

## AN ECONOMETRIC ANALYSIS OF FOREIGN DIRECT INVESTMENT AND ECONOMIC GROWTH- A STUDY WITH SPECIAL REFERENCE TO SAARC MEMBER ECONOMIES

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***Abstract:** Foreign direct investment (FDI) has been proved as the most important instrument to achieve the higher level of economic growth almost around the globe. Majority of the economies are being benefited by the FDI especially during last three decades. FDI contributes to economic growth mainly through technological and managerial up gradation, increasing returns to production via positive externalities, creation of competitive investment climate and productive spillover effects etc. A large amount of literature is available to measure the impact of FDI on the economic growth but the present study is an attempt to investigate in to the fact that how much time FDI requires to contribute in the economic growth with full effusion. At present, this fact seems to be the most important aspect of the issue to be studied. It is in this background that the present study is an attempt to examine and analyse the time lag required for the FDI to make its utmost contribution to the economic growth in SAARC (South Asian Association of for Regional Cooperation) economies. The present study has used the data of gross domestic product as the proxy of economic growth and FDI for all the member economies of SAARC region for the period during 2001-02 to 2014-15 and examined with the help of lagged regression model with seven lags. The finding of the study confirms that different time lag is required for each country of SAARC region to tap the utmost return of FDI in economic growth. For the contribution in utmost favourable manner in economic growth, FDI takes a time period of four years in India. For Pakistan, Sri Lanka, Nepal, Maldives, Bangladesh and Bhutan, the time period requires seven, one, two, zero, zero and four years respectively. In case of Afghanistan, the findings were not significant and positively auto correlated also. This could have been due to differences in policies, governance, investment climate and the nature of FDI etc. Thus the findings suggest that attracting the FDI is not sufficient enough, the techniques must be developed to tap the benefits of FDI with minimum time lag to economic growth.*

**Keywords:** SAARC, FDI, Economic Growth, Lagged Regression Model

**JEL Classification:** F6, F21, M2, O1, O4

### INTRODUCTION

Foreign direct investment (FDI) being the non-debt financial capital considered the most preferred international capital to contribute economic growth to the host

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economies. It is a win-win investment for both home and host economies. It contributes to the economic growth mainly through technological and managerial up gradation, increasing return to production via positive externalities, creation of competitive climate and productive spillovers effect. Through investment, it increases the level of employment, income and saving. In this way, it's has been established itself as the major contributor to economic growth to host economies.

The SAARC is an international organization consisting of eight South Asian countries i.e. India, Pakistan, Sri Lanka, Nepal, Afghanistan, Maldives, Bangladesh and Bhutan. With the secretariat in Nepal, it covers the areas of cooperation in agriculture, biotechnology, economic and trade, education, energy, poverty alleviation, science and technology, security aspects etc with the aim at accelerating economic growth and stimulates socio-cultural development in the South Asian Region. FDI has been playing a catalytic role to achieve the higher economic growth in the region. Indeed, it is also the fact that the benefits of FDI to economic growth are not attained immediately rather as every investment requires some time period to fetch the proper returns for different countries. It is this payback period which motivated the researcher to conduct a study on this issue which is very rarely touched. With this view point, the present study is an attempt to investigate the time tag required for FDI in economies of South Asian region to make it best impact on economic growth.

## **REVIEW OF LITERATURE**

There are various studies regarding the impact of FDI on economic growth but as far as the payback time is concerned, very few studies are found. The studies reviewed for the present study include the following-

Majagaiya Kundan P. and Qingliang Gu (2010) find out the linkage between Foreign Direct Investment (FDI) and economic growth in terms of Gross Domestic Product Growth Rate (GDPGR) for Nepal over the period 1980-2006; using the Granger Causality test, Unit root test and Co-integration test. The results show that there exit a long term relationship between the variable and direction of causality runs from FDI to GDPGR. The empirical analysis on basis of ordinary Least Square Method suggests that there is weak positive relationship between the variables and Unit Root Test suggested that variables that used in this study are non-stationary in their levels. Similarly, Johansen Co-Integration test suggests that there is long-run equilibrium relationship among these variables and Granger Causality Test suggest that causality runs from Foreign Direct Investment to Gross Domestic Product Growth Rate after four year. Then from above analysis it may be concluded that Nepal's Gross Domestic Product growth Rate especially does not depend up on FDI.

