Volume: 4, Issue: 10
Page: 39-63
2020

ISSN 2520-4750 (Online) & ISSN 2521-3040 (Print)

International Journal of Science and Business

Comparative Analysis of Economic Performance of SAARC Countries Based on the Estimated Cobb-Douglas Production Function

Deeti Saha

Abstract:
This study intends to compare the economic performance and examine the relationship between real GDP (dependence variable) and total labor force and gross fixed capital formation (independent variables) in the case of SAARC (South Asian Association for Regional Co-operation) countries based on the Cobb Douglas production function. To conduct the study, time series data were used from 1980-2017 in four countries and 1990-2017 in four other countries. The ordinary least square method (OLS) was used to measure the linear regression model. The Breusch-Pagan-Godfrey and Breusch-Godfrey Serial Correlation LM Test tests were used to test for heteroscedasticity and autocorrelation. The adjusted R-Squared shows that 96.81%, 99.98%, 99.74%, 99.85%, 99.36%, 97.84%, 99.65%, and 99.89% of the total variation in the dependent variable (GDP) in the case of Afghanistan, Bangladesh, Bhutan, India, Sri Lanka, Maldives, Nepal, and Pakistan respectively are explained by the fitted regression equation. That means the economies of SAARC countries are well defined by the Cobb-Douglas production function. The economies of Afghanistan, India, Sri Lanka, and Nepal show increasing returns to scale. The economies of Bangladesh, Bhutan, Maldives, and Pakistan show decreasing returns to scale. It is also noteworthy that the economies of the four countries show increasing returns to scale; these countries also have better marginal productivity of labor and marginal productivity of capital performance. Per capita GDP, GDP growth rate, labor and capital, the marginal productivity of labor and marginal productivity of capital, the elasticity of labor and capital have been highlighted to compare the economic performance of SAARC countries. The quality of the labor force is essential for sustainable capital investment.

IJSB
Accepted 10 September 2020
Published 12 September 2020
DOI: 10.5281/zenodo.4026029

Keywords: Cobb-Douglas Production Function, Returns to Scale, Marginal Productivity of Labor, Marginal Productivity of Capital, Growth Rate, Elasticity of Labor, Elasticity of capital.

About Author (s)

Deeti Saha, MBA Student, Department of Accounting & Information Systems, University of Dhaka, Dhaka-1000, Bangladesh.

1. Introduction

An economy is a system for coordinating society's productive activities. When we talk about the economy and economic performance of any country, in this case, efficiency and productivity are two common words. We primarily wanted the efficient use of resources (land, labor, money, energy, knowledge) and productive workers. The labor force is our human capital. If workers are not productive and we do not use our resources well, there will be no better economic outcome. Gross domestic product (GDP) is considered as economic output, so GDP growth is an indicator of economic growth and economic performance. Which country or economy can get better output by investing their labor and capital input is marked as a good and sophisticated economy. Measuring economic performance and potential output, the production function model can be used. Cobb-Douglas production work is widely used as a model of production function and represents the technical relationship between the number of inputs used and the amount of product produced through these inputs. To measure the relationship between the input and output and the performance of any country, any industry, or any sector this model can be used. To measure economic performance this model considers three variables GDP as potential output and labor and capita as input variables. Looking only at the number of input variables (human and financial); we cannot declare any country as good or bad. The quality of the input variables is important. Growth in output variable (GDP) is a measure of the quality of input variables and an indicator of economic performance. We will compare the economies of SAARC countries namely **Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, Sri Lanka** based on the Cobb-Douglas production function. Large investments will pay off if workers are productive. SAARC is an acronym and represents the South Asia Association for Regional Co-operation. It is the regional intergovernmental organization and geopolitical union of nations in South Asia. On December 8, 1985, SAARC was established in Dhaka to set up a trading blog by providing South Asians with a platform to work together in a spirit of friendship, trust, and understanding. It contains 3% of the world's land area, 21% of the world's population, and 3.8% (the US $ 2.9 trillion) of the global economy, since 2015. There are eight SAARC member states and these are Afghanistan, Bangladesh, Bhutan, India, Nepal, Maldives, Pakistan, and Sri Lanka (Wikipedia, 2018). Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka are the founding members of the Union. And in 2005, Afghanistan applied for membership in the Union. In April 2007, Afghanistan joined SAARC as the eighth and most recent member of the group. Afghanistan is the only member state not in South Asia as it is a Central Asian country.

Economic performance is one of the most important factors in any country. SAARC is made up of eight countries. We can see that Bangladesh or other countries are investing heavily but their performance is not good and investment is not sustainable. What is the cause of this problem? We can get a basic idea of the problem by analyzing the result of the Cobb-Douglas production function. Elasticity of labor and capital and marginal productivity of labor and capital will provide some basic idea.

This paper can contribute to the formulation of policy in several ways. For sustainable development of the country's economy, the government should implement such kind of policies that play a significant role to develop the resources of the countries. Otherwise, progress will not be sustainable over time. Qualified human capital or labor force is the precondition of sustainable capital investment and development. And policymakers will be keen to invest in quality education, training facilities, and nutrition to improve human capital.

The study is structured as follows: Section 2 focuses on critical analysis of both academic and artistic texts with the use of the Cobb-Douglas Production Function to compare the economies of different countries and the production of different industries; Section 3 describes the data sources and descriptive statistics and comparative performance based on GDP, labor force and gross fixed capital formation among SAARC countries; Section 4 outlines the research methodology and model specification; Section 5 interprets the result we obtain using the ordinary least square method (OLS), and finally section 6 concludes with a brief overview of key findings and policy implications.

2. Literature Review

A thorough review of theoretical and practical studies was conducted in this study. Many studies have been conducted using the Cobb-Douglas Production Function to compare the economies of different countries and the production of different industries. Li (2003) in his paper, worked on China's capital, and used the Cobb-Douglas production function in the Chinese economy. C-D estimates showed that in the years following product development China's total figure was almost 3.4 percent. It has been found that among the various sources of investment funding, foreign direct investment works better than a state-funded fund. Limam and Millar (2004) used a Cobb-Douglas model that incorporates financial and employee stocks, as well as intermediate financial and academic years of education to address the quality of capital and labor, respectively. The paper emphasized that the quality of capital positively and significantly affects output growth in all groups. And the quality of the workforce has a positive and significant effect on productivity growth in Africa, East Asia, and the West. On the other hand, the quality of the workforce has a negative and significant effect on Latin America and South Asia. Khan (2005) focused on factors that explain Pakistan's growth rate and energy analysis of this paper based on the typical production work of Cobb-Douglas, $Y = AK\alpha (LH) 1-\alpha$.There are various factors affecting growth, this paper focuses mainly on the quality of human capital. It has highlighted that the higher quality of human skills - that is, higher levels of education or better health indicators are associated with higher real per capita growth rates. Felipe and Adams (2005) took up Paul Samuelson's invitation to analyze his arguments that the entire postponement of the Cobb-Douglas (1928) product was to reproduce accounting income ownership by saying that additional value equals the total amount of salary and they did so using Cobb and Douglas' original data collection (1928). And the study concludes that Samuelson is right, and with today's work of macroeconomics Samelson's controversy has a great start. Ozyurt (2007) introduced a timely evaluation of Chinese industrial production during 1952-2005 and this analysis of product growth (TFP) was based on Cobb-Douglas manufacturing activity. The result of this paper was that large-scale fundraising was a major driving force of the spectacular economic performances in China's industries and the benefits of TFP have had a positive impact in the event of a recession in both pre-adjusted and post-adjustment periods. Rahman (2008) examined the macroeconomic structure of SAARC countries Bangladesh, India, Nepal, Pakistan, and Sri Lanka. In each country, combined production activity is measured using the Cobb-Douglas type production method. The study found that although there are differences among countries in manufacturing and consumption, investment behavior, taxation, and tax-free entities, there is room for significant trade expansion between SAARC countries. Feroz, Rashid, and Hossain (2009), in their paper, examined the relative profitability of shrimp production in some parts of the Satkhira district namely Assasuni, Manik-Khali, and Durgapur. 60 farmers were randomly selected and interviewed. Evaluating the contribution of the key variables in the shrimp production process, Cobb-Douglas production was applied.

The analysis showed that inputs such as fry, human performance, fertilizer, compost, lime, etc. had a positive effect on the output. Liu and Li (2010) investigated the total production characteristics and factors influencing Chinese soybeans using the Cobb-Douglas production function model. The formula for this model was $Y = AK\alpha L\beta M\gamma$, where Y indicates the yield of beans, K indicates the inclusion of workers, M indicates the planting areas. And α, β, respectively is the dynamics of large, labor, and investment areas. Studies have shown that technological success, farming patterns, the policy has a positive effect on soy TFP. And on the other hand, the import volume harms soy TFP. Hassani (2012) assumed both cost and time (which are normalized to be comparable) to do time- cost trade of problem analysis (TCTP). Cobb-Douglas production function (CDPF) is used for each job in terms of labor costs and equipment costs. Time and cost weights on purpose work reflect users' priorities and time preferences or costs. The results of the study suggested that, by combining the CDPF and TCTP, the proposed approach can identify an appropriate solution for the allocation of staff and resources to meet the need for duration reduction. Afzal and Manni (2013), in this paper, discussed the nature and level of productivity changes in the Cobb-Douglas production function components and the growth of selected ASEAN countries, namely, Malaysia, Indonesia, the Philippines, Thailand, Singapore, and South Korea throughout 2005 to 2010. The Philippines and Singapore have reported the highest increase in TFP (total production volume) over the referred years and growth in productivity is derived from both technical efficiency gains and technical progress. And with the knowledge economy model, Thailand and Philippine have achieved significant growth in TFP. Hossain, Basak, and Majumder (2013) examined various manufacturing industries in Bangladesh based on Cobb-Douglas production activity. The study examined the need to quantify Cobb-Douglas production activity parameters for additional errors to predict the output of manufacturing industries. Labor and investment are at a satisfactory level, then industrial investment will increase; the number of industries will increase which will directly affect the GDP and unemployment rate. Shakeel, et al. (2014) used the Cobb-Douglas production function model and analyzed data from seven South American economies such as Pakistan (PAK), Bangladesh (BAN), Sri Lanka (SRI), India (IND), and Nepal (NEP). The purpose of this study was to investigate the dual role of power use in the country's economic activities; its direct impact on GDP as a necessary input into the manufacturing process and its indirect impact as an important input into the export sector. GDP, Capital, labor, energy use, and exports were the main variables of the study. Wulan (2014) introduced the use of Cobb-Douglas production work in its traditional way to analyze the Indonesian and Malaysian economic growth in terms of spending power and labor as production indicators. The paper concludes that the production function model is appropriate to describe the Malaysian and Indonesian economy in terms of condition proportion to the population of productive age compared to emerging technologies that have a significant impact on economic growth. Hossain and Majumder (2015) estimated the limitations of the Cobb-Douglas production work with the many errors (direct model) and additional errors (non-linear model) of certain Bangladesh manufacturing industries from 1978-79 to 2011-2012. Industrial production is a very important part of economic development because if domestic industrial productivity increases, GDP will increase, if labor elasticity is high, implement rate will increase, and if capital elasticity is high, the investment will increase. Khatun and Afroze (2016) used Cobb-Douglas production in the event of Bangladesh, India, China, Malaysia, and Thailand and found significant relationships between GDP, labor, and capital. The results of this study showed that the contribution of labor in each country is greater than in the capital. India, China, and Bangladesh are the most labor-intensive countries; Malaysia and Thailand invest heavily in their people by emphasizing the

education, health, and training of their workers. Rahman and Sayeda (2016) also conducted an analysis based on the augmented Cobb-Douglas production function to estimate the effect of the integration and performance of international garment chains on Bangladesh textile companies. The findings of the study highlighted that both backward interactions with external suppliers of in-depth and forward-looking connections with global clothing retailers positively affected the firm's output and labor productivity. On the other hand, backward interactions with local providers have negative effects on robust performance. Husain and Islam (2016) also analyzed to evaluate Cobb-Douglas production activity in the Bangladesh manufacturing sector. The findings of this study found that in the case of Bangladesh manufacturing sectors Cobb-Douglas production is active and this sector shows increasing returns to scale. Nurunnajib, et al. (2018) applied the C-D production function in the case of five selected manufacturing industries in West Sumatra such as the rubber and plastics industries, the printing and printing industry, the textile industry, the food, and beverage industry, and the non-metallurgical industry. The rubber and plastics industries and the food and beverage industry have provided reduced returns. And three other industries have provided a return on a growing scale.

