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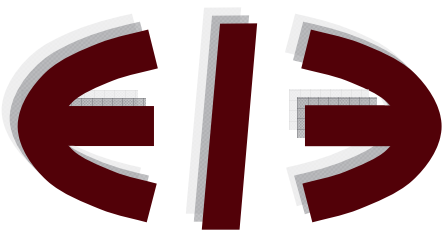
EERI Research Paper Series No 06/2012

ISSN: 2031-4892



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Assessment of the Impact of Fiscal Policy on Economic Growth: An Empirical Analysis

Vijay Varadi[1] and C.Vanlalramsanga[2]

Abstract: *The paper attempted to analyzes linkages between fiscal policies (public expenditure and public debt) and economic growth by investigating the impact of public expenditure and public debt on economic growth (GSDP). To find out empirically the relationship between GSDP and Public Debt, the study analyzes annual time series data from 1987-88 to 2009-10 (BE) having 23 observations. The study results indicated that public expenditure correlates positively to GSDP while public debt correlates negatively to GSDP during the study period. The empirical evidence suggests that debt funded public expenditure does not contribute positively to growth in the State and the state government should preferably avoid accumulation of debt. Further, the debt dynamics indicated that persistent generation of public debt in the state is resulting in mounting debt service burden as debt funded investment does not result in generating assets for economic growth.*

JEL Classification: A11, E21, E27, E61, H5, H30

Key Words: Debt Dynamics, Economic Growth, Government Expenditure

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Assessment of the impact of fiscal policy on growth in Mizoram State: An Empirical Analysis

I. Introduction:

There has been a revival of interest among policymakers and researchers in understanding the linkages between fiscal policies and economic growth. However, literature, in particular, of the empirical analysis on the relationship between public debt and economic growth are rather scarce and they vary in terms of data sets, econometric techniques, and often produce conflicting results[3]. In the Keynesian model, increase in government expenditure (on infrastructures) or public debt leads to higher economic growth. Contrary to this view, the neo-classical growth models argue that government fiscal policy does not have any effect on the growth of national output. However, it has been argued that government fiscal policy (intervention) helps to improve failure that might arise from the inefficiencies of the market[4]. Therefore, the relationship between fiscal policies (particularly public expenditure and public debt) and economic growth has continued to generate series of debate among scholars.

Higher government expenditure finance with borrowing may or may not contribute positively to the overall performance of the economy. For instance, if government increases borrowing in order to finance its expenditure, it will compete (crowds-out) away the private sector, thus reducing private investment or it may spend substantive amount on servicing its existing liabilities that can otherwise be used for investment. Furthermore, in a bid to score cheap popularity and ensure that they continue to remain in power, politicians and governments officials sometimes increase expenditure and investment in unproductive projects or in goods that the private sector can produce more efficiently. Thus, government activity sometimes produces misallocation of resources and impedes the growth of national output. In such cases, unfortunately, rising public debt for ever mounting public expenditure will not translated into meaningful growth and development. This paper investigates the effect of public debt and public expenditure separately on economic growth (GSDP) in the state of Mizoram.

The rest of the paper is organized as follows: Section II contains the literature review. Section III presents methodology, variables' description and data. Section IV shows estimation and empirical results and finally Section V concludes.

II. Literature Review of Framework

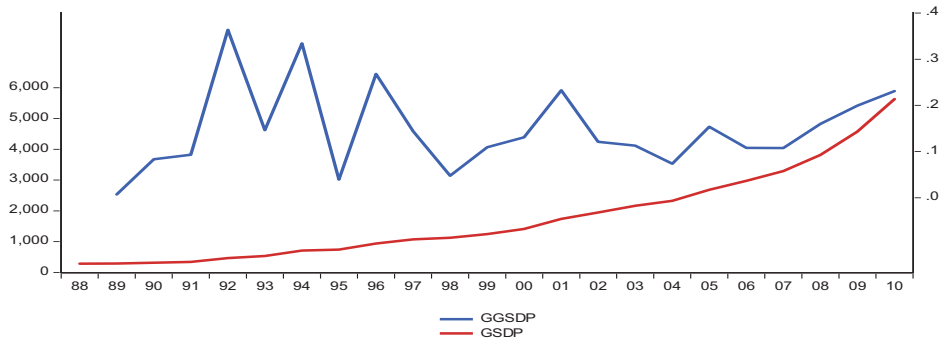
The nonlinear effect of debt on growth is reminiscent of "debt intolerance" (Reinhart, Rogoff, and Miguel A. Savastano 2003) and presumably is related to a nonlinear response of market interest rates as countries reach debt tolerance limits. Unilateral causal pattern from growth to debt, however, does not accord with the evidence. Public debt surges are associated with a higher incidence of debt crises; this temporal pattern is analyzed by Reinhart and Rogoff (2010b). Recent turmoil in Greece and other European countries can trace importantly to the adverse impacts of high levels of government debt on county risk and economic outcomes, a high public debt burden implies higher future taxes (inflation is also a tax) or lower future government spending while it has to repay its debts. Kumar and Woo (2010) highlight in their cross-country findings that debt levels have negative consequences for subsequent growth,

[3] **Niloy Bose et al**, (September 2007), "Public expenditure and Economic Growth: A Disaggregated Analysis for Developing Countries", *Manchester School*. Vol. 75(5), September 2007, 533-556.

[4] **Abu Nurudeen and Usman, Abdullahi,** (June 18,2010), "*Government expenditure and Economic Growth in Nigeria, 1970 – 2008: A Disaggregated Analysis*", Business and Economic Journal, Volume 2011: BEJ-4, http://astonjournals.com/bej access on 26th November 2011.

even after controlling for other standard determinants in growth equations. For emerging markets, an older literature on the debt overhang of the 1980s frequently addresses this theme. GDP and public debt are constantly linked in discussion about economic health. A country with a higher debt than GDP may be in serious financial trouble with large fiscal burden that can cause problems in the economy. A substantial amount of literature has addressed the negative effects of a heavy debt burden on economic growth. In most of the proposed channels for the debt-growth link, high levels of debt or debt service impede growth by reducing the quantity(efficiency) of investment. Empirical studies of the association between debt and growth have generally sought to estimate growth equations or investment equations with selected debt indicators as independent variables. (Sachs, 1989; Krugman, 1988; Elbadawi, Ndulu, and Ndung'u, 1997; Serieux and Samy, 2001; Pattillo, Poirson, and Ricci, 2002a; Pattillo, Poirson, and Ricci, 2002b).