Srinivasan (2011) conducted a study to examine the determinants of FDI in selected SAARC countries for the period of 1970 to 2007 which indicate that market size, GDP per capita, trade openness, inflation, degree of risk and uncertainty are the most significant factors in determining FDI in the region. Jun, Sanjooon (2015) examines the effects of FDI on SAARC economies' output growth, employing recent panel co integration testing and estimation techniques. The findings suggest evidence for both FDI and growth and growth induced FDI for the SAARC economies. The bi-directional causality between FDI and growth is found robust to the inclusion of other control variables and using different estimation techniques.

Aggarwal and Khan (2011) explain that the two countries India and China attained that 1 percent increase in FDI would result in 0.07 percent increase in GDP of China and 0.02 percent increase in GDP of India. Besides, China's growth is more affected by FDI, than India's growth.

Mustafa, A.M.M and Santhirasegaram, S (2013) examine the relationship between FDI and economic growth in Sri Lanka with the aim at tracing the impact of FDI in promoting economic growth by using the time series annual data from 1978 - 2012. Multiple regression models were used to estimate the impact of FDI on economic growth. The empirical evidence shows that FDI positively and statistically influences to determine economic growth in Sri Lanka. However, this study further reveals that the actual impact of FDI can be felt after time lag of two years.

Kuliaviene Aiste and Jolanta Solnyskiniene (2014) examine the impact of Foreign Direct Investment (FDI) on the Lithuanian Gross Domestic Product (GDP) through economic activities using lag-analysis, which allows evaluating the impact on the particular period of time. He investigated that how quickly FDI starts to affect country's economy as the impact of FDI occurs after a certain period of time (lag) following the investment actions. The study used the lag determination, statistical clustering and visualization methods and pointed out Lithuanian economic activities which have a significant value in attracting FDI. The study identified the optimum size of lag (certain period of time). The research showed that the impact of FDI was likely to occur rapidly in energetic sector despite the fact that many other sectors are subsidised by the government.

Gupta, Karnika and Ishu Garg (2015) investigate the time lag required for FDI to make its utmost impact on economic growth in India for the period during 2001 to 2012 using lagged regression model. The study concludes that FDI requires a time period of three years to make its contribution to the economic growth in a significant and utmost favourable manner. Adhikari, B.K (2011) explored the impact of FDI on the host country's exports, rate of inflation, domestic demand and the country's trade openness. He used the distributed delayed model and the causality test. It was obtained that FDI changed the export volume during the first year but

the other indicators like inflation rate, domestic demand and the trade openness increased at three and four years after the investments are attracted.

### OBJECTIVES OF THE STUDY

The present study has been conducted with the following basic objectives-

1. To investigate the relationship between FDI and Economic Growth in SAARC economies.
2. To compute and find out the time lag required for the FDI to make utmost and significant contribution to economic growth in SAARC economies.

### RESEARCH METHODOLOGY AND DATA SOURCES

The present study is based on the secondary sources of data, collected from the UNCTAD database and the World Development Indicators database published by United Nations Conference on Trade and Development and The World Bank respectively. Several research papers, study reports and working papers have also been tapped for the same purpose. The study covers the period of 14 years i.e. 2002 to 2014. The whole sale price index of 2010 has been used to convert the data from current to constant price. GDP has been used as the proxy of economic growth. Thus, the gross domestic product (GDP hence forth) has been taken as dependent variable and FDI is as independent variable. The impact of FDI on economic growth has been computed with the help of regression model with varying time lags.

