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A Study on FDI in Education Sector and Its Impact on Gross Enrolment Ratio in Higher Education in India: An Econometric Approach

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ABSTRACT

Higher education in India has been lagging behind due to various reasons. According to statistics of 2015-16, published by Ministry of Human Resource Development (MHRD), about 24.5% of the population is enrolled in the institutes of higher education in the country. Education ministry came up with the proposal of 100% Foreign Direct Investment (FDI) in higher education in the country. In the present research we found the relationship between FDI in Education and Gross Enrolment Ratio (GER) in Higher Education in India. We used econometric techniques to find out the impact of FDI in Education on GER In higher education and also to find out the causal relationship. Both Variables are stationery at first difference i.e. I (I) as per ADF Test. The co-integration test result showed the existence of long-run relationship between Foreign Direct Investments in Education and Gross Enrolment Ratio in Higher Education. The result shows the long-run GER in Higher Education. Granger Causality test indicates a bi-directional relationship between FDI in education and Gross Enrolment Ratio in Higher Education because the probability value is less than 0.10 in both the null hypothesis tested.

Keywords: Co-integration, Foreign Direct Investment, Gross Enrolment Ratio, Granger Causality Test.

INTRODUCTION:

Higher education in India has been lagging behind due to various reasons. According to statistics of 2015-16, published by MHRD[1], about 24.5% of the population is enrolled in the institutes of higher education in the country. Moreover, public expenditure on higher education is just 1.42% of the total actual expenditure of the Government of India (GOI) among various departments for financial year 2015-16.

Higher education structure of the country has been suffering from both quantitative and qualitative problems. Given the huge population the country has, the number of institutes for higher studies is very inadequate. It is causing a large number of Indian students to enrol themselves abroad for their higher studies. In fact, India is one of the largest importers of education at present. In the question & answer session of Loksabha in 2017, Ministry of State in the Ministry of External Affairs informed that as per information received from Missions/Posts abroad, an estimated number of Indian students currently studying abroad as on 28 December 2017 is 586183. This indicates a huge outflow of money and also indicates a drain of human capital.

Given this backdrop, the education ministry came up with the proposal of 100% Foreign Direct Investment (FDI) in higher education in the country. It would allow foreign universities and institutes to set up their campuses in India. Since then the matter has become a debateable topic among academicians. There are arguments in favour and in against of the proposal. There is a shortage of funds in higher education sector as budgeted allocation for this sector is very less. And there are not many ways in which this investment in this sector can be increased domestically. Since every year a large number of students go abroad for their higher education, it is sensible to allow foreign universities to set up their campuses here, in India. This would help in arresting the outflow of monetary and human capital.

In this paper we have tried to find out whether FDI in education has brought any changes in gross enrolment ratio (GER) in higher education. We also tried to determine whether the increasing GER in higher is attracting the foreign educational institution to invest here in India to explore the market.

REVIEW OF PUBLISHED LITERATURE:

FDIs have a variety of impact on human capital accumulation and education depending on the type of FDIs. Vertical FDIs or efficiency-seeking FDIs look for cost advantages, mostly cheap and low qualified labour to work in sweatshops, which may not add much to the human capital of an economy. On the contrary, it may lead to specialization into low value added products, thus providing the local population with little incentive to participate in higher education whereas Horizontal FDIs or market- seeking FDIs pursue increased market shares in the host countries; it competes directly with one another as well as with the local firms. This is generally synonymous with technology transfer; thereby contributing to the host country's technological up gradation and human capital accumulation. (Beugelsdijk et al., 2008)[2]

Using data for 29 Chinese provinces from 1978 to 1999, it was found that FDI contributes to the accumulation of skilled labour and the participation in middle school education. The increase in the share of population with college education and professional and technical education is larger in provinces with economic and technological development zones relative to other provinces. Moreover, the effect of FDI on human capital development is greater in the 1990s, even though its impact on high school education attainment is negative. (Zhuang, 2008)[3]

The impact of local competition and the availability of skilled labour on the technology imports of foreign MNE affiliates in Mexican manufacturing industries, and the study found no evidence that education was critical. Instead, the necessity of high per capita income for a positive impact of FDI inflows was indicated. (Blomström et al., 1994)[4]

While the interaction between human capital and FDI might have been important in the 1980s, it was no longer the case in the 1990s. (Ram and Zhang, 2002)[5]

In a study of 69 developing countries during the period of 1970-1989 it was found that the benefits of FDI are contingent on the country having the capacity to absorb the embodied technologies, and therefore a threshold level of human capital. It was estimated that 0.45 years of secondary school education was necessary to benefit from an infusion of foreign technology. (Borensztein et al., 1998)[6]

The role of natural resource abundance on human capital accumulation in various developing and developed countries suggests that FDI can have a lasting effect on a country's per capita income through a higher human capital stock. (Stijns, 2005, 2006)[7, 8]

A study was conducted to find out the impact of foreign direct investments on Indian economy and it was concluded that Foreign Direct Investment (FDI) as a strategic component of investment was needed by India for its sustained economic growth and development through creation of jobs, expansion of existing manufacturing industries, short and long term project in the field of healthcare, education, research and development. (Mahanta, 2012)[9]

OBJECTIVES:

The objectives of the present study is-

1. to analyse the impact of FDI in education sector on Gross Enrolment Ratio in higher education in India;
2. to determine the causal relationship between FDI in education sector and Gross Enrolment Ratio (GER) in higher education.