Figure 1: Level and Growth of Real GSDP



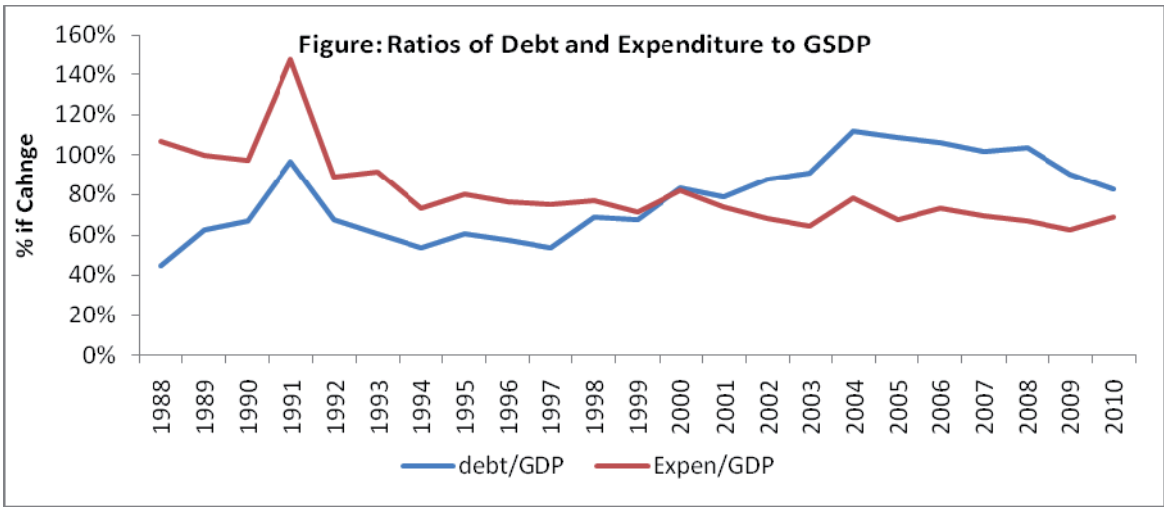
Economies growth rates varies year-on-year to define the business cycle; In Figure 1 we see the *level* of constant price GSDP in Mizoram since 1988 and the actual *rate of growth* from year to year. The *mean* annual percentage change is 1.4% which is very close to our compound growth rate measure of the Mizoram long run GSDP growth rate. However, there are clear shifts in GSDP with annual growth rates varying from as low as 0.06% to 3.6%.

One can construct distinguish hypotheses to explain the increase indebtedness and its effect on spending. Null is about retrenchment in spending and alternative hypothesis is, nations have willingly assumed greater debt in recent years because they expect them incomes to rise. They spend more in anticipation of increased earnings and they finance their higher spending through debt which leads to tragedy in the economic growth. Figure 2 depicts that both debt and expenditure ratios are moved similar direction to the period 2000 and then they moved opposite direction.

Better knowledge on the dynamic relationship between government expenditure and GDP is relevant for policy in two major respects. First, it improves the understanding of long-term, structural public finance issues. In particular, it could help to assess the impact on government expenditures and then on deficits arising from a structural deceleration in growth or, conversely, from an improvement in the growth potential (e.g., related to structural reforms). Second, the dynamic relation between government expenditure and GDP helps the comprehension of policy-relevant issues over a short-to medium term horizon. Disposing of a reliable measure of the structural relation between the non-cyclical component of government expenditure and potential output is key to obtain a benchmark against which to evaluate the stance of expenditure policy and then of overall fiscal policy. It helps in judging expenditure

policy is expansionary or contractionary. The empirical literature has tackled this issue from different corners. (e.g., Borcherding (1985), Heller and Diamond, (1990), Alesina and Wacziarg (1998), Rodrik (1998) and Alfonso Arpaia et.al (2008)).

Figure 2: Debt/GSDP and Expenditure/GSDP Ratios



Being a special category state Mizoram availing the Gadgil formula[5] have experienced high Debt-GSDP ratio, due to high fiscal and primary deficits and low growth rate with declined per capita income as a percent of national average. In Mizoram, disproportionately high contribution made by loan and advance and non-developmental expenditure made the growth of primary expenditure high, which resulted in primary deficit; distorted expenditure pattern put the state in deficit .However, contribution made by both developmental revenue and capital outlay was equitable. Mizoram experienced primary deficit in 2005-09. As a percentage of GSDP, primary receipts increased by 12.68 percentage points and expenditure by 4.23 points in 2005-09 over the previous period. However, growth in capital expenditure was negative and that of revenue positive. However, Mizoram state sectoral changes[6] are vary from period to period, the growth performance of agriculture was lower than the national average, contribution to growth by industry was much lower than the national average and contribution of service sector to growth is higher than the national average. This is the main reason, why Mizoram is experiencing a high debt-GSDP ratio. The direct effect of the distortion was felt in low growth rate of GSDP as compared to the previous period. Further, high interest payment made gross fiscal deficit high.

[5] Gadgil formula for devolution of Central assistance for States plan as approved by the National Development Council, 30 per cent of the total funds is earmarked for Special Category States. Further, as against the composition of Central assistance of 30 per cent grant and 70 per cent loan for major States (characterized as non-special category States), special category States receive 90 per cent plan assistance as grant and just 10 per cent as loan. Similar favored treatment is received by the special category States in the hands of the Finance Commission in respect of devolution of Central tax revenues. High levels of devolution by the Planning Commission and the Finance Commission compensate for the very fragile own revenue basis of these States.

[6] Contribution to growth analysis reveals a distorted picture in expenditure. Non-developmental revenue expenditure, with a sectoral share of 20 per cent was contributing 100 per cent and developmental revenue expenditure with a share of 57percent contributing 122.37percent to the growth of primary expenditure. Developmental capital outlay was contributing, - 311.81 percent.

In such scenario, this paper attempted to assess empirical evidence of the impact of fiscal policy represented by public expenditure and public debt in the context of the dynamics of economic growth (GSDP) in the state of Mizoram during the study period.

III. Data and Methodology:

The Present study is intended to examine whether public spending and public debt have been drivers of the economic growth in Mizoram state of India. However, we have made an attempt to analyze the dynamic of economic growth enhancement in the state. The significance of this study lies in attempting provide the answer of the question: is Debt-led growth better or is expenditure led growth is better in Mizoram state. We have colleted data from various RBI Bulletins of State Finances and Annual Reports, which are said to be accurate and transparent. Since, Mizoram became the 23rd state of India on 20 February 1987, the official data is not available beyond 1987, hence we have collected annual time series data from 1988 to 2010 (i.e., 23 years). Further, we also examine the nonlinearity associated with the relationship between the debt, spending and growth nexus. To achieve our objectives, we moved ahead in the production function framework.