It is with this view that FDI for the t period contributes to the GDP through multiplier effect in the next period i.e. t+k. (k= number of years) Therefore, the following model with varying time lags has been employed in the present study-

$$GDP_t = b_0 + b_1 FDI_{t-k} + u_t$$

In this equation, t indicates the time period without any time lag and t-k explains the time period after considering the time lag as k which signifies the value of years i.e. 0,1,2,.....so on. The regression model has been run with varying time lags. Thus, GDP is regressed on FDI and GDP of period t depends on the FDI of period t-k.

If k = 0,  $GDP_t$  is regressed on  $FDI_t$  (same year), K=1,  $GDP_t$  is regressed on  $FDI_{t-1}$  (FDI of the previous year). In the same way, if k=2, the impact of t-2 year's FDI on GDP of the year t (current year) is examined through the model. The similar process is applicable for each lag. The Ordinary Least Square estimation is employed for estimating the unknown parameters i.e.  $b_0$  and  $b_1$ . The Durbin Watson (DW) test is also employed to test whether the error terms are auto correlated or not. The autocorrelation free model is considered as the best model for the prediction from regression coefficient.

As the DW statistics always lies between 0 to 4 and the upper ( $d_u$ ) and the lower ( $d_L$ ) limits are also established for critical DW values. When the model is auto correlated, it is defined in two way namely positive auto correlation and negative auto correlation. If DW lies between 0 and lower limit  $d_L$  (i.e.  $0 < d_w < d_L$ ) the error terms are positively auto correlated. If it lies between  $4 - d_L$  and 4 ( $4 - d_L < d_w < 4$ ) error terms are negatively auto correlated. In case the calculated value of  $d_w$  lies between  $d_L$  and  $d_u$  or  $4 - d_u$  and  $4 - d_L$ , the test becomes inconclusive. Further, if  $d_u < d_w < 4 - d_L$ , it implies that the error terms are not auto correlated or in other words, the model is free from auto correlation.

### ANALYSIS AND RESULTS

The analysis of the study has been discussed through the lagged regression models tables below which indicate the results of each lag model for the each member of SAARC region during 2002 to 2014. The selected lag models are eight i.e.  $k = 0$  to  $k = 8$ . The table 1 to 8 explore the result of different lagged regression models. The estimators of the parameters of lag models have been fitted through OLS method. The estimated values of the regression coefficient ( $b_1$ ) with its standard error ( $SE_{b_1}$ ), coefficients of correlation ( $R$ ), coefficients of determination ( $R^2$  and adjusted  $R^2$ ), statistics of  $t$ ,  $F$  and Durbin Watson ( $DW$ ) are presented. The regression coefficient ( $b_1$ ) explains the strength of independent variable (FDI) in predicting the dependent variable (GDP).

**Table 1**  
**Results of Lagged Regression Models India**

Time Lag (k)	$b_0$	$b_1$	$SE_{b_1}$	$T_{b_1}$	R	$R^2$	Adjusted $R^2$	F-value	DW
0	936900000000	25.558	6.003	4.258	.776	.602	.569	18.13*	.598 <sup>PA</sup>
1	1062000000000	23.987	6.852	3.5	.726	.527	.484	12.53*	.514 <sup>PA</sup>
2	1170000000000	22.406	6.703	3.323	.724	.525	.477	11.04*	.540 <sup>PA</sup>
3	1258000000000	21.473	5.972	3.596	.768	.59	.544	12.93*	.753 <sup>PA</sup>
4	1317000000000	21.559	4.337	4.970	.869	.755	.725	24.70*	1.062 <sup>PA</sup>
5	1443000000000	19.857	4.670	4.256	.849	.721	.681	18.11*	1.155 <sup>NA</sup>
6	1536000000000	<b>18.962</b>	<b>3.351</b>	<b>5.370</b>	<b>.910</b>	<b>.828</b>	<b>.799</b>	<b>28.837*</b>	<b>1.638<sup>NA</sup></b>
7	1669000000000	17.603	3.446	5.109	.916	.839	.807	26.097*	1.062 <sup>NA</sup>

Source: Author's own calculations

Notes: \* indicates 1percent level of significance

<sup>PA</sup> implies positive auto correlation

<sup>IN</sup> indicates value where Durbin Watson test is inconclusive

<sup>NA</sup> symbolizes No auto correlation (1 percent level of significance)

In India's reference, it is clear from the table-1 that the value of standard error is minimum for the lagged regression model when  $k=6$ . In this model,  $SE_{b_1}$  i.e. standard error of FDI is 3.351,  $R^2$  and Adjusted  $R^2$  are .828 and .799 respectively.