DATA AND METHODOLOGY:

The study covers a period of 13 years beginning from 2004-5 to 2016-17. Where 2004-05 is the earliest year and 2016-17 is the latest year, the data is collected from the secondary sources. The data regarding FDI in education, Gross Enrolment Ratio (GER) in higher education is obtained from MHRD Website.

RESEARCH METHODOLOGY:

The study presents an empirical investigation into:

1. The relationship between Foreign Direct Investment in education sector and Gross Enrolment Ratio in higher education.

2. The causal relationship among the variables taken in the study

The methodology involves regressing Gross Enrolment Ratio in higher education on its explanatory variable i.e. FDI in education sector through the following procedures:

1. Testing for stationary properties of the variables using the Augmented Dickey Fuller unit roots tests;
2. Followed by lag selection and Johansen's co-integration test to check for the existence of co-integrating and long run relationships;
3. Simple regression by least square technique assuming GER as a dependant variable and FDI as explanatory variable.
4. The Granger Causality test was employed to causal relationship.

There is basically one basic model to be examined in the study. The model was adopted to examine the following functional form assuming the other factors constant:

$$GERHE = f(FDIE,) \quad (1)$$

The econometric form of the model is given as

$$GERHE_t = \alpha_0 + \alpha_1 FDIE_t + \varepsilon_t \quad (2)$$

GERHE stands for Gross Enrolment Ratio in Higher Education and FDIHE stands for Foreign Direct Investment in Education Sector.

Where α_0 is a constant, α_1 are parameters to be estimated and ε_t is the error term. The model is estimated with the aid of E-views 10 software.

Hypothesis Tested:

The following hypotheses are tasted in the present study:

H_{01}: There is no long run and short run relationship between Gross Enrolment Ratio in Higher Education and Foreign Direct Investment in Education Sector.

H_{02}: There is no causal relationship among the two variables taken in the study.

RESULTS & DISCUSSION:

Unit Root Test:

The first step in our analysis is to check for unit root. This test was done to determine the order of integration for each variable in the fiscal deficit function. A variable is said to have a unit root if it is non-stationary at level I (0) but became stationary after first differencing-integrated of order one I (1). The Augmented Dickey Fuller (ADF) test was used which involve estimating the equation:

$$\Delta Y_t = \alpha_0 + \alpha_1 Y_{t-1} + \sum_{i=1}^{n} \alpha \Delta Y_t + \varepsilon_t$$

Where Δ is the difference operator, t is a time trend, Y_t is the variable under deliberation, n is the number of lags and $_t$ is the stochastic error term. The null hypothesis is that the series is non-stationary against alternative hypothesis that the series is stationary.

Table No. 1: Unit Root Test of FDI at Level and at First Difference

Variables	Null Hypothesis	I(0) / I(1)	Calculated ADF(t-Statistic)	Critical value	Prob.*	Inference
FDI	FDI has a unit root	I(0)	-2.15	-4.12 (1%) -3.14 (5%) -2.71(10%)	0.231	Non-stationery at 1%,5% and at 10%
D(FDI)	D(FDI) has a unit root	I(1)	-3.19	-4.42 (1%) -3.25 (5%) -2.77 (10%)	0.052	Non-stationery at 1%,5% but Stationery at 10%

*MacKinnon (1996) one-sided p-values.

Source: Compiled by authors

Warning:
1. Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 12;
2. Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 9

Table No. 2: Unit Root Test of GER at Level and at First Difference

Variables	Null Hypothesis	I(0) / I(1)	Calculated ADF(t-Statistic)	Critical value	Prob.	Inference
GER	GER has a unit root	I(0)	-0.69	-4.12(1%) -3.14(5%) -2.71(10%)	0.81[1]	Non-stationery at 1%,5% and at 10%
D(GER)	D(GER)has a unit root	I(1)	-2.77	-4.20(1%) -3.17(5%) 2.72(10%)	0.09[2]	Non-stationery at 1%,5% but Stationery at 10%

*MacKinnon (1996) one-sided p-values.
Source: Compiled by authors

Warning:
1. Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 12;
2. Probabilities and critical values calculated for 20 observations and may not be accurate for a sample size of 11

The above calculation shows the results of test of stationarity by using Augmented Dickey Fuller Test; in ADF Test we know that if the calculated ADF statistics is greater than the critical value of t-statistics then we accept the null hypothesis i.e. variables are non-stationery or having unit root and if the calculated value is less than the critical values we reject the null hypothesis.
The unit root test revealed that FDI in education and Gross Enrolment Ratio in Higher Education (GER) were non-stationery at their level i.e. I (0) but became stationery after first differencing at 10% level of significance. This suggests the use of co-integration analysis because the concept of co-integration requires variables must be stationery at the same order.