Table 1: Descriptive Statistics

	Debt	***Expenditure***	Growth
Mean	1567.391	1273.826	1765.478
Std. Dev.	1465.452	955.4440	1477.991
Skewness	0.788930	1.080867	1.078227
Kurtosis	2.200526	3.489873	3.374476
Variance	2147549	912873.3	2184459
1st Qu.	354	511.5	622
3rd Qu.	2764	1822.0	2504
IQR	2410	1310.5	1881.5
Jarque-Bera	2.998	4.708	4.590
Probability	0.223	0.094	0.100

Table 1 depicts that all used variables are worrisome having non-normal distributions, fat tailed, and nonlinear. Variables are interacting to generate a spectrum of asymptotic autocorrelation patterns consistent with long-memory processes, such autocorrelations may decay very slowly as the number of lags increases or may not decay at all and remain constant at all lags. Such patterns, along with other sample characteristics of the transformed time series, such as jumps in the sample path, excessive volatility, and leptokurtosis, suggest the possibility that these three ingredients are involved in the data generating processes of many actual economic time series data. Depending upon the type of transformation considered and how the model error is specified, the autocorrelation functions are given by random constants, deterministic functions that decay slowly at hyperbolic rates, or mixtures of the two. We consider nonlinear transformations of random walks driven by thick-tailed innovations that may have infinite means or variances.

To examine whether the given variables follows nonlinear relationship, we have employed a BDS Test. BDS test was first devised by W.A. Brock, W. Dechert and J. Scheinkman in 1987 (BDS, 1987). BDS test is a powerful tool for detecting serial dependence in time series. It tests the null hypothesis of independent and identically distributed (I.I.D.) against an unspecified alternative. BDS test cannot test chaos directly, but only nonlinearity, provided that any linear dependence has been removed from the data (e.g. using traditional ARIMA-type models or taking a first difference of natural logarithms). Nevertheless, nonlinearity is

one of the indications of chaos, we may use BDS test to detect such indication. BDS test is a two-tailed test, we should reject the null hypothesis if the BDS test statistic is greater than or less than the critical values (e.g. if a=0.05, the critical value = ±1.96). Table 2 depicts that debt and expenditure are having more non-linear in its nature and growth is not behaving so.

Table 2: BDS Test Results for GROWTH, Debt and Expenditure

$\frac{\varepsilon}{\sigma}$	Embedding Dimension (m)	BDS Test Statistics		
		GROWTH	Debt	Expenditure
1	2	0.8229	2.0763**	2.8056***
1	3	2.3703**	5.9494***	2.3316***
2	2	0.4426	4.7861***	2.3302***
2	3	1.6139	3.0032***	2.3412***

*, ** and **** are 10, 5 and 1% significance level

In a Non-Classical Distributions estimating autoregressive models we find the data behaves as a Biased downwards, Skewed and Thick tails. Especially, when autoregressive coefficients are large and sample sizes are small (in our case it is 23 observations). Our basic regression model estimates have been examined and found that the assumptions are violated and also having nonlinearity, non-stationarity and thick tails. To deal with we transform the data into logarithmic to confirm those assumptions. However, a transformation will not eliminate or attenuate the leverage of influential outliers that bias the prediction and distort the significance of parameter estimates. In classic regression, if the errors are iid (independently identical distribution) normal, and independent of the regressor, then the least-squares estimates have an exact normal distribution, not just asymptotic. This is not true in most time-series regressions. Under these circumstances, robust regression that is resistant to the influence of outliers may be the only reasonable. Robust regression analysis provides an alternative to a least squares regression model when fundamental assumptions are unfulfilled by the nature of the data.

IV. Results and Discussion:

In our robust regression satisfies all assumptions such as outliers to avoid biased estimates, the residual distribution is normally distributed, it is used robust filter controls for heteroscadasticity and autocorrelation factors. by asymptotic (large sample) estimation, the sample sum of squared error corrections approximated those of their population parameters under conditions of Heteroscadasticity and yielded a heteroskedastically consistent sample variance estimate of the standard error (See Christopher Croux et.al (2004)). Hence our estimated robust regression model is as follows with white Heteroscadasticity-consistent standard errors & covariance:

$$\ln(gsdp) = \beta_0 + \beta_1 \ln debt + \beta_2 \ln \exp en + \varepsilon_t$$

Where β_0 is a intercept which the overall mean of the natural log the values, β_1 and β_2 are the terms of each represent "effects" of the debt and expenditure respectively.

Table 3.1: Regression Results

Variable	*Coefficient*	*Std. Error*	*t-statistics*
C	-0.343097	0.250657	-1.368793
LNDEBT	0.226665	0.116160	1.951311**
LNEXPEN	0.858183	0.147262	5.827576***
		R^2 = 0.98, D-W=1.687 and Chi-Square=0.19	

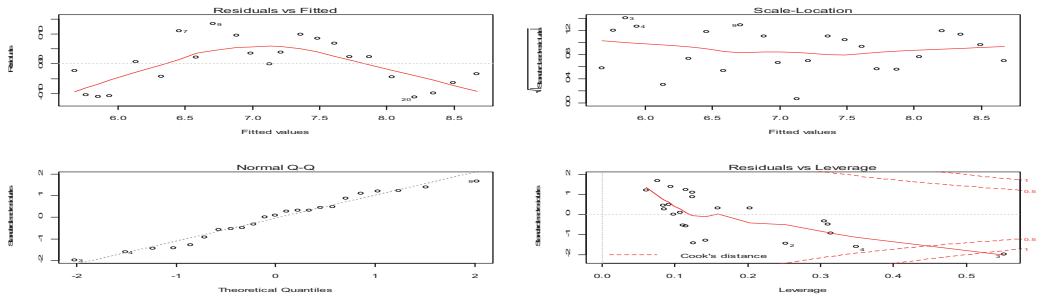
Table 3.2: Regression Results

Variable	*Coefficient*	*Std. Error*	*t-statistics*
C	6.663233	1.311644	5.080061***
LNDEBT	-0.311690	0.165667	-1.881426**
LNEXPEN	0.091611	0.187142	0.489528
@ Trend	0.176740	0.035842	4.931077***
		R^2 = 0.99, D-W=0.782 and Chi-Square=0.13	

Table 3.1 and 3.2 depicts the regression results of the estimated model. The solution proposed from table 3.1 was to add an exponential time trend to the regression which can estimate at 6% error which helps us to have robust estimations. From table 3.2 and Figure 3 provides evidence that debt is negatively significant and expenditure is positive but not statistically significant. The results are more robust than the previous model (for details see Annex 2). From table 3.2, we see that in the growth of GSDP in Mizoram for the period 1988-2010, the growth elasticity of debt and expenditure were -0.31 and 0.09, respectively. In other words, over the period of study, holding the expenditure input constant, a 1% increase in debt input led on the average to about a -0.31% decrease in the growth.

Similarly, holding the debt input constant, a 1% increase the expenditure input led on the average to about 0.09% increase in the GSDP growth. Adding two growth elasticities, we obtaining -0.22, which give the value of the returns to scale parameter. As it is evident, over period of the study, the GSDP growth was characterized by negative/decreasing returns to scale.