The t and F statistic are also at their highest level i.e. 5.370 and 28.837 respectively for the lagged regression model with k=6. It implies when a comparative analysis is done for all the lagged regression model for India at one percent level of significance, the model of time lag 6 is found the model of best fit. It makes evident that FDI requires six years to efficiently and significantly contribute in the economic growth of India.

**Table 2**  
**Results of Lagged Regression Models Pakistan**

Time Lag (k)	$b_0$	$b_1$	$SE_{b_1}$	$T_{b_1}$	R	$R^2$	Adjusted $R^2$	F-value	DW
0	170200000000	0.13	4.767	.003	.001	.000	.083	.000 <sup>ns</sup>	.0775 <sup>IN</sup>
1	171800000000	.870	4.459	.195	.059	.003	.087	.038 <sup>ns</sup>	.0925 <sup>IN</sup>
2	177400000000	.011	4.016	.003	.001	.000	.100	.000 <sup>ns</sup>	.114 <sup>PA</sup>
3	180900000000	.000	3.651	.000	.000	.000	.111	.000 <sup>ns</sup>	.130 <sup>PA</sup>
4	180600000000	1.326	3.447	.385	.135	.018	-.105	.148 <sup>ns</sup>	.178 <sup>PA</sup>
5	178000000000	3.216	3.145	1.022	.360	.130	.006	1.045 <sup>ns</sup>	.307 <sup>PA</sup>
6	175100000000	5.041	2.602	1.938	.620	.385	.282	3.755 <sup>***</sup>	.7495 <sup>IN</sup>
7	172300000000	6.889	.933	7.379	.967	.916	.899	54.543 <sup>*</sup>	1.711 <sup>NA</sup>

Source: Author's own calculations

Notes: \* , \*\* & \*\*\* indicate 1,5 & 10 percent level of significance respectively

<sup>ns</sup> implies not significant values

<sup>PA</sup> implies positive auto correlation

<sup>IN</sup> indicates value where Durbin Watson test is inconclusive

<sup>NA</sup> symbolizes No auto correlation (1percent level of significance)

For Pakistan, the results are not significant for the duration between k=0 to k=5. The values of correlation explain that there is no relationship or very low level of relationship between FDI and GDP during first five years. The same trend is represented by the t and F values. The level of standard error is lowest for the year k=7 at .933 when t statistics, R,  $R^2$  and adjusted  $R^2$  support the result that 89 percent of variation in GDP are explained by FDI. It implies that with 1 percent level of significance with no autocorrelation, FDI takes 7 years in Pakistan to contribute in economic growth. Therefore, it can be said that among all, the model with time lag of 7 is the best fit and like so the highest impact of FDI on GDP is explained in the seventh year of its original year of investment. The result is being supported by the fact that regression models are insignificant during the time lag from 0 to 5 years and after that it starts to be significant at 10 percent level of significance in sixth year and it is significant at the level of 1 percent in seventh year. The Durbin-Watson statistic for seventh year explains that this model is not auto correlated.

