Effect of Education on Economic growth of Northern Part of India

Financial Time Series Analysis

ABSTRACT

Education plays a vital role in enhancing economic growth by increasing productivity. It is one of the important elements of human capital formation. The study aims to examine the impact of education on economic growth of North Indian States based on an econometric model. To test the relationship between educational expenditure and economic growth, the data for the period of 2008-09, 2009-10, 2010-11 has been used for econometric analysis. In long run a combination of several factors, including Education contribute towards economic growth. The results have been tested for heteroskedasticity, multi-collinearity and autocorrelation for validation purposes.

INTRODUCTION

Economic growth is defined as an increase in value of the goods and services produced by an economy. Growth is generally measured in real terms, i.e. inflation-adjusted terms, in order to net out the effect of inflation on the price of the goods and services produced. As economic growth is considered as the annual percentage change in National Income, it has all the merits and demerits of that level variable.

The report aims to establish a relation between education and economic growth in the Northern States of India. The study explores that any improvement in the education results in economic growth of Northern States of India. Time series data for the periods 2008-09, 2009-10, 2010-11 are used for the analysis and co-integration and error correction models are used to determine the long and short run relationship of education and economic growth. In this study, an attempt is made to determine the significance of education in economic development in terms of GDP in the Northern States of India and the extent to which the variables contributed to the economic growth in the three years.

DATA SOURCE

Data has been taken from IndiaStat.com and ministry of human resource.

MODEL DESCRIPTION

We have used the following regression model to test our hypothesis

GDP (State wise GDP) = β_0 +β_1*NPT(New Primary teachers)+ β_2* FR(Fund released)+ β_3* NPS (No of primary schools) +U

Basis for selecting the independent variables:

Education plays an essential part in developing human capital and accelerating productivity in any country. It is considered as a tool for economic advancement. The number of primary teachers is quite an important variable as they contribute to the GDP in terms of the salary they earn and the output of the students. Funds allocated are important as the economic growth is dependent on the funds allocated for the schools through SSA, so that all the activities in school happen without any pause. Number of primary schools indicates how the funds are efficiently used and in turn contributing to the GDP.

STATISTICAL TESTS

Regression results:

2010-11:

Dependent Variable: GDP				
Method: Least Squares				
Date: 07/11/13 Time: 19:52				
Sample: 1 25				
Included observations: 25				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	6.924371	0.557924	12.41097	0
FR	2.16E-07	1.10E-05	0.019611	0.9845
NPS	-0.000121	0.000135	-0.89825	0.3792
NPT	1.36E-05	2.03E-05	0.668591	0.511
R-squared	0.093066	Mean dependent var		7.1532
Adjusted R-squared	-0.036496	S.D. dependent var		1.928529
S.E. of regression	1.963405	Akaike info criterion		4.332885
Sum squared resid	80.95418	Schwarz criterion		4.527905
Log likelihood	-50.16106	Hannan-Quinn criter.		4.386975
F-statistic	0.718309	Durbin-Watson stat		2.073303
Prob(F-statistic)	0.552138			

BREUSCH-PAGAN GODFREY TEST

Breusch-Pagan test the null hypothesis that the variance of the error terms is constant, i.e the homoskedasticity assumption.

2010-11.

Heteroskedasticity Test: Breusch-Pagan-Godfrey				
F-statistic	6.881156	Prob. F(3,21)		0.0021
Obs*R-squared	12.39298	Prob. Chi-Square(3)		0.0062
Scaled explained SS	4.334092	Prob. Chi-Square(3)		0.2276
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 07/11/13 Time: 22:34				
Sample: 1 25				
Included observations: 25				
Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.000714	0.709835	2.818562	0.0103
FR	1.33E-05	1.40E-05	0.954364	0.3508
NPT	3.20E-05	2.58E-05	1.239692	0.2288
NPS	-0.00047	0.000171	-2.76274	0.0117
R-squared	0.495719	Mean dependent var		3.238167
Adjusted R-squared	0.423679	S.D. dependent var		3.29049
S.E. of regression	2.498002	Akaike info criterion		4.814506
Sum squared resid	131.0403	Schwarz criterion		5.009526
Log likelihood	-56.1813	Hannan-Quinn criter.		4.868596
F-statistic	6.881156	Durbin-Watson stat		1.625705
Prob(F-statistic)	0.002098			

Analysis for 2008-09:

As observed R sqaured is less than 7.814 (which is chisqaure statistic at 95%), we cannot reject the null hypothesis of no heteroskedasticity.