Figure 3: Regression Results based on table 3



The regression results show that the variables are independent and random and variance inflation factor is not significant[7].Since public debt and public expenditure may act

[7] Multicollinearity is a statistical phenomenon in which two or more independent variables in a multiple regression model are highly correlated. In the presence of multicollinearity, the estimate of one variable's impact on dependent variable while controlling for the others tends to be less accurate than if independent variables were uncorrelated with one another. In statistics, the variance inflation factor (VIF) is a method of detecting the

differently in the state's economy. Public Debt may contains internal debt (market loans, special securities issued to NSSF, loans from banks and financial institutions), loans & advances from centre, public accounts (1. small savings, state provident fund etc., 2. reserve funds and 3. deposits and advances) and contingency fund. Whereas the government expenditure includes all government consumption, investment but excludes transfer payments made by the state.

The above results hold that public debt and government expenditure are significant contributors to economic growth. The theory also focuses on positive externalities and spillover effects of a knowledge-based economy which will lead to economic development. The endogenous growth theory also holds that policy measures can have an impact on the long-run growth rate of an economy. Due to the endogenous of all variables in our study, we have employed VAR (Vector Autoregression) to treat the model more symmetrically i.e., having a system of equation for identification, a statistical specialty in control theory; which is providing a theory-free method to estimate economic relationships, thus being an alternative to the "incredible identification restrictions" in structural models

$$\begin{bmatrix} \ln gsdp \\ \ln debt \\ \ln \exp \end{bmatrix} = \begin{bmatrix} c1 \\ c2 \\ c3 \end{bmatrix} + \sum_{s=1}^{3} \begin{bmatrix} \beta_{11} & \beta_{12} & \beta_{13} \\ \beta_{21} & \beta_{22} & \beta_{23} \\ \beta_{31} & \beta_{32} & \beta_{33} \end{bmatrix} \begin{bmatrix} \ln gsdp_{t-s} \\ \ln debt_{t-s} \\ \ln \exp_{t-s} \end{bmatrix} + \begin{bmatrix} u_{1t} \\ u_{2t} \\ u_{3t} \end{bmatrix}$$

Table 4: VAR Estimations

	LNGROWTH	LNDEBT	LNEXPEN
LNGROWTH(-1)	0.633***	-0.097	0.261
LNGROWTH(-2)	0.068	0.733***	0.316
LNDEBT(-1)	-0.282**	0.783**	-0.070
LNDEBT(-2)	0.207	0.441**	0.597**
LNEXPEN(-1)	0.620***	-0.656**	-0.082
LNEXPEN(-2)	-0.167	-0.492	-0.413
C	-0.311	2.099***	2.777***

***, ** indicates 1% and 5% level of significance

Table 4 depicts the VAR estimations and lags are identified with AIC, each estimated coefficients presented here are statistically significant. But collectively, they may be significant on the basis of the standard F test. Let us examine the results presented in Table 4. First consider the growth regression. Individually, only growth at lag 1 and debt at lags 2 are statistically significant. But the F value is so high that we can reject the null by saying collectively all the lagged terms are statistically significant. Turning to the public debt regression, we see that all the two lagged growth on debt and expenditure. Similarly, debt is negatively (-0.28) on lag 1 growth, positively (0.78) in lag 1 and (0.44) in lag 1 and 2 respectively; in case of expenditure debt is having a positive impact on expenditure (0.59) at lag 2; the numbers are statistically significant. Expenditure is having positive effect with growth (0.62) and negative effect with debt (-0.65) at lag 1 respectively and results are significant at 5% level.

problem of multicollinearity. More precisely, the VIF is an index which measures how much the variance of a coefficient (square of the standard deviation) is increased because of collinearity.

The Granger causality test is a statistical hypothesis test for determining whether one time series is useful in forecasting another. Ordinarily, regressions reflect "mere" correlations, but Clive Granger, argued that there is an interpretation of a set of tests as revealing something about causality.

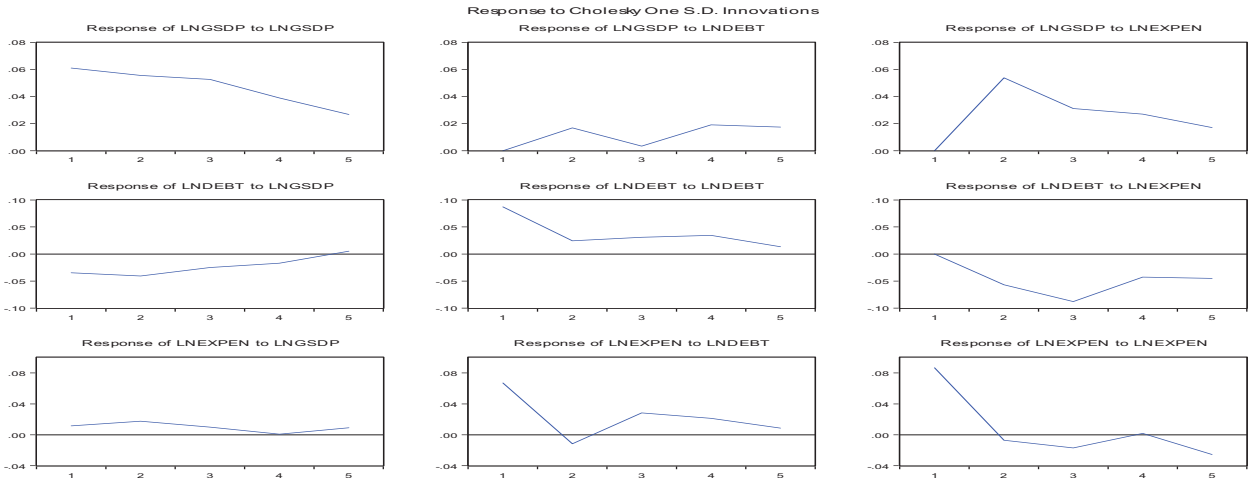
Table 5: VAR Granger Causality/Block Exogeneity Wald Tests

Dependent variable: LNGROWTH			
Excluded	Chi-sq	df	Prob.
LNDEBT	2.263095	2	0.3225
LNEXPEN	11.20376	2	0.0037
All	14.11725	4	0.0069
Dependent variable: LNDEBT			
Excluded	Chi-sq	df	Prob.
LNGROWTH	11.70528	2	0.0029
LNEXPEN	4.927792	2	0.0851
All	12.35545	4	0.0149
Dependent variable: LNEXPEN			
Excluded	Chi-sq	df	Prob.
LNGROWTH	4.762283	2	0.0924
LNDEBT	5.835712	2	0.0540
All	9.093215	4	0.0588