3. Data Sources and Some Descriptive Statistics

For this study, data are collected from the secondary source. Time series data are used from 1980-2017. The availability of all the data is very difficult. Data on the labor force was not available from 1980 in the case of Afghanistan, Bhutan, Maldives, and Nepal. And we try my level best to collect reasonable and appropriate data. To estimate the Cobb-Douglas production function we use three essential variables namely Gross Domestic Product (GDP) constant US$ (2010), total labor force, and Gross fixed capital formation constant US$ (2010). The data sets are collected from World Development Indicators (WDI) and UNCTAD statistics. Dr. Md. Sharif Hossain, Professor, University of Dhaka, has provided data of the labor force from 1980-1990 for Bangladesh, India, Sri Lanka, and Pakistan from his previous researches because now data of labor force from 1980 is not available.

Real GDP: Real or constant GDP means GDP adjusted for changes in money value. This is our dependent variable and represents the potential output.

Total labor force: Employed or unemployed both labor forces are considered in the total labor force. This is one of the independent variables.

Gross fixed capital formation: This is not a measure of total investment because only the net addition to fixed assets is measured. This is our other independent variable.

Some Descriptive Statistics

Table: 1 GDP & growth rate of GDP

	GDP					Growth rate of GDP		
Variables	**Mean**	**Std. Dev.**	**C.V.**	**Minimum**	**Maximum**	**Mean**	**Std. Dev.**	**C.V.**
Afghanistan	11489.29	5157.645	44.890894	4676.087	22174.50	2.98124	16.1842	542.8680
Bangladesh	75889.69	42747.35	56.328270	28626.91	179992.2	4.99043	1.5079142	30.21611
Bhutan	869.4458	658.1900	75.702246	154.3757	2368.866	7.522034	4.906785	65.23215
India	978610.5	682136.3	69.704576	271694.2	2629542	6.357912	2.100948	33.04462
Maldives	1637.400	1042.604	63.674361	283.6014	3914.373	7.784043	7.476589	96.05020
Nepal	11022.42	5149.971	46.722688	4252.352	21716.78	4.32635	2.577184	59.56947
Pakistan	122414.9	55869.85	45.639746	43430.14	240856.7	4.899692	2.098667	42.83263
Sri Lanka	37185.09	20655.71	55.5483662	13673.00	82394.20	5.014957	1.963874	39.16033

Note: Std. Dev.=Standard Deviation, C.V.= Coefficient of variation
Source: from calculations

Table 1 shows the GDP and growth rate of GDP. So from C.V., it is found that the GDP of Afghanistan and Pakistan is more consistent. And Bhutan and India have more volatile GDP than other SAARC countries. Afghanistan has a 542.868% risk in the growth rate of GDP which is more than other SAARC countries. From C.V. it can be said that the GDP growth rate of Afghanistan is more volatile. And the growth rate of Bangladesh is more consistent and more stable.

Table: 2 Labor force & growth rate of labor force

	Labor force					Growth rate of labor force		
Variables	**Mean**	**Std. Dev.**	**C.V.**	**Minimum**	**Maximum**	**Mean**	**Std. Dev.**	**C.V.**
Afghanistan	6581143	2187259	33.2352	3270825	10937230	4.588803	1.89422	41.2792
Bangladesh	57741908	14149558	24.5048	36271231	84472519	2.318654	1.23011	53.05302
Bhutan	276469.2	77975.83	28.2042	179854	396174	2.713547	3.02250	111.3857
India	392000000	82862246	21.1383	255000000	520000000	1.952037	0.91514	46.8815
Maldives	129881.2	57114.17	43.9742	577962	220009	5.089612	2.35638	46.298
Nepal	12850039	2211508	17.2101	9219209	17053278	2.306013	0.63455	27.5175
Pakistan	42647384	13675866	32.0673	23970381	69957925	2.949975	1.63119	55.2953
Sri Lanka	7517393	851974.8	11.3334	5988108	8724539	1.046261	2.25634	215.6581

Note: Std. Dev.=Standard Deviation, C.V.= Coefficient of variation
Source: from calculations

Table 2 shows the labor force & growth rate of the labor force. From C.V. we can say that Sri Lanka has a more consistent labor force. The labor force of Maldives is very volatile than other SAARC countries. Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka have 41.28%, 53.05%, 111.38%, 46.88%, 46.30%, 27.52%, 55.30% and 215.65% volatility respectively. So from C.V., it can be disclosed that Sri Lanka has a less consistent labor force growth rate. Nepal has a more consistent and more stable labor force growth rate compared to other SAARC countries.

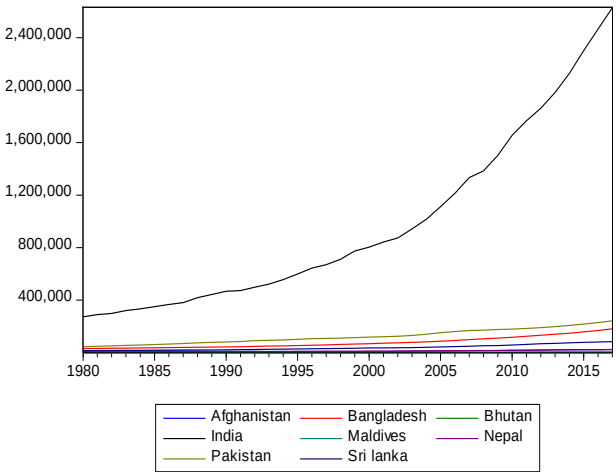
Table: 3 Gross fixed capital formation & growth rate of gross fixed capital formation

	Gross fixed capital formation					Growth rate of gross fixed capital		
Variables	**Mean**	**Std. Dev.**	**C.V.**	**Minimum**	**Maximum**	**Mean**	**Std. Dev.**	**C.V.**
Afghanistan	1884.958	585.4608	31.05962	870.3413	3122.824	1.44424	15.9607	1105.121
Bangladesh	17492.18	14457.76	82.65270	2967.761	54517.28	8.23601	3.441364	41.78431
Bhutan	429.0887	369.8177	86.18677	62.14873	1291.867	9.65923	15.32412	158.6474
India	286251.5	243382.8	85.02411	55763.26	847063.3	7.78368	5.847265	75.12207
Maldives	450.6137	437.2092	97.02527	43.64876	1426.838	10.8141	13.89411	128.4814
Nepal	2335.796	1301.181	55.70610	695.127	5870.736	6.33226	9.295738	146.799
Pakistan	19999.74	6120.478	30.60278	9468.543	34280.52	3.72228	6.389425	171.6532
Sri Lanka	8649.654	5796.649	67.01596	3068.662	21452.18	5.49211	7.570546	137.8438

Source: from calculations

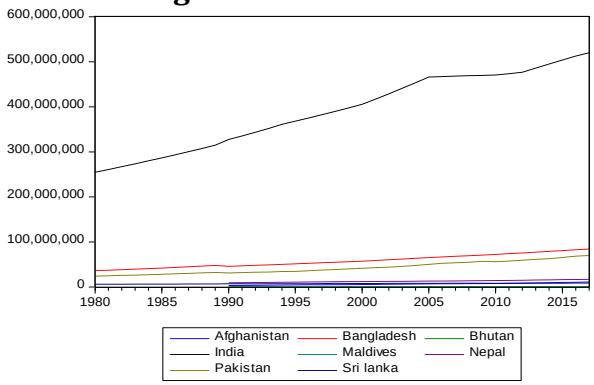
Table 3 shows gross fixed capital formation and growth rate of gross fixed capital formation. From C.V. it has appeared that Pakistan and Afghanistan have more consistent and less volatile gross fixed capital than other SAARC countries. The capital of Maldives is more volatile and less consistent compared to other SAARC countries. From C.V. it has appeared that Afghanistan has a more volatile and capital growth rate. Bangladesh and India have a more stable and consistent capital growth rate compared to other SAARC countries.

Figure: 1 GDP



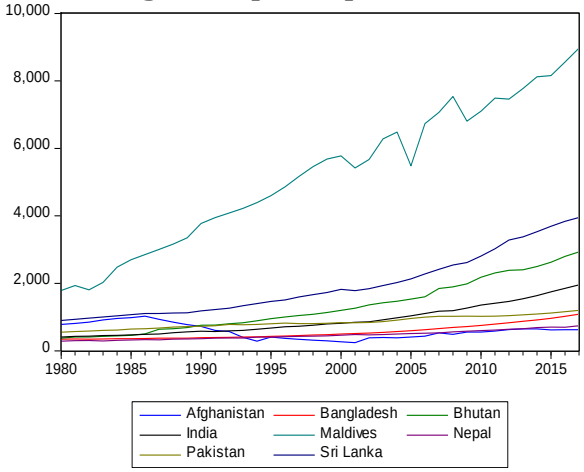
From figure 1, we can easily notice that India has the highest GDP because the black line of India's GDP is ranked above other country's line of GDP. The second and third positions have Pakistan and Bangladesh respectively. Bhutan and Maldives have a lower GDP than other SAARC countries.

Figure: 2 Labor force



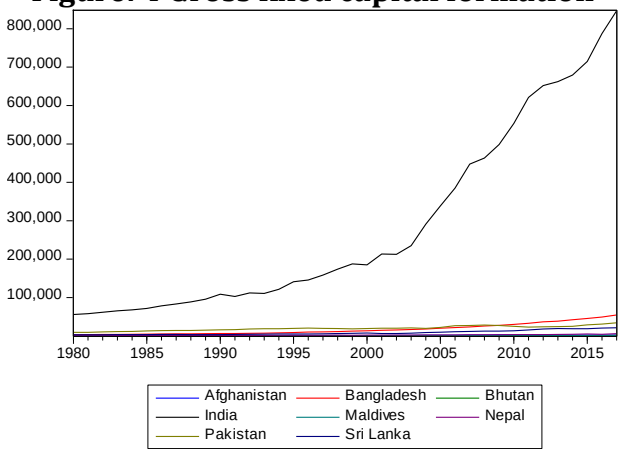
In figure 2, it is clearly shown that India has more labor force than other SAARC countries. The black line indicates the labor force of India. Maldives and Bhutan have less labor force than other SAARC countries.

