.4960	519.9889	42

Figure A.1

Trends in the Variables (1974 to 2015)

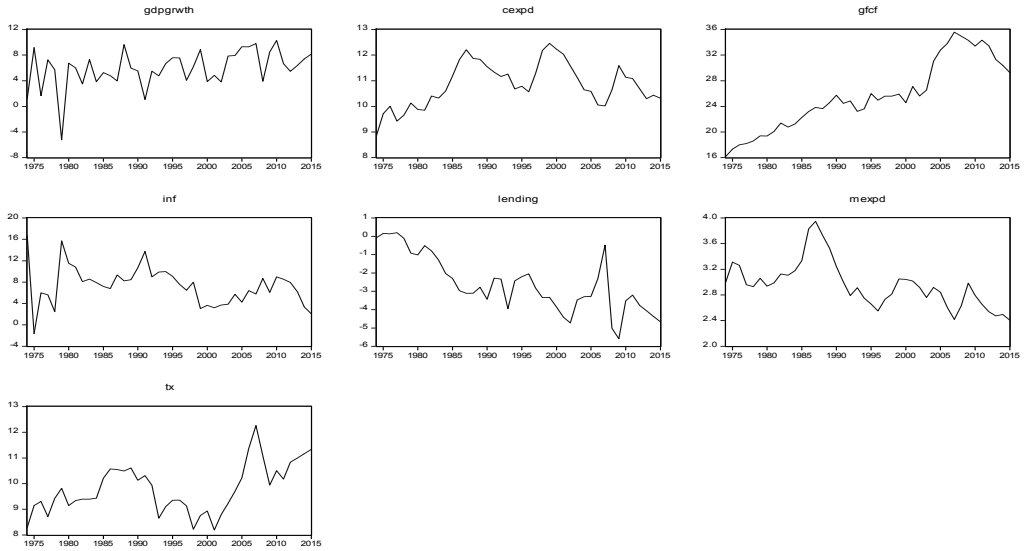
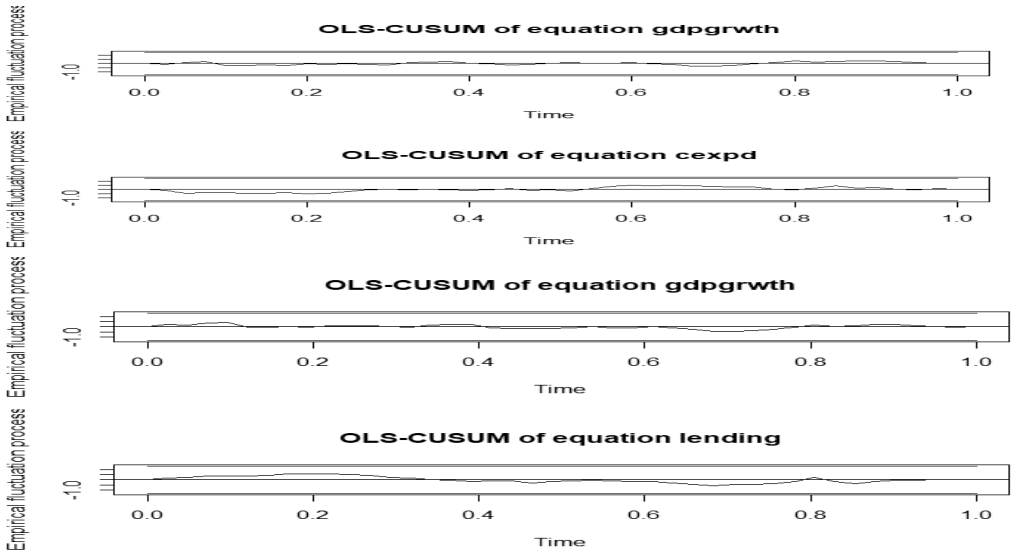
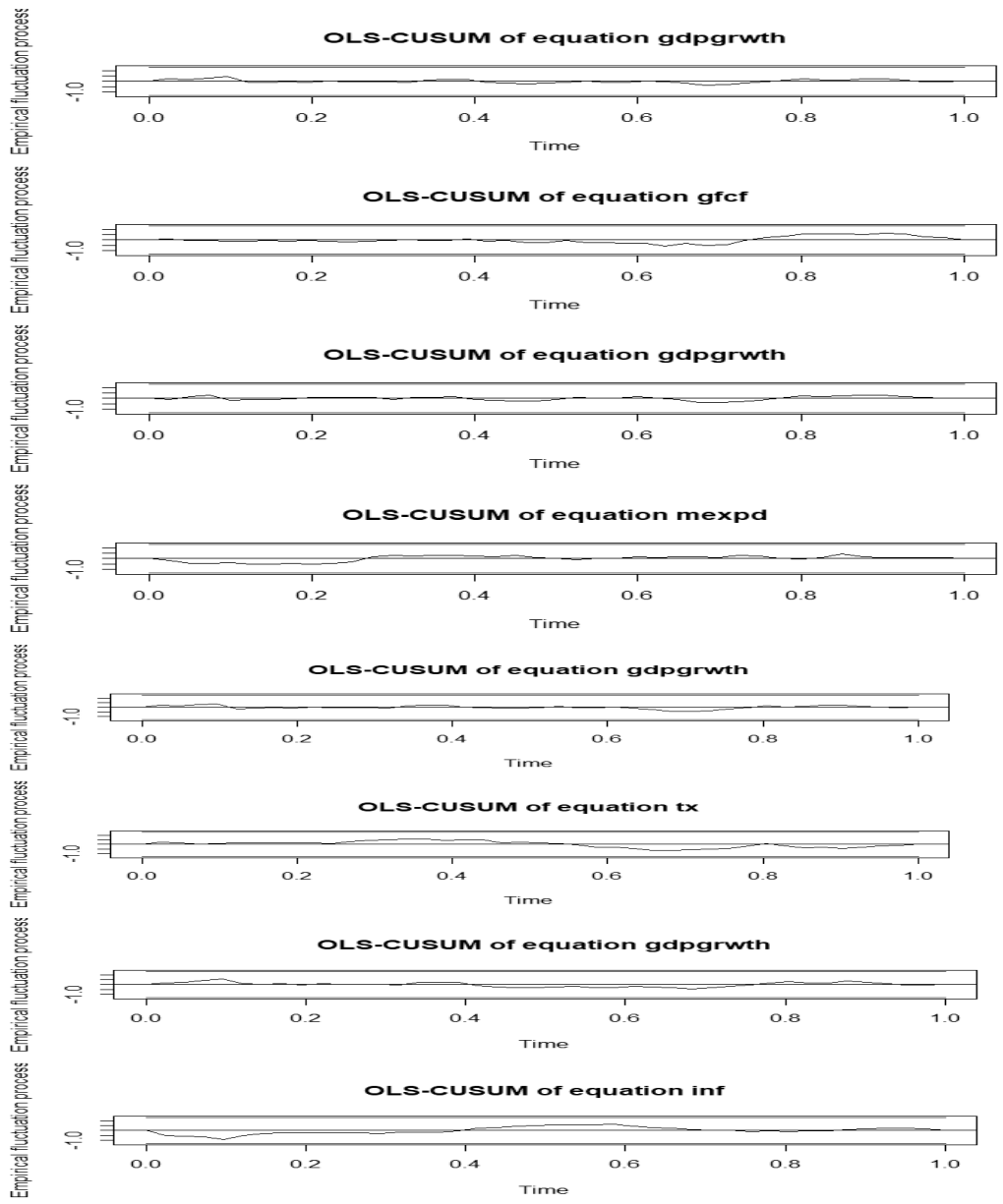


Figure A.2

OLS Based CUSUM Test




OLS-CUSUM of equation gdpgrwth
OLS-CUSUM of equation gfcf
OLS-CUSUM of equation gdpgrwth
OLS-CUSUM of equation mexpd
OLS-CUSUM of equation gdpgrwth
OLS-CUSUM of equation tx
OLS-CUSUM of equation gdpgrwth
OLS-CUSUM of equation inf
Empirical fluctuation process
-1.0
0.0
0.2
0.4
0.6
0.8
1.0
Time

Appendix B

Table 8

Portmanteau Test (asymptotic) Summary

VAR Model	Chi-Square	Lag(p)	d	p-value
Grwoth-CEXPD	50.885	2	56	0.6684
Growth-Lending	40.635	1	60	0.9739
Growth-GFCF	40.222	1	60	0.9768
Grwoth-MEXPD	48.227	2	56	0.7604
Growth-TAX	42.082	1	60	0.9618
Grwoth-INF	41.845	1	60	0.964

Note: H0= No Serial Correlation. P-Value indicating acceptance of H0