Table 5 explains that the growth is caused by expenditure but not debt. Whereas debt is caused by both expenditure and growth of the economy; and expenditure is caused by both debt and growth of the nation. An overall result explains that there is bi-causal relationship existing in all studied variables. Figure 5 shows the adjustment of the impulse response sequence for the model of GSDP growth in terms of debt and expenditure, based on the shock in the amount of the standard errors in the used variables i.e., growth, debt and expenditure. On the figure it is plotted the reactions on a shock in the growth and the reactions on the shock in orders received. According to our empirical evidence, it is found that there is nonlinear relationship exists between growth, debt and expenditure, which explains that there has a effect growth on debt and expenditure and vice versa up to 5 lags. Thus these graphs start at the point of origin. A shock in one variable has an instant effect on its present value. Therefore, the graphs are being at the respective standard error. The effects in the following periods depend on the dimension of the coefficients. If the sum of all coefficients in equation in one equation is smaller than one, the effects will decrease over time and will revert to a value close to zero after the certain period, here it is 5 lags. Due to high correlation, parts of the effect can be assigned to growth immediately.

The effect of growth shocks given to the studied variables is as follows: If growth has given shock to growth itself, the effect of growth would be decreasing from 6% to 2.6% for a 5 periods respectively. If growth shocks to debt and the effect is inclined initially from 0% to 1.6% then decreased up to 0.17%. Similarly growth shocks to expenditure the effect is increased initially 0%to 5.3%, and then decreased consequently to 1.7% during 5 years. Keeping debt as an dependent variables the shocks would be as follows: Public debt shocks to growth negative increased initially from -3.4% to -4.0% but consequently deceased from -2.4%, 0.4% respectively. If debt shocks to debt itself, the effect is reducing from 8.7%, 2.4%, 3%, 3.4% and 1.3% respectively. If debt shocks to expenditure, the effect would be 0% in the initial year, then it is having a enormous negative effect remaining 4 periods i.e., -5.6%, -8.7%, -4.2% and -4.4% reservedly for all the five periods.

Figure 5: **Response to Cholesky one SD innovations**



The effect of expenditure shocks given to the studied variables is as follows: If expenditure shock to growth, the effect would be 1.1%, 1.7%, 0.9%, 0.07% and 0.09% respectively. If expenditure shock to debt, the effects are 6.6%, -1.1%, 2.8%, 2.1% and 0.8% respectively and, if expenditure shock to expenditure itself, the effect are vary but economically significant i.e., 8.6%, -0.007%, -1.7%, 0.01% and -2.5% respectively for all the five periods. Based on VAR estimation results, we have employed Cholesky Decomposition/Impulse Response functions are used to see the effects and responses with other explained variables in the estimated model.

Variance Decompositions are used as an alternative of impulse response, to receive a compact overview of the dynamic structures of the VAR model, are variance decomposition sequences. In contrast to impulse response, the task of variance decomposition is to achieve information about the forecast ability. Variance decomposition or forecast error variance decomposition indicates the amount of information each variable contributes to the other variables in a vector auto regression (VAR) models. Variance decomposition determines how much of the forecast error variance of each of the variable can be explained by exogenous shocks to the other variables. The method posits a sort of "causal chain" of shocks. The first shock affects all of the variables at time t. The second only affects two of them at time t, and the last shock only affects the last variable at time t. The reasoning usually relies on arguments such as "certain variables are sticky and don't respond immediately to some shocks."

Figures 5 and 6 provide the Cholesky and Variance decompositions. Figure 4 depicts the Cholesky decomposition is typically used in intermediate calculations rather than being of interest in it with one standard deviation innovations shocks with respect to the other variables. The generalized impulse responses from an innovation to the j-th variable are derived by applying a variable specific Cholesky factor computed with the j-th variable at the top of the Cholesky ordering. Forecast standard errors are computed with 1 standard deviation. The results shows that debt is negatively shocked to the growth in the initial years then it will saturates after 5 years, but the expenditure is starts from positive and gets saturated at 4th year. Which will explain the more policy implications that state's intervention in the vulnerable situations of the nations. (For details see Figure 4 and table 1 in Annex 4)

Figure 6: **Variance Decomposition**

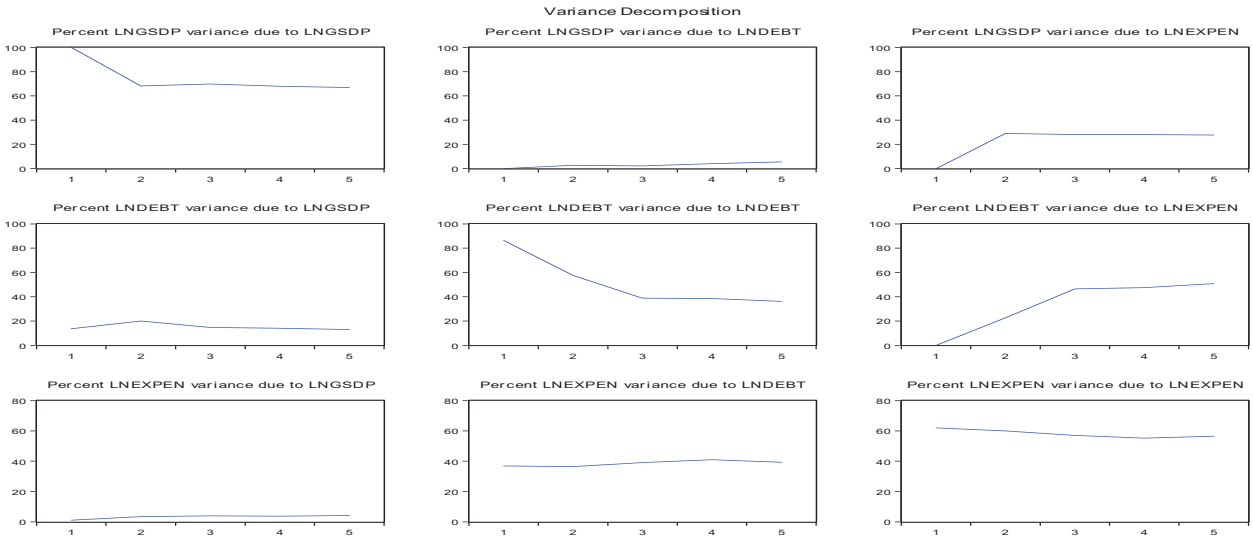


Figure 6 indicates the amount of information each variable contributes to the other variables in a vector auto regression (VAR) models. The information of growth contributes to other variables is as follows: for the initial year growth contributing 100%, in second year the growth can be explained by 68.23% of growth, 2.82% of debt and 28.92% of expenditure. For the third year the ratios are 69.76:2.13:28.09 respectively. In the fourth year the growth can be explained from growth 67.91%, from debt 4.01% and 28.06% from expenditure respectively. Similarly, in the fifth year growth is explained 66.92% from growth, 5.44% from debt and 27.63% from expenditure. (For details see figure 5 and table 2 in Annex 4).