Figure: 3 per Capita GDP



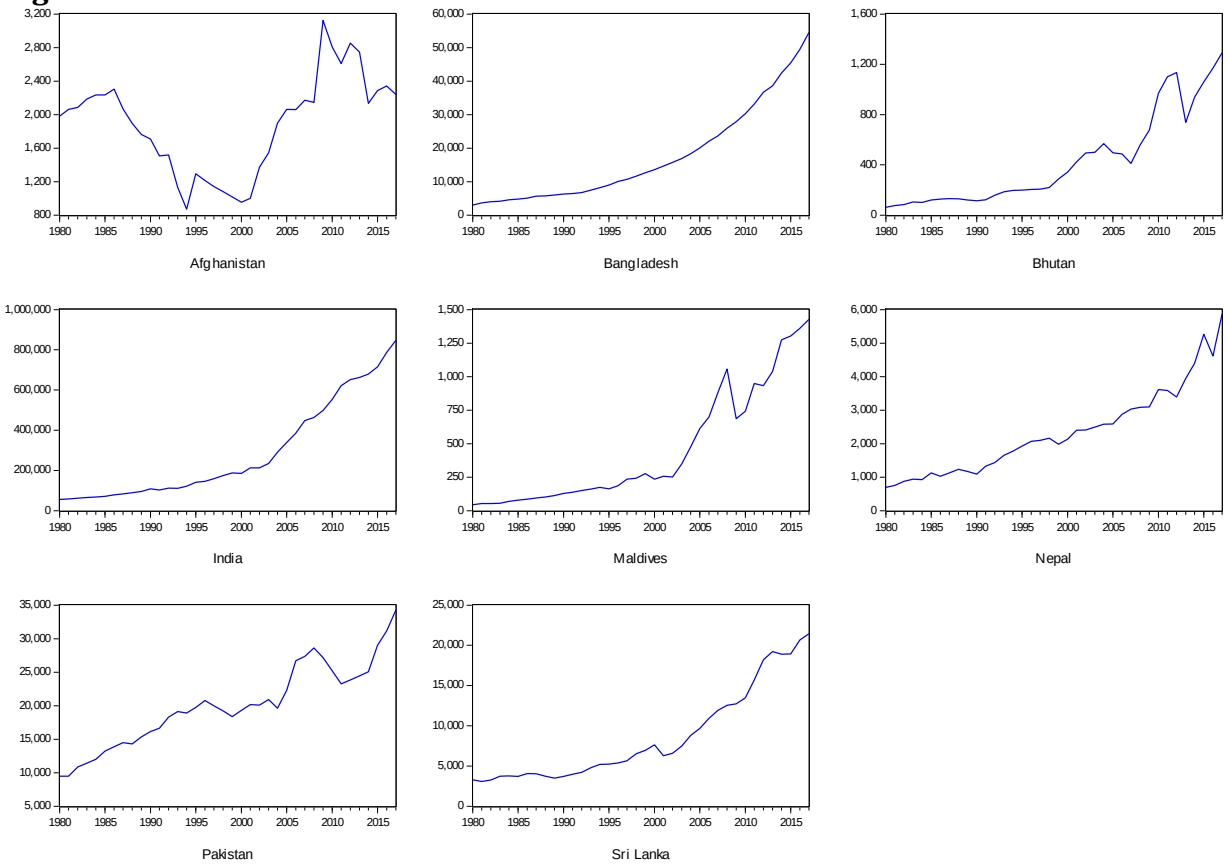
In (figure-1) we noticed that India has the highest GDP. But the population of every country is not the same. In that case, per capita GDP provides a more appropriate scenario. And in this figure, we can see that Maldives has the highest per capita GDP. Then Sri Lanka and Bhutan have more per capita GDP compared to other SAARC countries.

Figure: 4 Gross fixed capital formation



In figure 4, it has appeared that India has the highest capital investment. And in previous graphs, we also noticed that India had the highest GDP and labor force. Afghanistan and Nepal have less capital compared to other SAARC countries.

Figure: 5 Gross Domestic Product



From figure 5, the ups and downs of the gross domestic product of each SAARC country can easily be understood. It has appeared that Afghanistan has more ascent and descent. In 1994-1995 **Taliban** launched an operation against the capital Kabul and in that period there were different conflicts. It may be the reason for the descent of capital investment in that period. And we can see, after 2001 the capital investment gradually increases. Actually in 2001 Afghanistan freed from the Taliban government and was established as the Islamic Republic of Afghanistan. **On 26 December 2004, Maldives** was destroyed by a tsunami and the 2004 Indian Ocean earthquake. So, for rehabilitation, more capital investment was needed in that period. And we can see that in that period graph has an upward trend. **In 2013**, there were parliamentary elections in **Bhutan.** Maybe, for this reason, there was more capital investment in that period.

4. Methodology

In this paper, the ordinary least squares (OLS) method has been applied to estimate the production model. We know that ordinary least squares (OLS) can only be used in the case of the linear regression model. The cobb-Douglas production function is a non-linear regression model. So double-log transformation has been applied to covert non-linear Cobb-Douglas production function into a linear form. EViews software has been used to estimate the production function using the Ordinary Least Square method.

Model Specification

Cobb-Douglas Production Function is one of the most widely applied production function models in Management research and Economics. It represents the technical relationship between the number of inputs used and the amount of output produces by using these inputs. The Cobb-Douglas production model was first developed and tested by Charles Cobb and Paul Douglas (Cobb and Douglas, 1928). In manufacturing sectors, economic analysis this model can be used. In this paper, this model will be used for economic analysis. It helps to calculate the coefficients of capital and labor forces, the marginal productivity of GDP and labor forces, degree of returns to scale. The basic Cobb-Douglas production function: $\mathbf{Y_t = A_0 L_t^{\alpha} K_t^{\beta}}$

Where,

- Y= level of the output variable
- L= quantity of input variable labor
- K= quantity of input variable capital
- $A_{0=}$ constant or intercept
- α and β are two coefficients of L & K respectively

Let us consider the following Cobb-Douglas production function model for this analysis:

$\mathbf{GDP_t = A_0\, LF_t^{\alpha}\, CAP_t^{\beta}}$

$\mathbf{Ln\ GDP_t = ln\ A_0 + \alpha\ ln\ LF_t + \beta\ ln\ CAP}$

[Taking log in both sides to transform the non-linear equation in linear form]

$\mathbf{Y_t = \beta_0 + \alpha\, X_{1t} + \beta\, X_{2t} + \varepsilon_t}$

Where,

- GDP= Gross domestic product constant 2010 USD
- LF= Total labor force
- CAP= Gross fixed capital formation constant 2010 USD
- α = Output elasticity with respect to labor forces or coefficient of labor
- β = Output elasticity with respect to capital or coefficient of capital

- ε_t= Disturbance term

Marginal Productivity of Labor and Capital:

$Y_t = A_0 LF_t^{\alpha} CAP_t^{\beta}$

Marginal productivity of labor(MPL):

$$MPL = \frac{\delta Y}{\delta LF} * \frac{LF}{Y}$$

$$\frac{\delta Yt}{\delta LFt} = A_0 \alpha LF_t^{(\alpha-1)} CAP_t^{\beta}$$

Marginal productivity of capital (MPK):

$$MPK = \frac{\delta Y}{\delta CAP} * \frac{CAP}{Y}$$

$$\frac{\delta Yt}{\delta CAPt} = A_0 \alpha LF_t^{\alpha} CAP_t^{(\beta-1)}$$

Returns to Scale:

- $\alpha + \beta = 1$, the function is considered to be a constant returns to scale
- $\alpha + \beta > 1$, the function is considered to be an increasing returns to scale
- $\alpha + \beta < 1$, the function is considered to be a decreasing returns to scale

Different tests used in this study are:

- Breusch-Pagan-Godfrey test for heteroscedasticity.
- Bresch-Godfrey Serial correlation LM Test for autocorrelation
- Durbin-Watson statistic for autocorrelation.

5. Data Analysis and Interpretation

Ordinary least squares (OLS) method has been applied to estimate the production function model. At first, which result we get there were heteroscedasticity and autocorrelation problem. So, we can't apply this result for our analysis. Then we apply different test statistics and get our final result. Different statistical techniques like the Autoregressive distributive lag model [ar(1), ar(2), ar(3)] has been applied to solve these problems and we get this final result which is shown in table 4.

Table: 4 Final OLS result

Estimated result for Afghanistan						
Dependent Variable: Y **Method: Least Squares**						
Variable	**Coefficient**	**Std. Error**	**t-Statistic**	**Prob.**		
C	-12.36382	3.911661	-3.160759	0.0044	α + β	1.741868
X1	0.695694	0.123529	5.631826	0.0000	R-squared	0.971796
X2	1.046174	0.263977	3.963120	0.0006	Adjusted R-square	0.968118
AR(1)	0.708166	0.119545	5.923854	0.0000	Durbin-Watson stat	2.146093
Estimated Result for Bangladesh						
C	16.65437	1.203104	13.84283	0.0000		
X1	0.179276	0.03784	4.737783	0.0001		
X1(1)	0.206301	0.040141	5.13938	0.0000		
X2	0.080371	0.01579	5.089874	0.0000		
X2(1)	-0.003024	0.015531	-0.194737	0.8471	α + β	0.098905
AR(1)	1.482738	0.166028	8.930654	0.0000	R-squared	0.999907
AR(2)	-0.882059	0.26445	-3.335443	0.0026	Adjusted R-square	0.999882
AR(3)	0.427644	0.164152	2.605171	0.0150	Durbin-Watson stat	1.623391
Estimated Result for Bhutan						

C	388.9075	37245.22	0.010442	0.9918	α + β	0.430279
X1	0.01749	0.035992	0.485942	0.6316	R-squared	0.997721
X2	0.412789	0.198554	2.078979	0.0490	Adjusted R-square	0.997424
AR(1)	0.999864	0.013139	76.09979	0.0000	Durbin-Watson stat	2.047993
Estimated Result for India						
C	-9.645423	8.602617	-1.12122	0.2717		
X1	0.323802	0.072589	4.460757	0.0001		
X2	1.071849	0.687971	1.557987	0.1305		
X1(1)	0.190025	0.07500	2.533653	0.0172	α + β	1.395651
X2(1)	0.123825	0.727153	0.170288	0.8660	R-squared	0.998816
AR(1)	1.331606	0.198362	6.713017	0.0000	Adjusted R-square	0.998562
AR(2)	-0.421531	0.220089	-1.915274	0.0657	Durbin-Watson stat	2.019888
Estimated Result for Maldives						
C	-0.853801	1.767465	-0.483065	0.6336	α + β	0.795496
X1	0.155518	0.096181	1.616935	0.1195	R-squared	0.980858
X2	0.639978	0.193532	3.306824	0.0031	Adjusted R-square	0.978361
AR(1)	0.674878	0.156854	4.302578	0.0003	Durbin-Watson stat	2.079714
Estimated Result for Nepal						
C	-20.91417	2.09958	-9.961119	0.0000		
X1	0.089648	0.04714	1.901742	0.0710	α + β	1.900937
X2	1.811289	0.145882	12.41613	0.0000	R-squared	0.997032
AR(1)	0.959698	0.21202	4.526449	0.0002	Adjusted R-square	0.996466
AR(2)	-0.246666	0.223246	-1.104906	0.2817	Durbin-Watson stat	2.031545
Estimated Result for Pakistan						
C	19.7644	3.232987	6.113356	0.0000	α + β	0.380376
X1	0.110597	0.04235	2.611531	0.0135	R-squared	0.99906
X2	0.269779	0.158327	1.703929	0.0978	Adjusted R-square	0.998974
AR(1)	0.979641	0.007578	129.2712	0.0000	Durbin-Watson stat	1.785297
Estimated Result for Sri Lanka						
C	-6.114589	3.901147	-1.567382	0.1272		
X1	0.672974	0.047371	14.20656	0.0000	α + β	1.624054
X2	0.95108	0.300179	3.168376	0.0034	R-squared	0.994354
AR(1)	0.673502	0.190298	3.539194	0.0013	Adjusted R-square	0.993625
AR(2)	-0.124415	0.170509	-0.729664	0.4711	Durbin-Watson stat	1.883401
Source: From Calculations						

Table 4 shows that there is no autocorrelation problem and heteroscedasticity problem. And for our further analysis, this result will be used.