**Table 3**  
**Results of Lagged Regression Models Sri Lanka**

Time Lag (k)	$b_0$	$b_1$	$SE_{b1}$	$T_{b1}$	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F-value	DW
0	30470000000	40.521	7.427	5.456	.844	.713	.689	29.77*	1.0305 <sup>IN</sup>
1	32670000000	<b>39.747</b>	<b>5.995</b>	<b>6.630</b>	<b>.894</b>	<b>.800</b>	<b>.782</b>	<b>43.962*</b>	<b>1.463<sup>NA</sup></b>
2	36740000000	37.003	6.886	5.374	.862	.743	.717	28.880*	1.416 <sup>NA</sup>
3	40490000000	35.353	7.901	4.475	.831	.690	.655	20.023*	1.300 <sup>NA</sup>
4	43440000000	35.992	9.041	3.973	.815	.664	.622	15.787*	1.159 <sup>NA</sup>
5	45250000000	40.476	13.360	3.030	.753	.567	.505	9.178*	.9455 <sup>IN</sup>
6	48620000000	37.250	11.646	3.199	.794	.630	.596	10.231*	1.342 <sup>NA</sup>
7	51150000000	35.534	7.747	4.587	.899	.808	.770	21.036*	.9165 <sup>IN</sup>

Source: Author's own calculations

Notes: \* indicates 1percent level of significance

<sup>PA</sup> implies positive auto correlation

<sup>IN</sup> indicates value where Durbin Watson test is inconclusive

<sup>NA</sup> symbolizes No auto correlation (1percent level of significance)

The lagged regression models for Sri Lanka are explained in table-3. The table explained model for the each year from 0 to 7. The table depicts that for the model of time lag 1, the value of standard error is lowest and the value of R<sup>2</sup> and adjusted R<sup>2</sup> explain this model as the model of best fit. The result explains that 78.2 percent variations in GDP of Sri Lanka are explained by FDI in the model with time lag 1. In this model, the value of t and F statistic are found to be the highest. The Durbin-Watson for this model also explains the no auto correlation between the variables. Therefore, the model having lagged 1 is best.

**Table 4**  
**Results of Lagged Regression Models Nepal**

Time Lag (k)	$b_0$	$b_1$	$SE_{b1}$	$T_{b1}$	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F-value	DW
0	13800000000	41.269	16.197	2.548	.593	.351	.297	6.492*	.292 <sup>&gt;PA</sup>
1	13890000000	47.435	13.039	3.638	.739	.546	.505	13.236*	.533 <sup>&gt;PA</sup>
2	14080000000	<b>50.133</b>	<b>9.447</b>	<b>5.307</b>	<b>.859</b>	<b>.738</b>	<b>.712</b>	<b>28.161*</b>	<b>.7475<sup>IN</sup></b>
3	14650000000	47.457	9.611	4.938	.855	.730	.700	24.381*	.598 <sup>PA</sup>
4	15310000000	45.564	12.160	3.747	.798	.637	.592	14.040*	.516 <sup>PA</sup>
5	16000000000	46.011	17.749	2.592	.700	.490	.417	6.720*	.447 <sup>&gt;PA</sup>
6	16690000000	61.810	43.006	1.437	.506	.256	.132	2.066 <sup>ns</sup>	.572 <sup>PA</sup>
7	17420000000	-2.140	98.133	-.010	.010	.000	.200	.000 <sup>ns</sup>	.219 <sup>PA</sup>

Source: Author's own calculations

Notes: \*&\*\*\* indicates 1percent and 5 percent level of significance respectively.

<sup>ns</sup> implies not significant values

<sup>PA</sup> implies positive auto correlation

<sup>IN</sup> indicates value where Durbin Watson test is inconclusive

<sup>NA</sup> symbolizes No auto correlation (1percent level of significance)

The lagged regression models for Nepal are explained in table-4. The table explained model for the each year from 0 to 7. The table depicts that for the model of time lag 2, the value of standard error is lowest and the value of  $R^2$  and adjusted  $R^2$  explain this model as the model of best fit. It measure the strength of linear relationship between FDI and GDP in Nepal and this relationship is strongest in model of lagged 2 that explains that 71 percent of changes in GDP occurred due to FDI for this time lag. In this model, the value of t and F statistic are found to be the highest. The Durbin-Watson for the model explains that the auto correlation is inconclusive while in case of the models of remaining lagged, the variables are positively auto correlated. The results are at 1 percent level of significance up to the fifth lag thereafter, it becomes non significant. Therefore, the model having lagged 2 appears to be the best.