V. Conclusions:

The paper analyzes linkages between fiscal policies (public expenditure and public debt) and economic growth (GSDP). Attempt has been made to investigate the effect of public expenditure and public debt on economic growth (GSDP) in Mizoram. To find out empirically the relationship between GSDP and Public expenditure /Public debt in Mizoram, the study analyzes annual time series data from 1987-88 to 2010-11 (BE) having 23 observations.

The empirical results indicated that studied variables are having a non-linear relationship and the GSDP is having a positive correlation with public expenditure while it has a negative correlation with public debt during the study period. During study period, holding the expenditure constant, a 1% increase in debt resulting on the average to about a -0.31% decrease in the GSDP growth. Whereas, holding the debt level constant, a 1% increase in expenditure resulting on the average to about 0.09% increase in the GSDP growth. Adding two growth elasticity's, we obtaining -0.22, which give the value of the returns to scale parameter. As it is evident, over period of the study, the GSDP growth was characterized by negative/decreasing returns to scale. Moreover, the regression results indicated that expenditure is having positive effect with growth (0.62) and negative effect with debt (-0.65) at lag 1 respectively and results are significant at 5% level. However, closer look at the causality explains that the GSDP growth is granger caused by expenditure but not debt. Whereas debt is granger caused by both expenditure and growth of GSDP; and expenditure is granger caused by both debt and growth of GSDP. An overall result explains that there is bi-causal relationship existing in all the studied variables in the study period.

The impulse response sequence for the model of GSDP growth in terms of debt and expenditure, based on the shock in the amount of the standard errors in the used variables indicated that there is nonlinear relationship exists between growth, debt and expenditure, which explains that there was effect of GSDP growth on debt and expenditure and vice versa up to 5 lags Based on the empirical results, we can be safely concluded that while public expenditure does have positive impact on GSDP growth in the State of Mizoram, the empirical finding provides evidence to suggest that public debt is rather contributing negatively to GSDP growth in the State of Mizoram during the study period (1988-2010). The empirical evidence has clearly indicated important policy implications both from the angles of fiscal policy as well as development strategy for policy makers in the State Government. Firstly, debt funded public expenditure does not contribute positively to growth in the State and the State Government should preferably avoid accumulation of debt, except for creating of revenue generating assets. Secondly, debt funded public expenditure create mounting debt service burden as debt funded investment does not result in generating assets for economic growth. It is therefore, important that the state government policymakers sufficiently aware of the debt dynamics in the state while crafting a development strategy for the State.