Table: 5 Breusch-Godfrey Serial Correlation LM test

Breusch-Godfrey Serial Correlation LM Test				
Country	**F-statistic**	**Prob.F**	**Obs*R-squared**	**Prob. Chi-square**
Afghanistan	22.04957	0.1801	13.4070	0.1203
Bangladesh	1.554711	0.2240	1.99061	0.1583
Bhutan	34.8752	0.1863	16.58603	0.1503
India	0.089231	0.7674	0.11528	0.7342
Maldives	0.217181	0.6458	0.26394	0.6074
Nepal	0.162871	0.6908	0.210022	0.6468
Pakistan	0.239558	0.6279	0.27493	0.6001
Sri Lanka	1.829845	0.1863	2.06958	0.1503
Source: From calculations				

From table 5, As Prob. Chi-square values of all the countries are more than 0.05. We can say that there is no serial correlation in the residuals.

Table: 6 Heteroskedasticity Test:Breusch-Pagan-Godfrey

Heteroskedasticity Test:Breusch-Pagan-Godfrey						
Country	**F-statistic**	**Prob.F**	**Obs*R-squared**	**Prob.Chi-square**	**Scaled explained SS**	**Prob.Chi-square**
Afghanistan	2.2964	0.1215	4.3456	0.1139	2.5929	0.2735
Bangladesh	0.3765	0.8235	1.6786	0.7946	0.6434	0.9581
Bhutan	0.6634	0.5239	1.4111	0.4938	0.4799	0.7867
India	1.0836	0.382	4.4186	0.3523	2.0461	0.7273
Maldives	0.1536	0.8584	0.3414	0.8431	1.2335	0.5397
Nepal	0.122	0.8850	0.2747	0.8716	0.1383	0.9332
Pakistan	0.1828	0.8337	0.3937	0.8213	0.3485	0.8401
Sri Lanka	0.8244	0.4473	1.7132	0.4246	1.1646	0.5586
Source: From calculations						

From table 6, As Prob. Chi-square values of Obs*R-squared in the case of all the SAARC countries are more than 0.05. We can say that there is no heteroscedasticity in the residuals.

5.1 Estimated Production Function

The estimated production functions for the SAARC countries are presented in table 7:

Table: 7 Estimated Production Function

Country	ln A_0	α	β	Adjusted R^2	Production Function
Afghanistan	-12.36382	1.046174	0.695694	0.96811	GDP_t=0.00000427 $LF_t^{1.046174}CAP_t^{0.695694}$
Bangladesh	16.65537	0.080371	0.179276	0.99988	GDP_t=1.7E+07 $LF_t^{0.080371}$ $CAP_t^{0.179276}$
Bhutan	388.9075	0.412789	0.017490	0.99742	GDP_t=7.95E+168 $LF_t^{0.412789}$ $CAP_t^{0.017490}$
India	-9.645423	1.071849	0.323802	0.99856	GDP_t=0.0000647 $LF_t^{1.071849}$ $CAP_t^{0.323802}$
Sri Lanka	-6.114589	0.951080	0.672974	0.99362	GDP_t=0.0022103 $LF_t^{0.951080}$ $CAP_t^{0.672974}$
Maldives	-0.853801	0.639978	0.155518	0.97836	GDP_t=0.42579 $LF_t^{0.639978}$ $CAP_t^{0.155518}$
Nepal	-20.91417	1.811289	0.089648	0.99646	GDP_t=8.26E-10 $LF_t^{1.811289}$ $CAP_t^{0.089648}$
Pakistan	19.76440	0.269779	0.110597	0.99897	GDP_t=3.83E+08 $LF_t^{0.269779}$ $CAP_t^{0.110597}$

Table 7 shows the estimated production function. When there is more than one independent variable, the adjusted R-squared is better than R-squared. And from the estimated result, we can say that the fit is good. Because 96.81%, 99.98%, 99.74%, 99.85%, 99.36%, 97.84%, 99.65% and 99.89% of the total variation in the dependent variable GDP in case of Afghanistan, Bangladesh, Bhutan, India, Sri Lanka, Maldives, Nepal, and Pakistan respectively is explained by the fitted regression equation. And remaining variation can be attributed to the factors included in the random error term.

5.2 Returns to Scale

Table: 8 Returns to scale

Country	α	β	α + β	Returns to Scale	Rank
Afghanistan	1.046174	0.695694	1.741868	**Increasing returns to scale**	**02**
Bangladesh	0.080371	0.179276	0.259647	Decreasing returns to scale	08
Bhutan	0.412789	0.017490	0.430279	Decreasing returns to scale	06
India	1.071849	0.323802	1.395651	**Increasing returns to scale**	**04**
Sri Lanka	0.951080	0.672974	1.624054	**Increasing returns to scale**	**03**
Maldives	0.639978	0.155518	0.795496	Decreasing returns to scale	05
Nepal	1.811289	0.089648	1.900937	**Increasing returns to scale**	**01**
Pakistan	0.269779	0.110597	0.380376	Decreasing returns to scale	07

Table 8 shows the return to scale. Increasing returns to scale represents how much input we invest; output will be more than this input. And decreasing returns to scale represents how much input we invest; output will be less than this input. The economy of Afghanistan, India, Sri Lanka, and Nepal indicate increasing returns to scale. And the Economy of Bangladesh, Bhutan, Maldives, and Pakistan indicate decreasing returns to scale. Which countries have more labor co-efficient; these countries provide increasing returns to scale. Actually for the economic growth of any country efficiency and productivity of labor is very important. If we rank them based on returns to scale, it has appeared that Nepal is ranked the 1st position. Afghanistan, Sri Lanka, India, Maldives, Bhutan, Pakistan, and Bangladesh are ranked the 2nd, 3rd, 4th, 5th, 6th, 7th and 8th positions respectively.

5.3 Elasticity of Labor and Capital

Afghanistan: From the estimated results it can be concluded that the output elasticity with respect to labor is 1.046174 which means for increasing 100% input labor the output will be increased by 104.6174% while the input capital is constant. And the output elasticity with respect to capital is 0.695694 which means for increasing 100%input capital the output will be increased by 69.5694% while the input labor is constant.

Bangladesh: From the estimated results it is found that the output elasticity with respect to labor is 0.080371 which means that for increasing 100% input labor the output will be increased by 8.0371% while the input capital is constant. And output elasticity with respect to capital is 0.179276 which means that for increasing 100% input capital the output will be increased by 17.9276% while the input labor is constant.

Bhutan: From the estimated results it can be concluded that the output elasticity with respect to labor is 0.412789 which means for increasing 100% input labor the output will be increased by 42.2789% while the input capital is constant. And the output elasticity with respect to capital is 0.017490 which means for increasing 100% input capital the output will be increased by 1.740% while the input labor is constant.

India: From the estimated results it is found that the output elasticity with respect to labor is 1.071849 which means for increasing 100% input labor the output will be increased by 107.1849% while the input capital is constant. And the output elasticity with respect to capital is 0.323802 which means for increasing 100% input capital the output will be increased by 32.3802% while the input labor is constant.

Maldives: From the estimated results it can be concluded that the output elasticity with respect to labor is 0.639978 which means for increasing 100% input labor the output will be

increased by 63.9978% while the input capital is constant. And the output elasticity with respect to capital is 0.155518 which means for increasing 100% input capital the output will be increased by 15.5518% while the input labor is constant

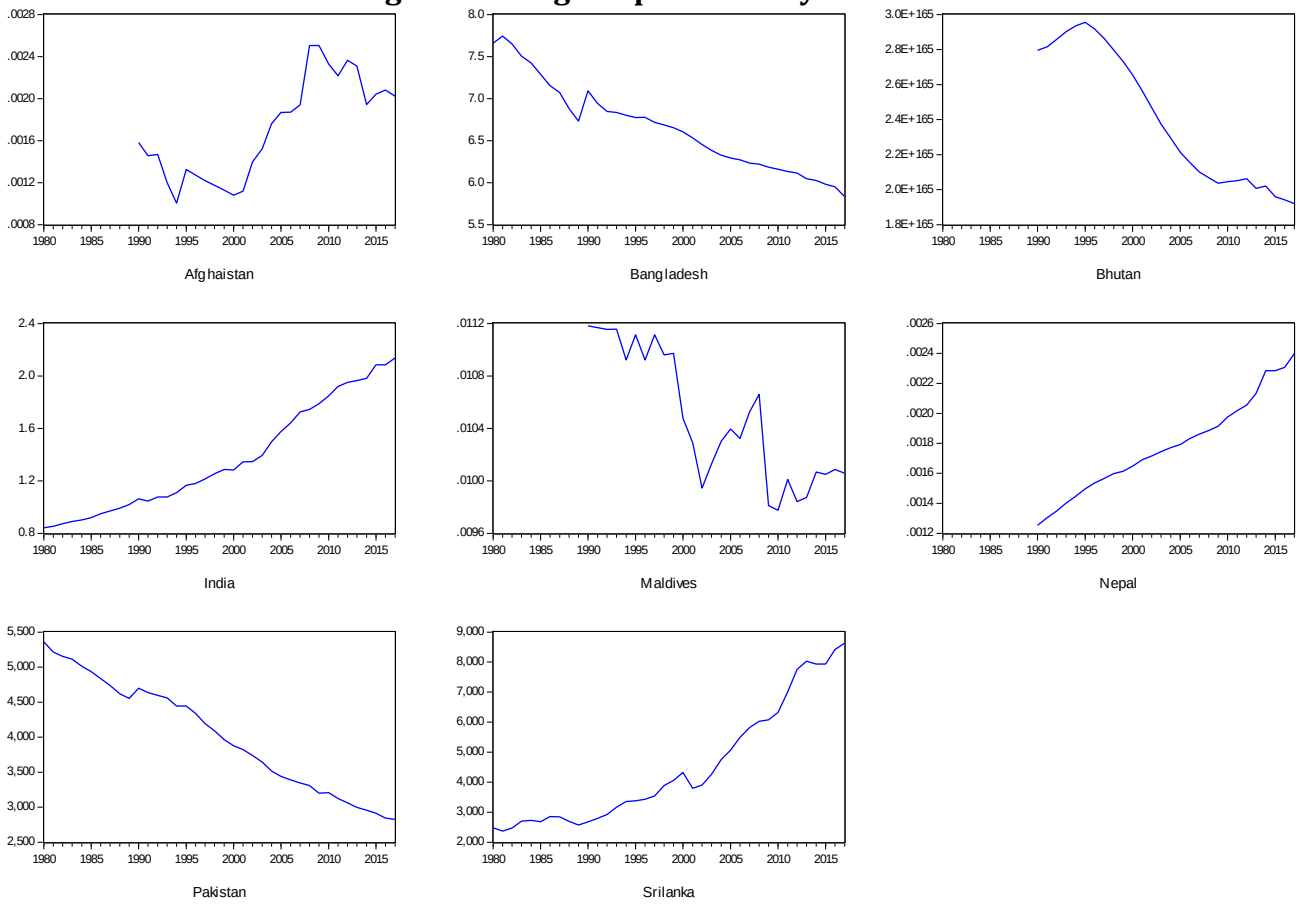
Nepal: From the estimated results it can be concluded that the output elasticity with respect to labor is 1.811289 which means for increasing 100% input labor the output will be increased by 181.1289% while the input capital is constant. And the output elasticity with respect to capital is 0.089648 which means for increasing 100% input capital the output will be increased by 8.9648% while the input labor is constant.