**Table 5**  
**Results of Lagged Regression Models Afghanistan**

Time Lag (k)	$b_0$	$b_1$	$SE_{b1}$	$T_{b1}$	R	$R^2$	Adjusted $R^2$	F-value	DW
0	17090000000	27.556	13.829	-1.993	.499	.249	.186	3.971 <sup>ns</sup>	.465 <sup>PA</sup>
1	17340000000	24.740	13.847	-1.787	.474	.225	.154	3.192 <sup>ns</sup>	.345 <sup>PA</sup>
2	17300000000	19.292	14.394	-.390	.390	.152	.068	1.796 <sup>ns</sup>	.230 <sup>PA</sup>
3	16770000000	-9.690	15.039	-.644	.210	.044	-.062	.415 <sup>ns</sup>	.199 <sup>PA</sup>
4	16560000000	-3.323	14.813	-.224	.079	.006	-.118	.050 <sup>ns</sup>	.139 <sup>PA</sup>
5	15940000000	5.685	13.844	.411	.153	.024	-.116	.169 <sup>ns</sup>	.180 <sup>PA</sup>
6	15220000000	13.988	12.195	1.147	.424	.180	.043	1.316 <sup>ns</sup>	.480 <sup>PA</sup>
7	16400000000	<b>11.668</b>	<b>9.156</b>	<b>1.274</b>	<b>.495</b>	<b>.245</b>	<b>.094</b>	<b>1.624<sup>ns</sup></b>	<b>.389<sup>PA</sup></b>

Source: Author's own calculations

Notes: \* indicates 1percent level of significance

<sup>ns</sup> implies not significant values

<sup>PA</sup> implies positive auto correlation

<sup>IN</sup> indicates value where Durbin Watson test is inconclusive

<sup>NA</sup> symbolizes No auto correlation (1percent level of significance)

The time lag impact of FDI on GDP of Afghanistan has been explained in Table -5 as the result of Afghanistan. The table analyses the results during the time lag of 0 to 7 years. FDI and GDP are positively auto correlated for all the selected years which indicate that no indicator is independent in the model. This also explains that the contribution of FDI in GDP of Afghanistan is not notable for the first eight years. Form the standard error statistic, it can be shown that in the time lag of 7 it is minimum.



**Table 6**  
**Results of Lagged Regression Models Maldives**

Time Lag (k)	$b_0$	$b_1$	$SE_{b1}$	$T_{b1}$	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F-value	DW
0	1504000000	<b>3.623</b>	<b>.473</b>	<b>7.663</b>	<b>.911</b>	<b>.830</b>	<b>.816</b>	<b>58.723*</b>	<b>2.015<sup>NA</sup></b>
1	1676000000	3.243	.519	6.248	.883	.780	.760	39.043*	2.151 <sup>NA</sup>
2	1833000000	2.928	.595	4.921	.841	.708	.679	24.220*	1.965 <sup>NA</sup>
3	1930000000	3.011	.657	4.585	.837	.700	.667	21.020*	1.505 <sup>NA</sup>
4	2109000000	2.476	.516	4.797	.861	.742	.710	23.010*	1.263 <sup>NA</sup>
5	2106000000	3.923	.622	6.303	.922	.0850	.829	39.724*	2.661 <sup>NA</sup>
6	2195000000	4.175	.658	6.348	.933	.870	.849	40.292*	1.727 <sup>NA</sup>
7	2268000000	4.222	.964	4.379	.891	.793	.752	19.177*	.7735 <sup>IN</sup>

Source: Author's own calculations

Notes: \* indicates 1percent level of significance

<sup>PA</sup> implies positive auto correlation

<sup>IN</sup> indicates value where Durbin Watson test is inconclusive

<sup>NA</sup> symbolizes No auto correlation (1percent level of significance)

For this the value of t, F, R<sup>2</sup> and adjusted R<sup>2</sup> the model seems to be best fit. The results for all the time lags are not significant i.e. the level of confidence interval for all the models is much less than 90 percent. The results do not explain any specific picture.