Annex 1

Figure 1: Auto and Partial Correlations

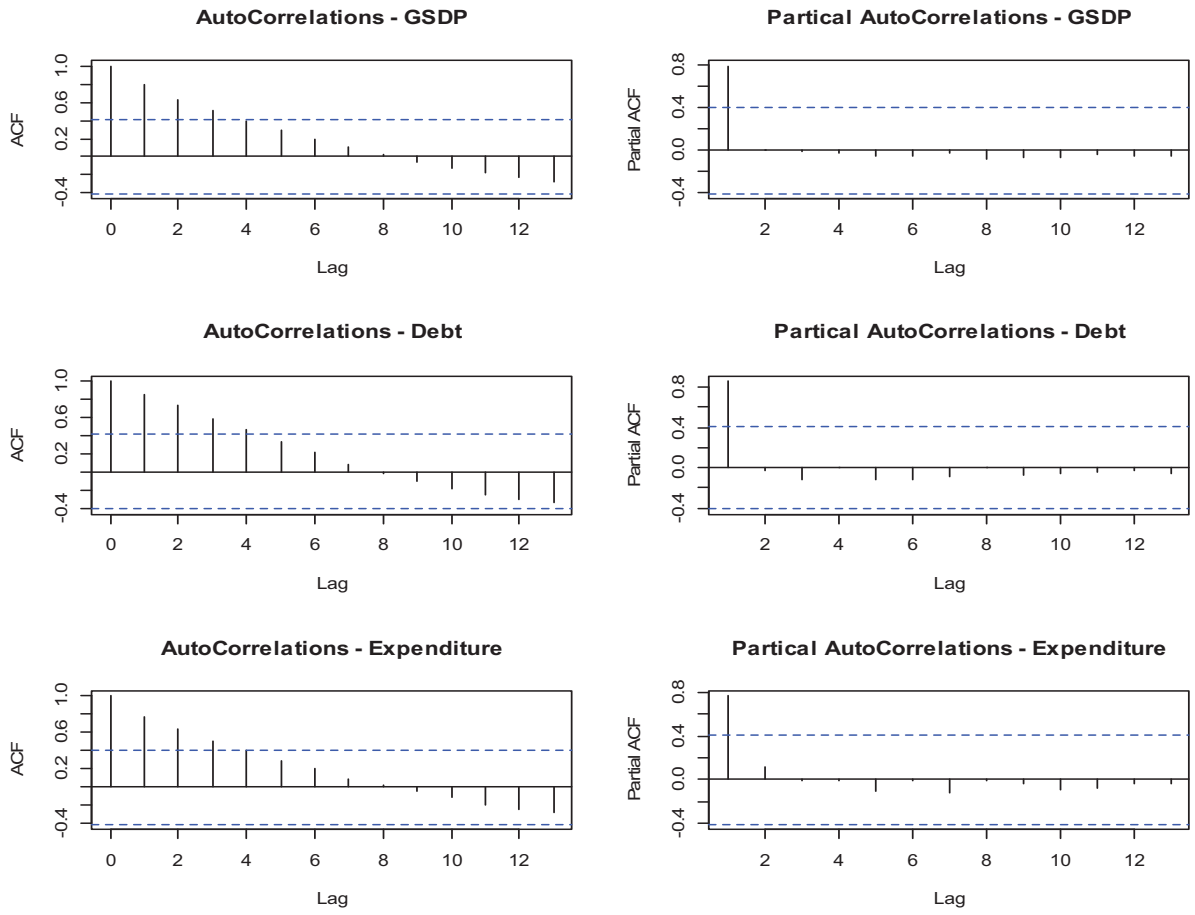


Figure 2: Cross-Correlations GROWTH with Debt and Expenditure

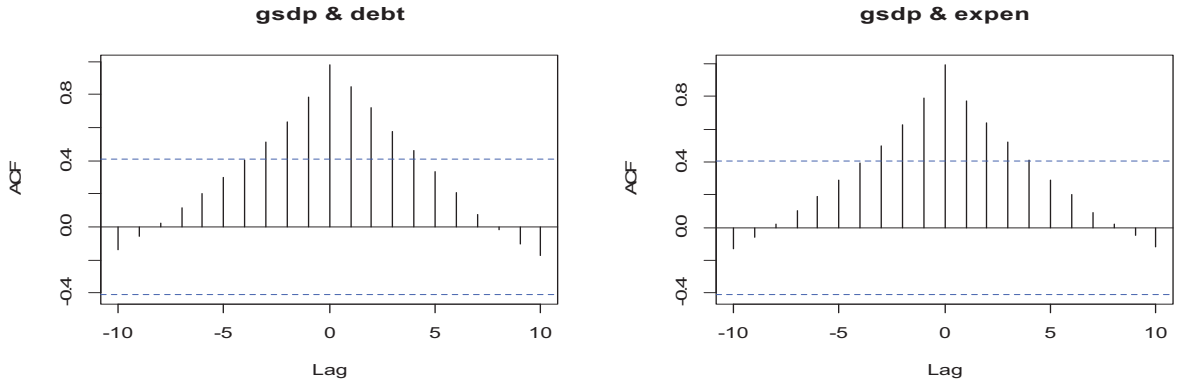
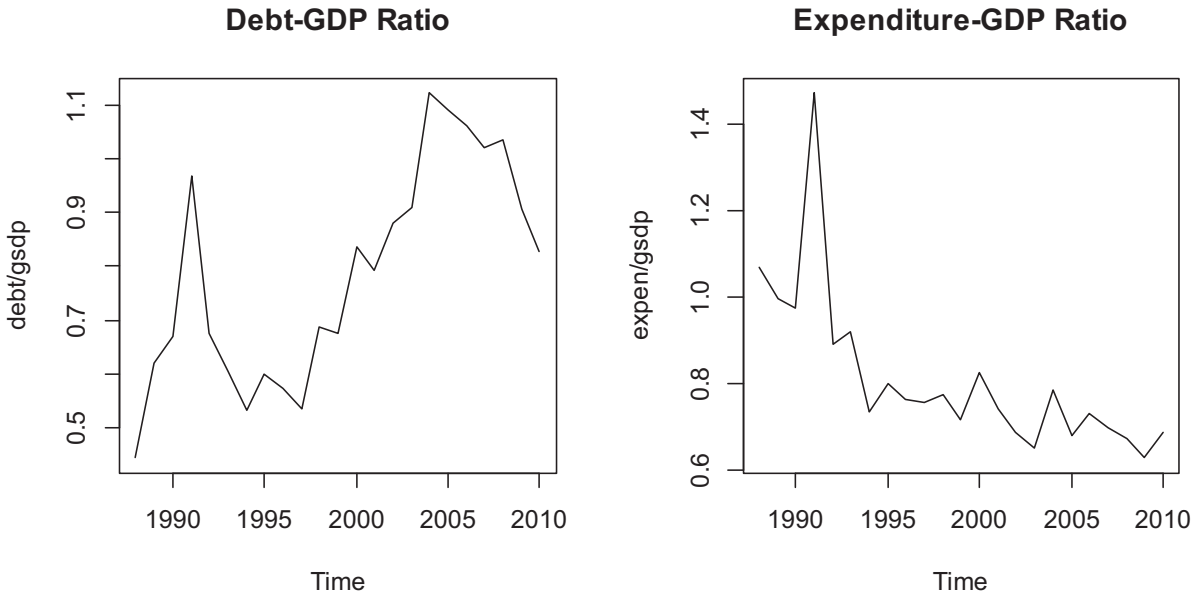


Figure 3: Ratio of Debt and Expenditure to the GROWTH



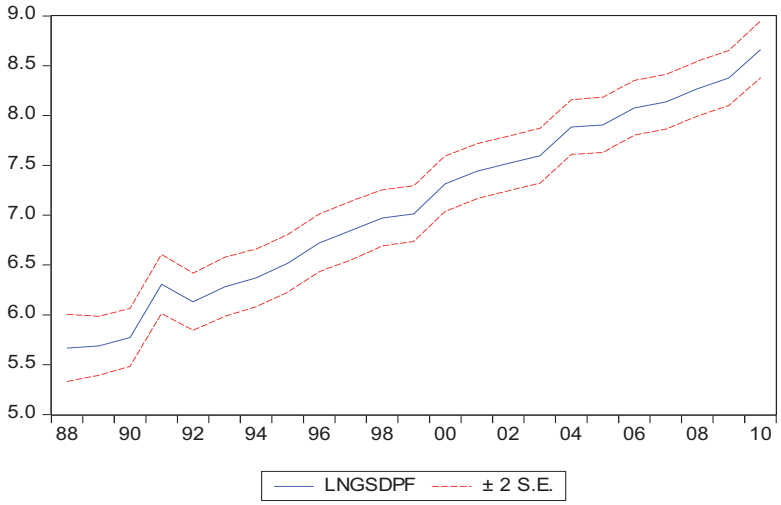
Annex 2

Table 1: Regression Results (Method 1)

R-squared	0.980513	Mean dependent var	7.107664
Adjusted R-squared	0.978565	S.D. dependent var	0.924919
S.E. of regression	0.135416	Akaike info criterion	-1.039825
Sum squared resid	0.366749	Schwarz criterion	-0.891717
Log likelihood	14.95798	Hannan-Quinn criter.	-1.002576
F-statistic	503.1696	Durbin-Watson stat	1.687161
Prob(F-statistic)	0.000000		

Figure 1: Estimated Results

Figure 2: Forecast Results (In-sample)



Forecast: LNGSDPF	
Actual: LNGSDP	
Forecast sample: 1988 2010	
Included observations: 23	
Root Mean Squared Error	0.126276
Mean Absolute Error	0.080284
Mean Abs. Percent Error	1.190929
Theil Inequality Coefficient	0.008813
Bias Proportion	0.000000
Variance Proportion	0.004920
Covariance Proportion	0.995080

Table 2: Regression Results (Method 2)

R-squared	0.992906	Mean dependent var	7.107664
Adjusted R-squared	0.991786	S.D. dependent var	0.924919
S.E. of regression	0.083828	Akaike info criterion	-1.963338
Sum squared resid	0.133514	Schwarz criterion	-1.765861
Log likelihood	26.57839	Hannan-Quinn criter.	-1.913673
F-statistic	886.4270	Durbin-Watson stat	0.716625
Prob(F-statistic)	0.000000		

Figure 3: Estimated Results (method 2)