Lag Order Selection:
Before proceeding with the Johansen's test of co-integration, the optimal lag selection criteria was employed to determine the lag length to be used in carrying out the estimation.

Table No. 3: VAR Lag Order Selection Criteria

Endogenous variable: FDI GER
Exogenous Variable: C
Included in observation: 11

Lag	LogL	LR	FPE	AIC	SC	HQ
0	-95.12635	NA	160265.8	17.65934	17.73168	17.61373
1	-75.92431	27.93024*	10382.71*	14.89533*	15.11236*	14.75852*
2	-73.49576	2.649324	15502.71	15.18105	15.54277	14.95303

* indicates lag order selected by the criterion
LR: Sequential modified LR Test statistics (each test at 5%)
FPE: Final prediction error
AIC: Akaike information criterion
SC: Schwarz information criterion
HQ: Hannan-Quinn information criterion
On the basis of VAR lag order selection criterion it is found that LR, FPE, SC, HQ, AIC is suggesting to take 1 as lag.
Source: Compiled by authors

Co-Integration Test Analysis:

Given that the variables are assumed to be stationary-integrated of the same order, the co-integration analysis will be appropriate to estimate the long-run relationship since the theory assert that non-stationary time series are co-integrated if their linear combination is stationary. The co-integration tests involve testing for the presence of long-run equilibrium relationship between the variables of the same order of integration through the formulation of co-integration equation(s). The maximum likelihood test method recommended by Johansen and Juselius (1988, 1990) is used. The co-integration requires the error term in the long-run relation to be stationary. Exclusively, given that Y_t is a vector of n number of stochastic variables, it follows that there exist a K-lag vector auto-regression with Gaussian errors of the following structure where Johansen and Juselius methodology adopt its initial point in the vector auto regression (VAR) of order k specified by:

$$Y_t = \delta + \beta_1 Y_{t-1} + \cdots + \beta_k Y_{t-k} + w_t$$

Where Yt denotes an (nx1) column vector of k-variables that are integrated of order one, and w_t denotes a vector of white noise residuals. In representing the vector error correction model (VECM), equation (5) can be written as:

$$\Delta Y_t = \delta + \prod Y_{t-1} + \sum_{i=1}^{k-1} M_i \Delta Y_{t-1} + \varepsilon_t$$

$$\prod = \sum_{i=1}^{k} M_i - I \text{ ; where } M_i = -\sum_{j=i+1}^{k} \alpha_j$$

Where Δ is the difference operator, Y_t is an nx1 column vector of k-variables, δ is a constant, ε_t is an error term, M_i denote the long-run coefficient matrix and $\prod$ denotes the short-run coefficient matrix. They both show the impact in the long-run and short-run respectively. Thus the significant issue is to determine the number of co-integrating vectors. Johansen and Juselius (1988, 1990) suggested the use of two statistical tests which are the trace test (λ_{trace}) and the maximum Eigen value test (λ_{max}). These two tests are estimated with the aid of the following Equations:

$$\lambda_{trace}(r) = -T \sum_{j=i+1}^{n} \ln(1 - \hat{\lambda}_i)$$

$$\lambda_{max}(r, r+1) = -T \ln(1 - \widehat{\lambda_{r+1}})$$

Where

λ_{trace} test the null hypothesis r = 0 against the alternative of r > 0

= T = number of usable observations

λ_{max} = Eigen values or estimated characteristics root

λ_{max} test the null hypothesis r = 0 against the alternative of r =1

If the null hypothesis of no co-integrating vector is rejected, it indicates that there is a long-run relationship among the variables in the model.