Also Prob chi square F* is greater than .05, we cannot reject the null hypothesis.

Analysis for 2009-10:

As observed R squared is less than 7.814 (which is chi-sqaure statistic at 95%), we cannot reject the null hypothesis of no heteroskedasticity.

Also Prob chi square F* is greater than .05 , we cannot reject the null hypothesis.

Analysis for 2010-11:

As observed R squared is greater 7.814 (which is chisqaure statistic at 95%), we can reject the null hypothesis of no heteroskedasticity.

Also Prob chi square F* is less than .05 , we can reject the null hypothesis.

HETEROSKEDASTICITY TEST: WHITE

DURBIN WATSON TEST: SERIAL CORRELATION

2010-11:

Heteroskedasticity Test: White				
F-statistic	2.84402	Prob. F(9,15)		0.0357
Obs*R-squared	15.76268	Prob. Chi-Square(9)		0.072
Scaled explained SS	5.512548	Prob. Chi-Square(9)		0.7875
Test Equation:				
Dependent Variable: RESID^2				
Method: Least Squares				
Date: 07/11/13 Time: 19:53				
Sample: 1 25				
Included observations: 25				
Variable	Coefficient	Std. Error	t-	Prob.

			Statistic	
C	1.705442	1.182269	1.442515	0.1697
FR	5.35E-05	6.25E-05	0.855405	0.4058
FR^2	-1.52E-10	4.22E-10	-0.3588	0.7247
FR*NPS	-6.95E-08	8.05E-08	-0.86329	0.4016
FR*NPT	2.43E-10	1.06E-09	0.230595	0.8207
NPS	0.001255	0.003148	0.398598	0.6958
NPS^2	-9.76E-08	5.16E-07	-0.18896	0.8527
NPS*NPT	1.35E-07	1.38E-07	0.977344	0.3439
NPT	-6.09E-05	9.48E-05	-0.64256	0.5302
NPT^2	1.32E-10	1.27E-09	0.103775	0.9187
R-squared	0.630507	Mean dependent var		3.238167
Adjusted R-squared	0.408811	S.D. dependent var		3.29049
S.E. of regression	2.530018	Akaike info criterion		4.983504
Sum squared resid	96.01486	Schwarz criterion		5.471055
Log likelihood	-52.2938	Hannan-Quinn criter.		5.11873
F-statistic	2.84402	Durbin-Watson stat		2.034918
Prob(F-statistic)	0.035651			

For 2008-09

Test statistic	10.30015
Chi Square at 5%	16.91898

Since test statistic here is less than 5% critical value of χ 2 , **we can not reject the null hypothesis of no heteroskadasticity.**

Probability of .3267 can be interpreted as you would be incorrect if you rejected the null hypothesis.

Durbin watson test tries to detect the serial correlation in the residuals.
As here the value is 2.38 which is greater than 2 , we can infer that there is no serial correlation in the residuals.

For 2009-10

Test statistic	2.27345
Chi Square at 5%	16.91898

Since test statistic here is less than 5% critical value of χ 2 , **we can not reject the null hypothesis of no heteroskadasticity.**

Probability of .9864 can be interpreted as you would be incorrect if you rejected the null hypothesis.

Durbin watson test tries to detect the serial correlation in the residuals. As here the value is 1.94 which is less than 2 , we can infer that there is serial correlation in the residuals.