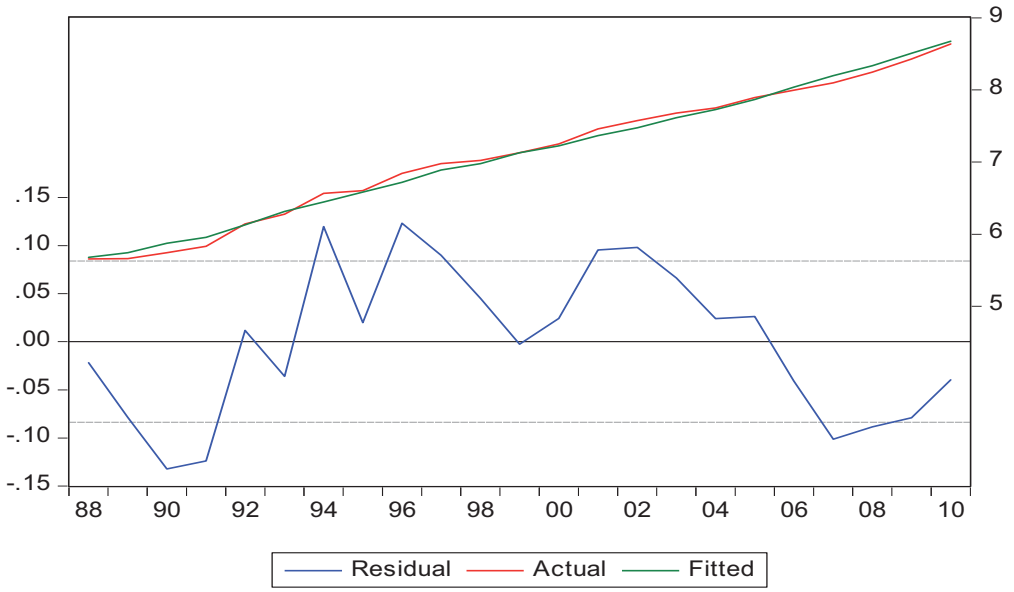
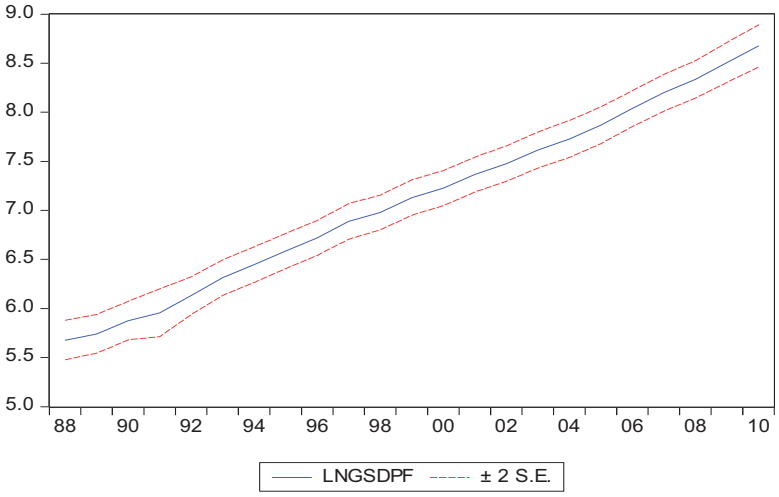


Figure 3: Forecast in-sample estimations (method 2)



Forecast: LNGSDPF	
Actual: LNGSDP	
Forecast sample: 1988 2010	
Included observations: 23	
Root Mean Squared Error	0.076190
Mean Absolute Error	0.064709
Mean Abs. Percent Error	0.934905
Theil Inequality Coefficient	0.005317
Bias Proportion	0.000000
Variance Proportion	0.001780
Covariance Proportion	0.998220

Annex 3: Causality and VAR

Cholesky and Variance Decomposition Results:

Table 1: Cholesky Decomposition Results

Response of LNGROWTH:

Period	LNGROWTH	LNDEBT	LNEXPEN
1	0.061077	0.000000	0.000000
	(0.00942)	(0.00000)	(0.00000)
2	0.055577	0.016816	0.053771
	(0.01987)	(0.01723)	(0.02058)
3	0.052628	0.003364	0.031145

	(0.02372)	(0.01685)	(0.03349)
4	0.038943	0.019057	0.026973
	(0.02801)	(0.01355)	(0.03915)
5	0.026732	0.017440	0.017068
	(0.03073)	(0.01268)	(0.03981)

Response of LNDEBT:

	LNGROWT		
Period	H	LNDEBT	LNEXPEN
1	-0.034650	0.087247	0.000000
	(0.01978)	(0.01346)	(0.00000)
2	-0.040659	0.024551	-0.056845
	(0.02497)	(0.02300)	(0.03025)
3	-0.024942	0.030889	-0.087809
	(0.03129)	(0.02678)	(0.04048)
4	-0.016983	0.034365	-0.042760
	(0.03521)	(0.02072)	(0.04878)
5	0.005096	0.013428	-0.044807
	(0.03705)	(0.01863)	(0.04968)

Response of LNEXPEN:

	LNGROWT		
Period	H	LNDEBT	LNEXPEN
1	0.011467	0.066791	0.086609
	(0.02393)	(0.02153)	(0.01336)
2	0.017497	-0.011658	-0.007133
	(0.02382)	(0.02237)	(0.03393)
3	0.009861	0.028104	-0.017170
	(0.01926)	(0.01985)	(0.03144)
4	0.000782	0.021199	0.001773
	(0.01746)	(0.01331)	(0.02589)
5	0.009001	0.008704	-0.025560
	(0.01530)	(0.01284)	(0.02332)

Cholesky Ordering: LNGROWTH LNDEBT LNEXPEN

Standard Errors: Analytic

Table 2: Variance Decomposition Results

Variance Decomposition of LNGROWTH:

		LNGROWT		
Period	S.E.	H	LNDEBT	LNEXPEN
1	0.061077	100.0000	0.000000	0.000000
2	0.099967	68.23764	2.829644	28.93272
3	0.117236	69.76616	2.139748	28.09410
4	0.127873	67.91655	4.019461	28.06399
5	0.132897	66.92478	5.443479	27.63174

Variance Decomposition of LNDEBT:

		LNGROWT		
Period	S.E.	H	LNDEBT	LNEXPEN
1	0.093875	13.62393	86.37607	0.000000

2	0.119582	19.95670	57.44588	22.59742
3	0.153579	14.73681	38.87327	46.38992
4	0.163964	14.00192	38.49751	47.50056
5	0.170582	13.02584	36.18813	50.78603

Variance Decomposition of LNEXPEN:

Period	S.E.	LNGROWTH	LNDEBT	LNEXPEN
1	0.109971	1.087260	36.88766	62.02508
2	0.112190	3.476958	36.52277	60.00027
3	0.117339	3.884698	39.12437	56.99093
4	0.119254	3.765219	41.03767	55.19711
5	0.122604	4.101294	39.33006	56.56864

Cholesky Ordering: LNGROWTH LNDEBT LNEXPEN

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