Pakistan: From the estimated results it can be concluded that the output elasticity with respect to labor is 0.269779 which means for increasing 100% input labor the output will be increased by 26.9779% while the input capital is constant. And the output elasticity with respect to capital is 0.110597 which means for increasing 100% input capital the output will be increased by 11.0597% while the input labor is constant.

Sri Lanka: From the estimated results it can be concluded that the output elasticity with respect to labor is 0.951080 which means for increasing 100% input labor the output will be increased by 95.108% while the input capital is constant. And the output elasticity with respect to capital is 0.672974 which means for increasing 100% input capital the output will be increased by 67.2974% while the input labor is constant.

5.4 Marginal Productivity of Labor and Capital:

Figure: 6 Marginal productivity of labor



From figure 6, we can see that Afghanistan, India Sri Lanka, and Nepal have increasing returns to scale. And in this graph, we can see the marginal productivity of labor is increasing gradually in the case of Afghanistan, India, Nepal, and Sri Lanka. So it can be concluded that an economy will provide increasing returns to scale when the marginal productivity of labor of these countries is in increasing trend. If the labor force is skilled marginal productivity will be better.

Figure 7: Marginal productivity of capital

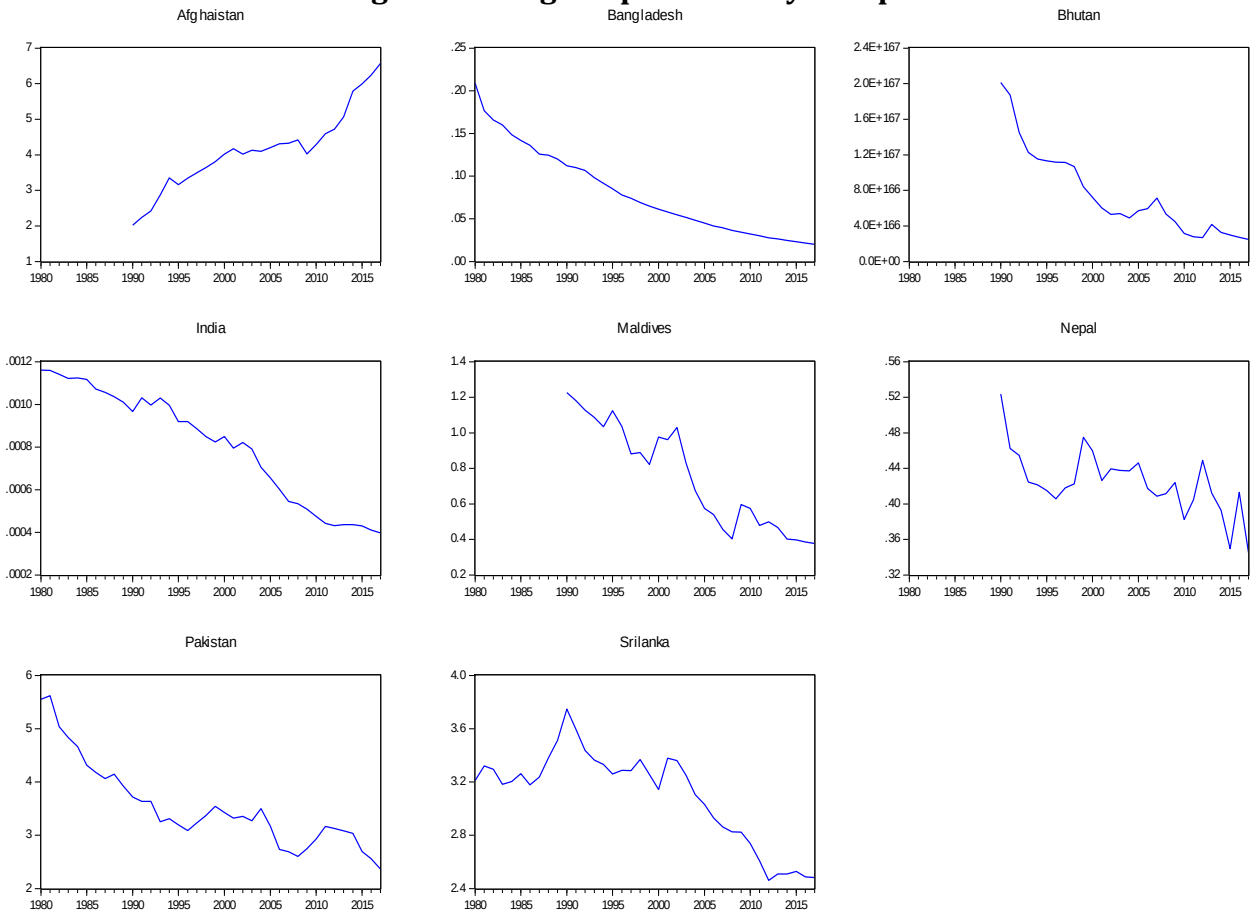


Figure 7 shows that the marginal productivity of capital is more volatile in Bangladesh. In Bangladesh, capital investment increases from 2967761199 to 54517277224. But from this figure, we can see that the productivity of capital is decreasing day by day. That means there is a capital investment but these are not sustainable. The productivity of capital is more increasing in Afghanistan. If Afghanistan invests more capital, it will be able to gain more output because the productivity of capital is higher.

6. Conclusion and Policy Implications

The main objective of the paper is to compare the economic performance of SAARC countries based on the estimated Cobb-Douglas production function. A production function is a relationship between the number of inputs a firm uses and the quantity of output it produces (Krugman P. and Wells R., 2009). If An economy, manufacturing sector, or other sectors can provide more and better output using the same level of input or less input, then that economy and sector will be considered as more productive and have a scope of prosperity. In this study, Labor and capital are the input variables and GDP is the output variable of the Cobb-Douglas production function. If labor forces are not productive and skilled, capital investment will not be sustainable. As a result, there will be no better output and capital investment will

be fruitless in these cases. Marginal productivity of labor and capital help to decide whether decision-maker should invest in labor forces or capital. If the marginal productivity of labor decreases then that economy needs qualified labor forces, in that case, quantity does not much matter. If the marginal productivity of capital is in increasing trend then that economy should invest more capital.

Afghanistan, India, Sri Lanka, and Nepal have increasing returns to scale. And Bangladesh, Bhutan, Maldives, and Pakistan have decreasing returns to scale. The adjusted R- Squared indicates that 96.81%, 99.98%, 99.74%, 99.85%, 99.36%, 97.84%, 99.65%, and 99.89% of the total variation in the dependent variable (GDP) in the case of Afghanistan, Bangladesh, Bhutan, India, Sri Lanka, Maldives, Nepal, and Pakistan respectively is explained by the fitted regression equation. That means most of the variation is affected by labor and capital. And remaining variation can be attributed to the factors included in the random error term.

Therefore the fit is good in the case of SAARC countries. India's economy is one of the world's fastest-growing and largest economies. India has the highest GDP, labor, and capital compared to other SAARC countries. Maldives has the highest per capita GDP. The growth rate of GDP and capital is more variable in the case of Afghanistan. But the marginal productivity of labor and capital is good of this country. So a proper and structured system of capital investment is needed for Afghanistan. The growth rate of labor forces is more variable in Sri Lanka. The growth rate of capital is consistent in Bangladesh and India. Though in Bangladesh capital investment is increasing day by day, GDP is not increasing at that fast rate. Bangladesh, Pakistan, Maldives, and Bhutan need more productive labor forces and structured capital investment to get an increasing return to scale. For sustainable development of the country's economy, the government should implement such kind of policies which will play a significant role to develop the resources of the countries. Otherwise, capital investment and development will not be sustainable in the long run. Proper education, different training facilities, and adequate nutrition can develop the quality of human capital. And qualified human capital is the precondition of sustainable capital investment and development.

Acknowledgement

The author is grateful to Dr. Md. Sharif Hossain, Professor, Department of Accounting & Information Systems, University of Dhaka, for his guidelines and supervision.

References

Afzal, M. N. I., and Manni, U. H. (2013). An Empirical Productivity Analysis of ASEAN Economies in Transition Towards Knowledge-Based Economy. *Asian Research Policy*, Vol. 4(1), pp. 1-9

Cobb, C. W.; Douglas, P. H. (1928). A Theory of Production (PDF). *American Economic Review*. 18, 139–165.

Felipe, J., and Adams, F. G. (2005). The Estimation of the Cobb-Douglas Function: A Retrospective View. *Eastern Economic Journal*, Vol. 31(3), pp. 427-445.

Feroz, A.N.M., et al. (2009). Profitability Analysis of Bagda Farming in Some Selected Areas of Satkhira District, Progress.Agric.20(1&2): 221-229. ISSN 1017-8139(online).

Hossain, M., and Majumder, A. K. (2015). On Measurement Efficiency of Cobb-Douglas Production Function with Additive and Multiplicative Error, Statistics, Optimization and Information Computing, *An International Journal*, Vol. 3 No. 1. ISSN, 2310-5070 (online).

Hossain, M. M., Basak, T. and Mahumder, A. K. (2013). Application of Non-linear Cobb-Douglas Production Function with Autocorrelation Problem in Selected Manufacturing Industries in

Bangladesh, *Open Journal of Statistics,* Vol. 3, p. 173-178, Available at http://dx.doiorg/10,426/ojs, 2013.33019.

Hossain, M. Z., and Khalid, Said Al-Amri. (2010). Use of Cobb-Douglas production model on some selected manufacturing industries in Oman, Education, *Business and Society: Contemporary Middle Eastern Issues,* Vol. 3 Issue: 2, pp.78-85.