For 2010-11

Test statistic	15.76268
Chi Square at 5%	16.91898

Since test statistic here is less than 5% critical value of χ 2 , **we cannot reject the null hypothesis of no heteroskadasticity.**

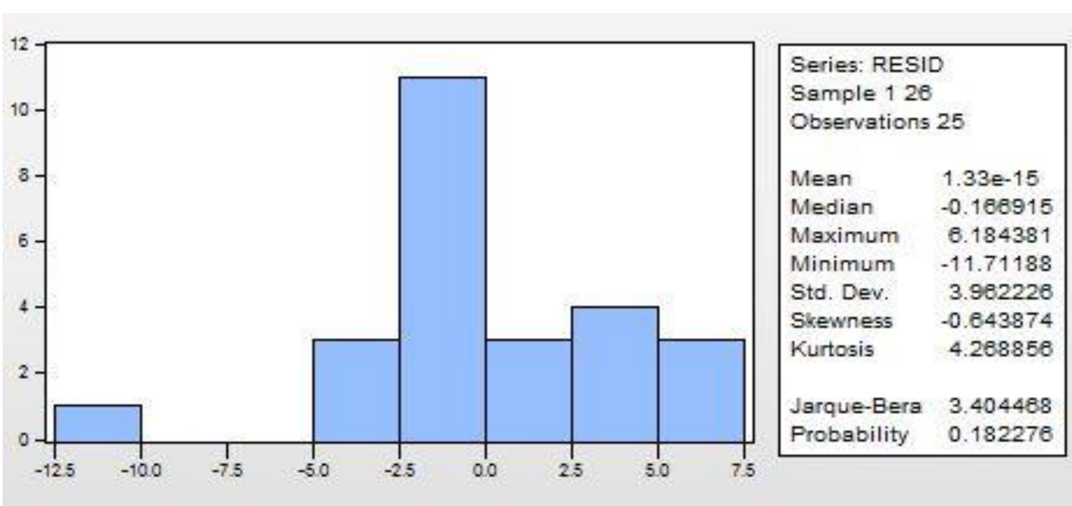
Probability of .072 can be interpreted as you would be incorrect if you rejected the null hypothesis.

Durbin Watson test tries to detect the serial correlation in the residuals. As here the value is 2.034 which is greater than 2 , we can infer that there is no serial correlation in the residuals.

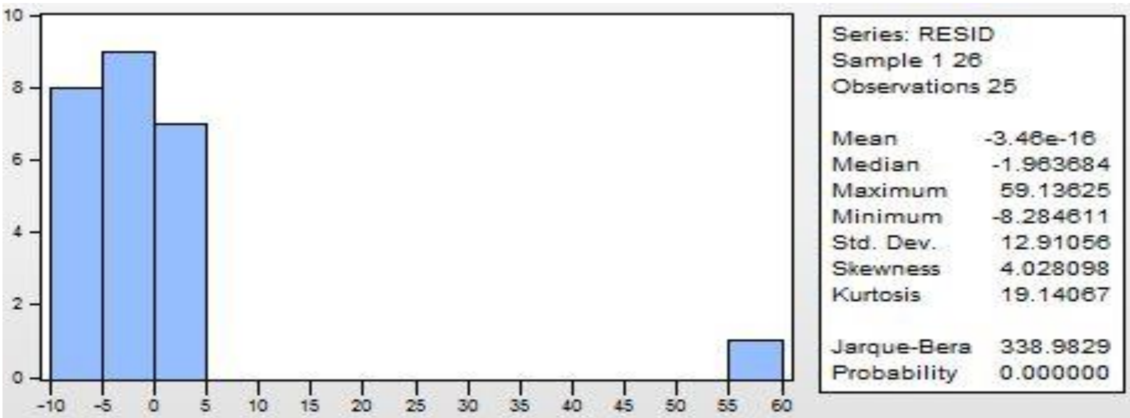
NORMALITY TEST FOR RESIDUALS: JARQUE-BERA TEST

2008-09:

Jarque bera- 3.404468, probability- 0.182276

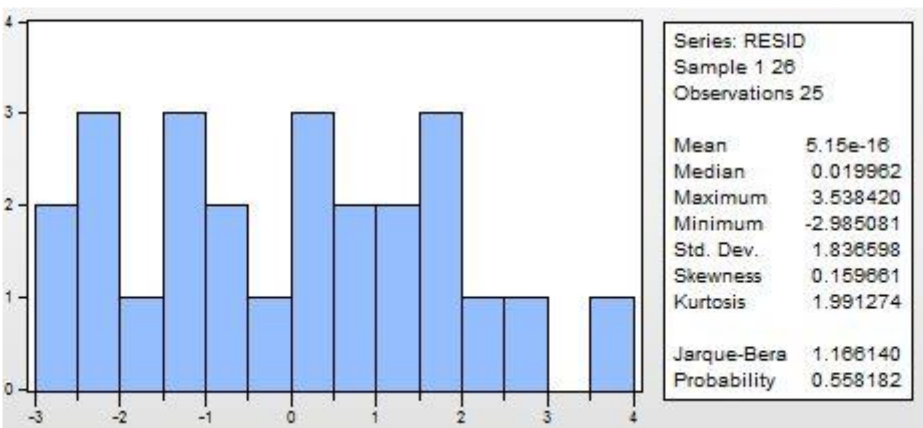


2009-10



Jarque bera- 338.9829, probability- 0.000000

2010-11



Jarque bera- 1.166140, probability- 0.558182

In jarque bera test we have

H0: residuals are normal

H1: Residuals are not normal.

If p<.10, H1 is accepted. Ideally our Jarque Bera test coefficient should be around 2.

Therefore in year 2008 and 2010 we are having a normal GDP distribution and Jarque Bera value is around 2 only .While in 2009 coefficient is too high and probability is also less than .1, so distribution is not normal.

BREUSCH–GODFREY SERIAL CORRELATION LM TEST

The Breusch–Godfrey serial correlation LM test is a test for autocorrelation in the errors in a regression model. It makes use of the residuals from the model being considered in a regression analysis, and a test statistic is derived from these. The null hypothesis is that

H0: there is no serial correlation of any order up to *p*.

H1 : there is serial correlation

We check probability F, which should be less than .05

2010-11

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	2.132211	Prob. F(2,19)	0.1461
Obs*R-squared	4.582557	Prob. Chi-Square(2)	0.1011

Test Equation:
Dependent Variable: RESID
Method: Least Squares
Date: 07/12/13 Time: 15:46
Sample: 1 25
Included observations: 25
Presample missing value lagged residuals set to zero.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.288288	0.550273	-0.523900	0.6064
FR	5.12E-06	1.09E-05	0.467677	0.6453
NPS	7.17E-05	0.000133	0.541121	0.5947
NPT	-4.76E-06	1.98E-05	-0.240537	0.8125
RESID(-1)	-0.016505	0.211920	-0.077882	0.9387
RESID(-2)	0.473556	0.230433	2.055071	0.0539

R-squared	0.183302	Mean dependent var	5.15E-16
Adjusted R-squared	-0.031618	S.D. dependent var	1.836598
S.E. of regression	1.865407	Akaike info criterion	4.290398
Sum squared resid	66.11509	Schwarz criterion	4.582928
Log likelihood	-47.62998	Hannan-Quinn criter.	4.371534
F-statistic	0.852884	Durbin-Watson stat	1.861211
Prob(F-statistic)	0.529837		

As prob F value is greater than .05 in each year, therefore our null hypothesis is rejected and it comes that there is a serial correlation between previous year data.

EIGEN VALUE TEST

Principal Components Analysis
Date: 07/12/13 Time: 23:00
Sample: 1 25
Included observations: 25
Computed using: Ordinary correlations
Extracting 3 of 3 possible components

Eigenvalues: (Sum = 3, Average = 1)

Number	Value	Difference	Proportion	Cumulative Value
1	2.077206	1.269918	0.6924	2.077206
2	0.807288	0.691781	0.2691	2.884493
3	0.115507	---	0.0385	3

Eigenvectors (loadings):

Variable	PC 1	PC 2	PC 3
NPT	0.653859	-0.257317	-0.711517
FR	0.648353	-0.294188	0.702205
NPS	0.390009	0.920457	0.025526

Ordinary correlations:

	NPT	FR	NPS
NPT	1		
FR	0.883993	1	
NPS	0.336407	0.308716	1

CONCLUSION

Thus various tests like Breusch Pagan test, White Test (heteroskedasticity) ,Jarque-Bera(Normality of residuals), Durbin Watson(autocorrelation),Goldfield Quant Test-homoskedasticity, Eigen value (multicollinearity) were performed and results were interpreted.