The Table 6 explains the contribution of FDI on GDP of Maldives as the result of lagged regression model for the time lag of 0 to 7 years. All the eight models have been calculated on 1 percent level of significance. Except k=7, all the lags are having no auto correlation whereas, it is inconclusive for lag 7. The first model with lag 0

**Table 7**  
**Results of Lagged Regression Models Bangladesh**

Time Lag (k)	$b_0$	$b_1$	$SE_{b1}$	$T_{b1}$	R	R <sup>2</sup>	Adjusted R <sup>2</sup>	F-value	DW
0	76770000000	<b>26.052</b>	<b>2.455</b>	<b>10.610</b>	<b>.951</b>	<b>.904</b>	<b>.896</b>	<b>112.577*</b>	<b>1.387<sup>NA</sup></b>
1	79050000000	30.451	3.313	9.191	.941	.885	.874	84.481*	1.706 <sup>NA</sup>
2	83770000000	32.461	4.347	7.468	.921	.848	.833	55.774*	1.564 <sup>NA</sup>
3	82570000000	43.737	5.829	7.504	.929	.862	.847	56.306*	2.360 <sup>NA</sup>
4	89000000000	43.961	7.573	5.805	.899	.808	.784	33.693*	2.173 <sup>NA</sup>
5	96640000000	41.377	8.542	4.844	.878	.770	.737	23.467*	2.115 <sup>NA</sup>
6	104200000000	39.087	10.558	3.702	.834	.696	.645	13.707*	1.965 <sup>NA</sup>
7	110700000000	36.698	9.004	4.076	.877	.769	.722	16.612*	1.500 <sup>NA</sup>

Source: Author's own calculations

Notes: \* indicates 1percent level of significance

<sup>PA</sup> implies positive auto correlation

<sup>IN</sup> indicates value where Durbin Watson test is inconclusive

<sup>NA</sup> symbolizes No auto correlation (1percent level of significance)

explains that the value of standard error is lowest. The adjusted  $R^2$  explains that 81.6 percent variations of GDP are explained by FDI in the model of lag 0. The t and F statistic also are highest in this model. Therefore, it can be said that in Maldives, the FDI provides immediate returns to host countries' economic growth.

The lagged regression models for Bangladesh are explained in table 7. The table explains the model for the each year from 0 to 7. The table depicts that for the model of time lag 0, the value of standard error is lowest and the value of  $R^2$  and adjusted  $R^2$  explain this model is a of best fit.

**Table 8**  
**Results of Lagged Regression Models Bhutan**

Time Lag (k)	$b_0$	$b_1$	$SE_{b1}$	$T_{b1}$	R	$R^2$	Adjusted $R^2$	F-value	DW
0	1231000000	6.917	4.237	.426	.426	.182	.114	2.665 <sup>ns</sup>	.459 <sup>PA</sup>
1	1293000000	6.389	4.069	1.570	.428	.183	.109	2.465 <sup>ns</sup>	.525 <sup>PA</sup>
2	1305000000	7.407	3.654	2.027	.540	.291	.220	4.109**	.9185 <sup>IN</sup>
3	1398000000	6.296	3.659	1.721	.498	.248	.164	2.961 <sup>ns</sup>	.7795 <sup>IN</sup>
4	1454000000	6.202	3.144	1.972	.572	.327	.243	3.890**	1.059 <sup>NA</sup>
5	1539000000	<b>5.227</b>	<b>2.684</b>	<b>1.948</b>	<b>.593</b>	<b>.351</b>	<b>.259</b>	<b>3.793***</b>	<b>.947<sup>PA</sup></b>
6	1650000000	3.374	3.799	.888	.341	.116	-.031	.789 <sup>ns</sup>	.579 <sup>PA</sup>
7	1707000000	3.212	3.143	1.022	.416	.173	.007	1.045 <sup>ns</sup>	.726 <sup>PA</sup>

Source: Author's own calculations

Notes: \* indicates 1percent level of significance

<sup>PA</sup> implies positive auto correlation

<sup>IN</sup> indicates value where Durbin Watson test is inconclusive

<sup>NA</sup> symbolizes No auto correlation (5percent level of significance)

It suggests that 89.9 percent variations in GDP are explained by GDI. In this model, the value of t and F statistic are found to be the highest. The Durbin-Watson for this model also explains no auto correlation between the variables. The level of significance is 1 percent. Therefore, the model having lagged 0 is the best.