Here the Johansen's co-integration test was used to check whether the variables are co-integrated or not. Both the trace statistics'$_{trace}$ and the maximum eigen statistics '$_{max}$ were used and the results are presented below-

Table No. 4: Test of Co-integration (Trace and Max- Eigenvalue)

Sample (adjusted): 4 13
Included observations: 10 after adjustments
Trend assumption: Linear deterministic trend
Series: FDI GER
Lags interval (in first differences):1 to 2
Unrestricted Co-integration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.1 Critical Value	Prob**
None*	0.779416	17.64465	13.42878	0.0234
At most 1	0.223523	2.529887	2.705545	0.1117

Trace test indicates 1 co-integrating eqn(s) at the 0.1 level
*denotes rejection of the hypothesis at the 0.1 level
**MacKinnon-Hauq-Michelis (1999) p-values
Unrestricted Co-integration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.1 Critical Value	Prob**
None*	0.779416	15.11477	12.29652	0.0366
At most 1	0.223523	2.529887	2.705545	0.1117

Max-Eigenvalue test indicates 1 co-integration eqn(s) at the 0.1 level
*denotes rejection of the hypothesis at the 0.1 level
**MacKinnon-Haug-Michelis (1999) p-values
Source: Compiled by authors

The co-integration test result for the trace test indicates one co-integrating equations at the 5% significance level similarly the maximum Eigen test also indicates one co-integrating equation. It means co-integrating equation indicated by the trace test being well supported by the maximum Eigen test. Since the power of the maximum Eigen test is higher than the trace test, we therefore employ the suggestion by the maximum Eigen test. However, the co-integration test result showed the existence of long-run relationship between Foreign Direct Investments in Education and Gross Enrolment Ratio in Higher Education. The result of the long-run GER in Higher Education function is presented in below:

Table No. 5: Regression by Fully Modified Least Square

Dependent Variable: GER
Method: Fully modified Least Squares(FMOLS)
Sample (adjusted): 2
Included observations: 12 after
Co-integrating equation deteministics:
Long run covariance estimate (Bartlett kernel, Newey-West fixed Bandwidth= 3.0000)

Variable	Co-efficient	Std. Error	t- statistic	Prob.
FDI	0.05947	0.016736	3.553914	0.005
C	12.75301	2.287094	5.576075	0.000
R-squared	0.210495	Mean dependent variance		18.69176
Adjusted R-squared	0.131545	S.D. dependent variance		5.205154
S.E. of regression	4.850732	Sum squared residual		235.2960
Long-run variance	25.95608			

Source: Compiled by authors

The above equation calculation done by Fully Modified Least Squares (FMOLS) technique is showing FDI in

Education has significant impact on Gross Enrolment Ratio in Higher Education as the calculated t-statistic is more than 2 and probability value is less than 0.05. but the coefficient of the independent variable i.e. FDI in Education is only 0.0594, it means due to change in 1% expenditure in FDI in Education GER in higher education is also positively changed by only 0.0594%. Adjusted R^2 is 0.13 only. It indicates FDI in Education explains only 13% variation in GER in Higher Education.

Granger Causality Test Results to determine causal relationship:

The granger causality test was conducted in order to identify causal relationship between the variables under investigation and to ascertain whether the current lagged values of one variable affects another. Granger (1969) postulated that given two variables X and Y, X is caused by Y if X can be predicted well from previous values of Y. This causal relationship can be explained with the aid of the following equations:

$$X_t = b_0 + \sum_{i=1}^{p} b_l Y_{t-i} + \sum_{j=1}^{q} d_l X_{t-j} + e_t$$

$$Y_t = c_0 + \sum_{i=1}^{p} c_l X_{t-i} + \sum_{j=1}^{q} r_l Y_{t-j} + w_t$$

These equations are based on the assumption that e_t and w_t are uncorrelated white noise error terms. The granger causality test was conducted to examine whether causal relationship exist between the variables under investigation. The result based on the significant probability values less than or equal to 0.10 reveals that there exists bi-directional causal relationship between Gross Enrolment Ratio in higher education and Foreign Direct Investment in education.

Table No. 6: Pair-wise Granger Causality Tests

Sample: 1 13
Lags: 1

Null Hypothesis	Obs	F-statistic	Prob.
GER does not Granger Cause FDI	12	4.67764	0.0588
FDI does not Granger Cause GER		4.85689	0.0550

Source: Compiled by authors

The above calculation of Granger Causality test indicates a bi-directional relationship between FDI in education and Gross Enrolment Ratio in Higher Education because the probability value is less than 0.10 in both the null hypothesis tested. So, we can conclude that GER granger causes FDI as well as FDI granger causes GER. It means GER in higher education is getting affected by FDI in education and GER in higher education is also attracting the foreign institution to invest in India because 'market for education' is growing very rapidly.

CONCLUSION:

The above calculations and discussion indicates that there is a Long run relationship between FDI in education and Gross Enrolment Ratio in higher education. And the relationship is proved by co-integration test. The co integrating equation is tested by Fully Modified Least Squares (FMOLS) method. The dependant variable i.e. FDI in education sector is showing a positive and significant coefficient although the coefficient value is very less. The granger causality test was applied to determine the causal relationship; it showed a bi-directional causal relationship among the variables. So it can finally be concluded that FDI in Education Sector will improve the GER in higher education in long run.

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