Husain Shaiara and Islam Md. Shahidul. (2016). A Test for the Cobb Douglas Production Function in Manufacturing Sector: The Case of Bangladesh. *International Journal of Business and Economic Research.* Vol. 5, No. 5, 2016, pp. 149-154. doi:10.11648/j.ijber.20160505.13.

Khan, M.S.(2005). Human Capital and Economic Growth in Pakistan, *The Pakistan Development Review*,44:4 Part I,pp.455-478.

Khatun,T and Afroze, S. (2016). Relationship between Real GDP and Labour and Capital by Applying the Cobb-Douglas Production Function: A Comparative Analysis among Selected Asian Countries*, Journal of Business Studies*,Vol. XXXVII.

Krugman Paul and wells Robin. (2009). *Macroeconomics,* book 2nd edition. United States of America: Worth Publishers.

Li, K. W. (2003). China's Capital and Productivity Measurement Using Financial Resources. Yale University Economic Growth Center Discussion Paper, Vol.(851).

Limam, Y. R. and Miller, S. M. (2004). Explaining Economic Growth: Factor Accumulation, Total Factor Productivity Growth, and Production Efficiency Improvement. University of Connecticut, Department of Economics Working Paper Series, Economics Working 2004-20

Liu, M., and Li, D. (2010). An Analysis on Total Factor Productivity and Influencing Factors of Soybean in China. *Journal of Agricultural Science*, Vol. 2(2), p. 158.

Miller, S. M., and Upadhyay, M. P. (2002). Total Factor Productivity, Human Capital and Outward Orientation: Differences by Stage of Development and Geographic Regions. University of Connecticut, Department of Economics Working Paper Series, (Working Paper 2002-33).

Nurunnajib, A.F. et al. (2018). Application of Cobb-Dougls Production Function to Manufacturing Industries in West Sumatra Indonesia. *World Scientific News*, WSN 101, p.145-156, EISSN 2392-2192.

Ozyurt, S. (2009). Total Factor Productivity Growth In Chinese Industry: 1952-2005, *Oxford Development Studies* 37(1):1-17.

Rahman M.M .(2008). Macroeconomic and Trade Link Models of SAARC Countries: An Investigation for Regional Trade Expansion. *Journal of the Asia Pacific Economy*,Volume 13,2007,Issue 1

Rahman, M., and Sayeda, T. (2016). The Effect of Integration with Global Apparel Value Chain: The Case of Bangladesh Apparel Industry, *South Asia Economic Journal.*

Shakeel, M., et al. (2014). Energy Consumption, Trade and GDP: A case Study of South Asian Countries, *The Pakistan Development Review*, 53:4, pp,461-476.

Wulan, E. R. (2014). The Utilization of the Cobb-Douglas Production Function for Analyzing Indonesia's and Malaysia's Economic Growth. *International Journal of Nusantara Islam, Vol*. 1(2), pp. 38-44.

Appendix: A (GDP, Labor Force and Capital of SAARC Countries)

	Afghanistan			Bhutan			Maldives		
Year	GDP	LF	Cap	GDP	LF	Cap	GDP	LF	Cap
1990	8857.199	3270825	1706.949	407.4652	194467	114.4491	842.9495	57962	128.4532
1991	7889.052	3480811	1507.366	410.4815	192463	122.6425	907.461	59905	137.57
1992	8016.421	3759162	1518.49	425.5415	189091	157.844	964.231	61960	149.3074
1993	6015.127	4067992	1129.486	434.1081	185186	185.6329	1023.582	64163	160.0839
1994	4676.087	4365798	870.3413	459.6256	181816	196.0507	1091.534	66544	174.446
1995	7011.073	4631347	1293.387	490.7834	179854	198.7761	1168.947	69157	162.7984
1996	6641.568	4801781	1214.275	522.2201	183902	203.5329	1260.811	72634	186.178

1997	6300.127	4924653	1141.466	552.8918	190056	207.068	1366.693	76343	233.8177
1998	6014.181	5032304	1079.745	586.7867	198120	219.6297	1469.122	80408	241.1486
1999	5722.292	5162557	1017.91	633.3889	207884	285.9651	1559.85	84990	275.9758
2000	5407.37	5336840	952.9776	688.729	219105	341.8126	1619.839	90212	235.4468
2001	5100.465	5606987	1001.067	745.2309	234269	423.0959	1555.959	98254	255.5682
2002	8415.634	5934968	1372.096	825.1781	250989	493.777	1669.052	107322	251.6681
2003	9108.107	6292828	1542.889	888.5053	268487	499.6188	1898.547	117329	348.4057
2004	9321.438	6644955	1897.441	940.9068	285786	568.0937	2013.101	128078	475.1664
2005	10244.4	6969404	2061.216	1007.926	302195	496.029	1748.8	139354	612.5254
2006	11182.91	7133722	2058.865	1076.984	316034	486.2586	2205.437	150383	698.7261
2007	14229.29	7264788	2170.739	1270.259	328786	410.6085	2375.562	157306	879.931
2008	13285.51	7390836	2144.144	1330.434	340498	559.6821	2600.892	164500	1056.962
2009	15573.93	7549815	3122.824	1418.991	351556	676.1265	2412.877	171917	686.7762
2010	16077.92	7766590	2807.688	1585.464	352752	970.1299	2588.176	179485	741.2777
2011	17473.63	8126681	2608.201	1710.584	352709	1100.653	2809.898	186958	948.8786
2012	19383.47	8560749	2852.348	1797.33	349247	1134.115	2880.634	194529	932.9933
2013	20638.73	9051268	2747.235	1835.833	361128	737.149	3090.375	201956	1037.923
2014	21271.16	9567711	2133.073	1941.31	360141	939.7648	3316.888	208998	1274.062
2015	20890.16	10087598	2285.589	2069.387	380655	1060.83	3412.565	212105	1302.675
2016	21633.66	10551800	2340.431	2234.746	387787	1169.272	3661.314	213912	1361.044
2017	22174.5	10937230	2240.525	2368.866	396174	1291.867	3914.373	220009	1426.838

Bangladesh				India			Pakistan		
Year	GDP	LF	CAP	GDP	LF	CAP	GDP	LF	Cap
1980	2.8627E+10	36271231	2.97E+09	1.84E+11	2.55E+08	3.93E+10	4.34E+10	23970381	9.49E+09
1981	3.0698E+10	37314068	3.65E+09	1.91E+11	2.61E+08	4.03E+10	4.69E+10	24895177	9.47E+09
1982	3.1353E+10	38414011	3.96E+09	1.98E+11	2.67E+08	4.21E+10	4.99E+10	25813766	1.08E+10
1983	3.257E+10	39572437	4.14E+09	2.15E+11	2.73E+08	4.38E+10	5.33E+10	26303556	1.14E+10
1984	3.4134E+10	40789459	4.55E+09	2.09E+11	2.8E+08	4.46E+10	5.6E+10	27254365	1.2E+10
1985	3.5275E+10	42066363	4.82E+09	2.29E+11	2.87E+08	5.27E+10	6.03E+10	28240995	1.32E+10
1986	3.6747E+10	43402785	5.09E+09	2.46E+11	2.94E+08	5.5E+10	6.36E+10	29242980	1.39E+10
1987	3.8133E+10	44803318	5.61E+09	2.75E+11	3E+08	6.71E+10	6.77E+10	30261429	1.45E+10
1988	3.9055E+10	46279964	5.7E+09	2.93E+11	3.08E+08	7.45E+10	7.29E+10	31273697	1.43E+10
1989	4.0163E+10	47848276	5.98E+09	2.92E+11	3.15E+08	7.72E+10	7.65E+10	32251977	1.53E+10
1990	4.2421E+10	34585841	6.31E+09	3.17E+11	3.28E+08	9.19E+10	7.99E+10	31130954	1.61E+10
1991	4.3899E+10	35621946	6.47E+09	2.67E+11	3.35E+08	6.47E+10	8.39E+10	31842626	1.66E+10
1992	4.6288E+10	36723431	6.72E+09	2.84E+11	3.43E+08	7.3E+10	9.04E+10	32679313	1.83E+10
1993	4.8469E+10	37894393	7.48E+09	2.76E+11	3.52E+08	6.81E+10	9.2E+10	33244083	1.91E+10
1994	5.0355E+10	39138880	8.17E+09	3.23E+11	3.61E+08	8.9E+10	9.54E+10	34423557	1.89E+10
1995	5.2934E+10	40461698	8.95E+09	3.55E+11	3.68E+08	1E+11	1E+11	34623303	1.97E+10
1996	5.5328E+10	41775968	1E+10	3.88E+11	3.75E+08	1.02E+11	1.05E+11	36057146	2.08E+10
1997	5.7812E+10	43172218	1.07E+10	4.1E+11	3.83E+08	1.17E+11	1.06E+11	37577502	2E+10

1998	6.0805E+10	44628349	1.16E+10	4.16E+11	3.9E+08	1.12E+11	1.09E+11	38654373	1.92E+10
1999	6.3645E+10	46112850	1.26E+10	4.53E+11	3.98E+08	1.34E+11	1.13E+11	40043321	1.84E+10
2000	6.7013E+10	47598773	1.35E+10	4.62E+11	4.06E+08	1.25E+11	1.18E+11	41617691	1.93E+10
2001	7.0416E+10	48946794	1.46E+10	4.79E+11	4.17E+08	1.29E+11	1.2E+11	42713694	2.02E+10
2002	7.3115E+10	50303954	1.57E+10	5.08E+11	4.29E+08	1.4E+11	1.24E+11	43991382	2.01E+10
2003	7.658E+10	51642722	1.69E+10	6E+11	4.41E+08	1.79E+11	1.3E+11	45816194	2.09E+10
2004	8.0593E+10	52935998	1.83E+10	7E+11	4.53E+08	2.56E+11	1.39E+11	47704747	1.96E+10
2005	8.586E+10	54175076	2.01E+10	8.09E+11	4.66E+08	3.12E+11	1.5E+11	50083730	2.23E+10
2006	9.1589E+10	55153622	2.21E+10	9.2E+11	4.67E+08	3.66E+11	1.59E+11	52551736	2.67E+10
2007	9.8054E+10	56091457	2.36E+10	1.2E+12	4.68E+08	5.1E+11	1.67E+11	53655064	2.74E+10
2008	1.0395E+11	57004748	2.6E+10	1.19E+12	4.69E+08	4.54E+11	1.7E+11	54888464	2.86E+10
2009	##########	57920440	2.79E+10	1.32E+12	4.7E+08	5.38E+11	1.75E+11	56949189	2.72E+10
2010	##########	58860664	3.03E+10	1.66E+12	4.71E+08	6.74E+11	1.77E+11	56125279	2.52E+10
2011	##########	59932582	3.31E+10	1.82E+12	4.74E+08	7.22E+11	1.82E+11	57508050	2.33E+10
2012	##########	61016510	3.67E+10	1.83E+12	4.77E+08	7.01E+11	1.89E+11	59382954	2.38E+10
2013	##########	62111483	3.86E+10	1.86E+12	4.86E+08	6.32E+11	1.97E+11	61333632	2.44E+10
2014	##########	63214859	4.24E+10	2.04E+12	4.95E+08	6.99E+11	2.06E+11	62716806	2.51E+10
2015	##########	64315695	4.54E+10	2.1E+12	5.04E+08	6.68E+11	2.16E+11	65422753	2.9E+10
2016	##########	65383994	4.95E+10	2.27E+12	5.13E+08	6.9E+11	2.28E+11	68396800	3.12E+10
2017	##########	66642260	5.45E+10	2.06E+12	5.2E+08	7.99E+11	2.41E+11	69957925	3.43E+10