The table 8 explains the lagged regression models for Bhutan for the time lag from 0 to 7. The table depicts that for the model of time lag 5, the value of standard error is lowest and the value of  $R^2$  and adjusted  $R^2$  are also highest but the level of significance and the Durbin Watson results confirm that the result of this model are not significant. Therefore, the model with time lag 4 with little bit of higher standard error seems the model of best fit as the value of t and F statistic are highest for this model. The results for this model are at 5 percent level of significance and at the same time there is no auto correlation. It explains that this model is the model of best fit. It suggests that FDI takes 4 to 5 years to contribute in the economic growth of Bhutan.

## DISCUSSION AND CONCLUSION

The present study makes it evident that the time lag required by FDI to produce its influence on GDP varies from country to country. The lagged regression model of India explains that FDI requires six year contributing in GDP significantly. This result is not supported by Gupta and Garg's (2015) study of payback period three for India. This may be because of the difference of the study period which is 2002-2015 for the present study and 2000 -2013 for the study of Gupta and Garg. The contribution of FDI in GDP growth rate of Nepal requires two year for utmost returns is in contradiction of Majagaiya Kundan P. and Qingliang Gu's (2010) study for Nepal which concluded that FDI requires four years to contribute in the GDP growth of Nepal. This may be due to the different study periods which were 1980 to 2006 for Majagaiya Kundan P. and Qingliang Gu (2010) and 2001 to 2015 for the present study. As the major flow of FDI came into existence at international level after 2000, the result seems to be justified. For Sri Lanka. The lagged regression model finds out that the significant payback returns time lag required to FDI in economic growth is one year. This is in contradiction with the results of the study conducted by Mustafa, A.M.M and Santhirasegaram, S (2013) which claims this time lag as two year with the study period during 1978 to 2012. It implies that time lag required for significant contribution of FDI in economic growth in India has increased from three to four year and reduced in case of Nepal and Sri Lanka from four to two and four to one respectively. The lagged regression model of Pakistan explains that the time lag required for FDI to make significant contribution to economic growth is seven year. In case of Bhutan, it was computed as four to five year. Maldives and Bangladesh were the economies where this time lag was zero year indicating that FDI makes utmost contribution to economic growth in the current year itself significantly. Afghanistan was the country in which lagged regression model's result were not found significant for all the seven lags and both the variables, FDI and GDP were found positively auto correlated for all the seven lags. Therefore, the required time lag for FDI to make significant contribution to GDP could not be identified.

Therefore, it can be concluded that as per the different FDI policies of each member economy of SAARC region, the amount of contribution varies but at the same time the payback return period also varies, which implies that if the increasing volume of FDI inflow is not sustained over a period of time, the rate of economic growth may be negatively affected in long run. The contribution period of FDI in India has increased from three to four year indicating that the quantity of FDI is growing but the quality of FDI has reduced. The study reveals the fact that if quantitative FDI is preferred over qualitative FDI in the long run, the payback returns time lag for India may also increase over a period of time. This result is equally significant for all the selected economies. The long time lag required for Pakistan, India, Bhutan and Nepal may be due to political uncertainties, economic

instability and absence of good governance practices at par with international standards etc.

## POLICY IMPLICATIONS

Besides, there may some research direction originate from the study. FDI is being invited to various industries in different economies. The priority area for the FDI attraction may vary from one to another country. The time lag required for FDI to contribute in production and productivity of each industry may be research scope for the future studies. As these types of studies are very rarely available, it will really be of highly significance for the policy makers of each economy from the point of view of host as well as home economy.

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