Sri Lanka				Nepal		
Year	GDP	LF	Capital	GDP	LF	Cap
1980	4024621900	5988108	1359044162			
1981	4415844156	6069318	1226493506			
1982	4768765017	6139685	1466938972			
1983	5167913302	6205131	1493072673			
1984	6043474843	6273715	1560849057			
1985	5978460972	6351192	1424226804			
1986	6405210564	6376371	1515453248			
1987	6682167120	6488463	1559103261			
1988	6978371581	6605012	1589500157			
1989	6987267684	6722272	1517947295			
1990	8032551173	7355728	1783699451	6751.789	9219209	1091.01
1991	9000362582	7198777	2058399807	7181.637	9486556	1324.613
1992	9703011636	7019888	2355441478	7476.665	9787994	1436.781
1993	10338679636	7159147	2642280629	7764.274	10112767	1651.437
1994	11717604209	7299364	3166936463	8402.438	10447095	1776.54
1995	13029697561	7155180	3352682927	8693.872	10780183	1923.244
1996	13897738375	7278672	3370074181	9157.925	11041507	2068.242
1997	15091913884	7401484	3680335650	9639.668	11295196	2094.15
1998	15794972847	7978309	3970349108	9923.319	11543782	2161.543
1999	15656327860	7864117	4272692525	10368.25	11794678	1983.24

2000	16330814180	7830731	4579041683	11002.31	12011409	2130.934
2001	15749753805	7907981	3465577844	11621.58	12231635	2400.577
2002	16536535647	7984113	3851202174	11635.5	12445975	2403.749
2003	18881765437	8056471	4157853295	12094.56	12652191	2494.559
2004	20662525941	8123334	5218065026	12660.9	12846163	2576.135
2005	24405791045	8183016	6547452736	13101.39	13027892	2589.675
2006	28267410543	8231291	7909195845	13542.2	13237636	2876.976
2007	32351184234	8273940	9042849394	14004.2	13426530	3029.081
2008	40715240469	8310608	11218019016	14859.11	13604039	3085.222
2009	42067974595	8341363	10278832434	15532.68	13865431	3100.432
2010	56728002830	8242391	17218352701	16280.8	14152815	3615.608
2011	65289915890	8250892	21783244877	16837.9	14545682	3589.436
2012	68436230408	8172455	26728140938	17642.96	14972888	3392.35
2013	74294206491	8498965	24702389804	18371.41	15417273	3949.221
2014	79359306576	8449225	25640607111	19471.66	15851443	4399.164
2015	80554807486	8519572	25118107635	20118.7	16260015	5260.133
2016	81788375090	8630101	28608945686	20201.78	16689835	4614.208
2017	87174682200	8724539	31841928533	21716.78	17053278	5870.736

Appendix: B (Marginal productivity of capital and marginal productivity of labor)

Marginal productivity of capital								
Year	**Afghanistan**	**Bangladesh**	**Bhutan**	**India**	**Maldives**	**Nepal**	**Pakistan**	**Sri Lanka**
1980		0.20880598		0.00116091			5.55148995	3.211833
1981		0.17675089		0.0011592			5.61944756	3.321205
1982		0.16557767		0.00114072			5.0357762	3.294227
1983		0.16006933		0.00112203			4.83267843	3.182675
1984		0.14843487		0.00112381			4.66355422	3.203626
1985		0.14193815		0.0011165			4.31716935	3.262757
1986		0.13605757		0.00107206			4.18006863	3.17907
1987		0.12586947		0.00105687			4.06408247	3.237506
1988		0.12463304		0.00103578			4.14587294	3.380317
1989		0.12013193		0.00101018			3.92454601	3.511857
1990	2.017253	0.1119935	2.013E+167	0.00096712	1.225997	0.523855	3.71787362	3.74676
1991	2.235962	0.11004332	1.872E+167	0.00103065	1.181697	0.462373	3.6373008	3.59476
1992	2.417943	0.1068123	1.451E+167	0.00099733	1.126816	0.454425	3.6373008	3.437151
1993	2.873632	0.09817321	1.226E+167	0.00103025	1.086436	0.424706	3.25474302	3.364762
1994	3.349471	0.09154362	1.153E+167	0.00099607	1.034239	0.421506	3.31367632	3.332165
1995	3.158286	0.08513111	1.133E+167	0.00091901	1.12375	0.415072	3.1966366	3.259426
1996	3.343587	0.0777971	1.117E+167	0.00091902	1.035353	0.405721	3.08854744	3.286703
1997	3.49836	0.07409693	1.113E+167	0.00088567	0.8818	0.417999	3.23319245	3.285363
1998	3.639451	0.06916262	1.069E+167	0.00084935	0.88811	0.422451	3.36877927	3.368251
1999	3.805749	0.06481136	8.413E+166	0.00082367	0.821098	0.475036	3.54314176	3.255554
2000	4.020097	0.06141159	7.215E+166	0.00084904	0.975481	0.459888	3.4269347	3.143327

2001	4.170287	0.0578108	6.015E+166	0.00079452	0.961342	0.42642	3.32004807	3.378437
2002	4.020951	0.05463248	5.317E+166	0.00082119	1.030513	0.439522	3.35732844	3.361475
2003	4.125018	0.05153101	5.404E+166	0.00079065	0.828977	0.437771	3.27509735	3.249938
2004	4.100407	0.04839635	4.888E+166	0.00070438	0.674688	0.437012	3.50260476	3.104341
2005	4.202862	0.04491743	5.715E+166	0.00065547	0.574681	0.446139	3.16980223	3.031795
2006	4.308081	0.04163224	5.936E+166	0.00060194	0.539892	0.417291	2.73251345	2.930446
2007	4.320786	0.03939261	7.125E+166	0.00054502	0.45735	0.408523	2.69061238	2.861819
2008	4.415781	0.03652634	5.332E+166	0.00053353	0.403132	0.411422	2.60135639	2.825779
2009	4.027039	0.03449497	4.487E+166	0.00050849	0.5968	0.423949	2.74892166	2.82337
2010	4.284559	0.03228699	3.151E+166	0.0004747	0.575168	0.38254	2.92980529	2.739214
2011	4.594496	0.02999929	2.784E+166	0.00044209	0.479269	0.404658	3.167111	2.607923
2012	4.721219	0.02766494	2.692E+166	0.00043093	0.49866	0.448937	3.12724493	2.461454
2013	5.062107	0.02654143	4.168E+166	0.00043517	0.466799	0.412192	3.08387926	2.510281
2014	5.794059	0.02460577	3.279E+166	0.00043622	0.401306	0.392905	3.03451785	2.510137
2015	5.996486	0.02328778	2.979E+166	0.00042966	0.397587	0.349655	2.69442159	2.529524
2016	6.240281	0.02174116	2.728E+166	0.00041014	0.385225	0.413011	2.55770076	2.48823
2017	6.56563	0.02011381	2.495E+166	0.00039638	0.376887	0.344897	2.36473608	2.483177

Marginal productivity of labor

Year	Afghaistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Srilanka
1980		7.65926		0.84111			5360.89	2477.917
1981		7.742706		0.853261			5213.463	2373.141
1982		7.650786		0.87191			5153.304	2466.983
1983		7.503711		0.891123			5112.366	2702.351
1984		7.422801		0.902853			5009.587	2722.623
1985		7.290167		0.920176			4934.129	2684.195
1986		7.153178		0.949256			4835.09	2853.088
1987		7.070348		0.968954			4737.685	2841.049
1988		6.881348		0.991819			4618.86	2689.396
1989		6.731425		1.017572			4551.747	2571.109
1990	0.001583	7.093424	2.8E+165	1.063499	0.011181	0.001253	4696.814	2672.311
1991	0.001456	6.939608	2.8E+165	1.045699	0.011167	0.001304	4636.046	2792.706
1992	0.001469	6.845723	2.9E+165	1.077116	0.011155	0.001348	4597.445	2919.038
1993	0.0012	6.834585	2.9E+165	1.075765	0.011157	0.001401	4561.604	3166.233
1994	0.001004	6.802221	2.9E+165	1.109745	0.010921	0.001448	4442.218	3352.107
1995	0.001326	6.773807	3E+165	1.166923	0.011114	0.001496	4444.176	3376.829
1996	0.001271	6.775855	2.9E+165	1.179924	0.010921	0.001535	4338.819	3429.593
1997	0.001219	6.716276	2.9E+165	1.214577	0.011114	0.001566	4191.832	3543.837
1998	0.001174	6.686759	2.8E+165	1.253325	0.010961	0.001598	4089.183	3885.079
1999	0.001128	6.65252	2.7E+165	1.286464	0.010972	0.001614	3964.883	4053.84
2000	0.001079	6.604011	2.7E+165	1.28242	0.010477	0.001648	3875.818	4322.082
2001	0.00112	6.530682	2.6E+165	1.34563	0.01029	0.001691	3821.288	3796.324
2002	0.001398	6.453771	2.5E+165	1.346438	0.009944	0.001715	3738.428	3906.63
2003	0.001521	6.383754	2.4E+165	1.393757	0.01013	0.001744	3645.28	4260.265

2004	0.001761	6.325894	2.3E+165	1.497216	0.010301	0.001771	3514.654	4756.082
2005	0.001869	6.291111	2.2E+165	1.574888	0.010395	0.001792	3439.933	5063.485
2006	0.00187	6.272607	2.2E+165	1.642546	0.010323	0.001832	3388.543	5491.748
2007	0.001941	6.230725	2.1E+165	1.724642	0.010528	0.001862	3346.27	5823.341
2008	0.002505	6.219469	2.1E+165	1.744234	0.010659	0.001885	3307.55	6027.864
2009	0.002505	6.184292	2E+165	1.786681	0.009811	0.001915	3201.662	6081.168
2010	0.002329	6.160417	2E+165	1.848284	0.009775	0.001975	3208.804	6326.14
2011	0.002217	6.131609	2.1E+165	1.919668	0.01001	0.002018	3124.447	7012.775
2012	0.002366	6.114316	2.1E+165	1.950789	0.009842	0.002055	3060.204	7755.898
2013	0.00231	6.045934	2E+165	1.96327	0.009872	0.002133	2997.266	8026.823
2014	0.001943	6.024379	2E+165	1.982304	0.010067	0.002285	2956.986	7938.357
2015	0.002043	5.979876	2E+165	2.084346	0.010049	0.002285	2913.992	7938.27
2016	0.002081	5.94961	1.9E+165	2.084346	0.010086	0.002307	2843.478	8416.253
2017	0.002023	5.831518	1.9E+165	2.136596	0.010058	0.002399	2826.559	8628.896

Appendix: C (Growth rate of GDP and growth rate of capital) & Per capita GDP

Growth rate of GDP								
Year	**Afghanistan**	**Bangladesh**	**Bhutan**	**India**	**Maldives**	**Nepal**	**Pakistan**	**Sri Lanka**
1980	-3.71694	0.819142	5.0087	6.735822	18.572858	-2.3193	10.2157	5.846027
1981	2.15293	7.233944	13.908	6.006204	11.764706	8.34197	7.920764	5.699525
1982	2.03488	2.134328	3.4139	3.475733	-3.012212	3.77937	6.537487	4.141496
1983	4.91453	3.881046	11.311	7.288893	16.256295	-2.9774	6.778378	4.813991
1984	1.83299	4.80331	4.4821	3.820738	26.955475	9.68113	5.065206	5.099147
1985	0.26667	3.342015	4.2118	5.254299	12.985782	6.14491	7.592115	4.999406
1986	2.99202	4.173383	11.731	4.776564	9.3791946	4.56565	5.501654	4.355547
1987	-10.2647	3.772402	28.696	3.965356	8.8663906	1.69562	6.452343	1.725611
1988	-8.27338	2.416257	4.9873	9.627783	8.7219952	7.69681	7.625279	2.472685
1989	-7.05882	2.836582	7.4326	5.947343	9.2534992	4.32965	4.959769	2.299301
1990	-3.12236	5.622258	10.876	5.533455	16.251483	4.63504	4.458587	6.399995
1991	-10.9306	3.485228	-0.408	1.056831	7.6530612	6.36815	5.061568	4.599987
1992	1.6145	5.442686	4.6009	5.482396	6.2559242	4.10641	7.705898	4.399991
1993	-24.9649	4.711562	1.9864	4.750776	6.1552185	3.84985	1.757748	6.900063
1994	-22.2612	3.890126	4.9515	6.658924	6.6386555	8.216	3.737416	5.599919
1995	49.9346	5.121278	7.0741	7.574492	7.0921986	3.46845	4.962609	5.500085
1996	-5.27031	4.522919	5.5652	7.549522	7.8586467	5.32828	4.846581	3.799967
1997	-5.14096	4.489896	5.3738	4.049821	8.3979407	5.04861	1.014396	6.4054
1998	-4.53873	5.177027	5.914	6.184416	7.494683	3.01639	2.550234	4.698423

1999	-4.85335	4.670156	7.984	8.845756	6.1756561	4.41257	3.660133	4.30054
2000	-5.50342	5.293295	6.933	3.840991	3.8458105	6.2	4.260088	6.000033
2001	-5.67568	5.077288	8.2038	4.823966	-3.943635	4.79976	1.982484	-1.54541
2002	64.9974	3.833124	10.728	3.803975	7.2683863	0.12027	3.22443	3.964676
2003	8.22841	4.739567	7.6643	7.860381	13.75005	3.94504	4.846321	5.940269
2004	2.34221	5.239533	5.8964	7.922943	6.0337541	4.6826	7.368571	5.445061
2005	9.90153	6.535945	7.1226	9.284825	-13.12905	3.47918	7.667304	6.241748
2006	9.16115	6.671868	6.8494	9.263965	26.111493	3.36461	6.177542	7.668292
2007	27.2414	7.058636	17.926	9.80136	7.7138673	3.41156	4.832817	6.796826
2008	-6.63268	6.01379	4.7684	3.890957	9.4853328	6.10464	1.701405	5.950088
2009	17.225	5.045125	6.6572	8.479784	-7.228842	4.53308	2.831659	3.538912
2010	3.23612	5.571802	11.731	10.25996	7.2651292	4.81641	1.606692	8.015959
2011	8.6809	6.464384	7.8909	6.638364	8.5667336	3.42183	2.748403	8.404738
2012	10.9298	6.521435	5.0717	5.456388	2.5173838	4.78119	3.507033	9.144579
2013	6.47593	6.013596	2.1425	6.386106	7.281074	4.12888	4.396457	3.395723
2014	3.06429	6.061093	5.7455	7.410228	7.3296062	5.98898	4.674708	4.960707
2015	-1.79114	6.552633	6.5974	8.154425	2.2459244	3.32291	4.731147	5.007683
2016	3.55909	7.113465	7.9907	7.112686	6.1631583	0.41289	5.526736	4.46883
2017	2.5	7.284208	6.8188	6.624227	4.8	7.4994	5.700621	3.112558

Growth rate of capital								
Year	**Afghanistan**	**Bangladesh**	**Bhutan**	**India**	**Maldives**	**Nepal**	**Pakistan**	**Sri lanka**
1981	4.1775	22.8563	21.4573	3.9901	20.6897	8.2794	-0.2195	-6.1262
1982	0.9984	8.5901	11.3506	6.3419	0.0000	16.1714	14.3728	6.0208
1983	4.9457	4.5122	24.6845	6.4012	3.8095	7.1537	5.3362	14.5887
1984	2.1611	9.9560	-4.0734	3.5765	27.7108	-1.2605	5.2137	1.1976
1985	0.0421	5.9238	19.6631	5.4915	12.7974	21.9615	10.2479	-2.0027
1986	3.0356	5.6138	5.7975	9.5131	9.1337	-8.8544	4.7976	9.5227
1987	-10.2229	10.2901	2.8372	5.9962	9.0466	9.2036	4.2918	-0.5004
1988	-8.3148	1.5320	-1.4208	6.9132	9.0546	9.9770	-1.2346	-7.7086
1989	-7.0453	4.9256	-6.6830	7.6792	9.9356	-5.1050	7.3611	-6.3455
1990	-3.1172	5.5154	-4.9438	13.5990	14.2841	-6.9148	5.1371	6.6000
1991	-11.6924	2.4592	7.1590	-5.5670	7.0973	21.4116	3.1992	6.6000
1992	0.7380	4.0075	28.7025	8.9981	8.5320	8.4680	10.0368	6.6000
1993	-25.6178	11.1640	17.6053	-0.9252	7.2177	14.9401	4.3277	13.0000
1994	-22.9436	9.2375	5.6121	9.4582	8.9716	7.5754	-0.9555	9.0000
1995	48.6069	9.6082	1.3901	16.2679	-6.6769	8.2578	4.3088	0.9514
1996	-6.1167	11.9517	2.3930	3.0468	14.3611	7.5393	5.2306	2.4580
1997	-5.9961	6.4594	1.7369	8.8858	25.5883	1.2527	-3.8185	5.1175

1998	-5.4071	9.1132	6.0665	9.7111	3.1353	3.2182	-3.6920	15.2649
1999	-5.7268	8.5866	30.2033	7.9258	14.4422	-8.2488	-4.4987	6.4107
2000	-6.3790	7.1177	19.5295	-1.3940	-14.6857	7.4471	5.0422	9.9548
2001	5.0462	7.9347	23.7800	15.3030	8.5460	12.6537	4.4472	-17.470
2002	37.0634	7.4201	16.7057	-0.4359	-1.5260	0.1322	-0.3608	4.4206
2003	12.4476	7.6574	1.1831	10.5673	38.4386	3.7779	4.1029	13.8170
2004	22.9798	8.2086	13.7054	23.9817	36.3831	3.2702	-6.1299	17.8441
2005	8.6313	9.7636	-12.685	16.1933	28.9076	0.5256	13.5433	9.8118
2006	-0.1141	9.8880	-1.9697	13.8172	14.0730	11.0941	19.9011	12.8708
2007	5.4338	7.1469	-15.557	16.2028	25.9336	5.2870	2.3960	9.1434
2008	-1.2252	9.8151	36.3055	3.5071	20.1187	1.8534	4.5844	5.2969
2009	45.6443	7.3881	20.8055	7.6662	-35.0236	0.4930	-4.9586	1.3440
2010	-10.0914	8.5646	43.4835	10.9953	7.9359	16.6163	-7.3251	5.9521
2011	-7.1050	9.5609	13.4542	12.2530	28.0058	-0.7239	-7.7055	16.5548
2012	9.3607	10.5677	3.0402	4.9391	-1.6741	-5.4907	2.4264	16.0638
2013	-3.6851	5.3646	-35.002	1.5618	11.2465	16.4155	2.5832	5.5345
2014	-22.3556	9.8551	27.4864	2.6032	22.7511	11.3932	2.5220	-1.6753
2015	7.1500	7.1188	12.8825	5.1889	2.2458	19.5712	15.7732	0.0587
2016	2.3995	8.9094	10.2224	10.1410	4.4807	-12.279	7.4693	9.1791
2017	-4.2687	10.1488	10.4847	7.6021	4.8340	27.2317	9.9705	3.8594

Per capita GDP

Year	Afghanistan	Bangladesh	Bhutan	India	Maldives	Nepal	Pakistan	Sri Lanka
1980	784.44	347.56	377.29	410.31	1790.58	285.35	552.31	900.93
1981	813.26	349.70	409.28	427.10	1933.49	302.12	571.33	936.12
1982	849.62	344.59	408.22	433.08	1808.77	306.35	588.63	970.11
1983	917.30	351.92	430.54	454.60	2026.55	290.39	607.75	1001.72
1984	960.64	361.22	445.43	460.66	2480.04	311.24	617.56	1037.51
1985	984.79	362.25	457.45	475.02	2703.33	322.92	642.90	1074.18
1986	1030.17	367.94	505.35	487.23	2855.68	330.22	656.59	1104.19
1987	932.32	373.18	640.61	499.46	3005.31	328.52	676.98	1106.24
1988	852.36	373.96	657.37	537.39	3162.18	346.04	706.21	1121.21
1989	776.28	373.68	689.96	560.76	3347.76	352.73	719.17	1128.07
1990	723.09	388.72	758.39	580.34	3776.40	360.11	729.68	1183.31
1991	607.15	392.55	763.99	571.03	3949.71	373.17	745.49	1225.51
1992	573.37	399.97	800.60	590.05	4082.44	378.11	781.63	1264.68
1993	398.48	409.17	829.85	607.20	4221.67	382.08	774.92	1337.97
1994	289.13	416.77	889.88	639.95	4393.67	402.66	783.61	1400.30
1995	410.02	427.99	953.21	675.77	4600.67	406.32	802.01	1465.67
1996	372.64	438.31	1005.66	712.09	4861.86	418.11	820.12	1510.40
1997	342.74	452.29	1045.65	730.17	5171.48	430.54	808.24	1598.67
1998	318.82	466.17	1082.32	759.74	5457.24	434.16	809.00	1666.10
1999	294.91	479.09	1136.04	799.30	5682.85	444.87	819.09	1728.17

2000	269.11	497.72	1201.10	816.89	5777.22	463.43	834.77	1820.49
2001	243.27	514.10	1263.96	844.73	5420.95	480.99	832.81	1783.12
2002	382.88	527.01	1360.78	861.81	5670.47	473.64	841.52	1840.57
2003	394.89	545.05	1425.18	918.59	6282.23	484.74	864.09	1934.07
2004	386.48	569.85	1469.52	978.80	6485.02	500.24	908.82	2022.83
2005	408.62	594.85	1534.98	1039.75	5484.95	510.97	958.61	2132.36
2006	431.88	625.83	1602.11	1106.30	6736.81	522.05	997.20	2278.88
2007	534.60	661.94	1849.11	1173.17	7068.65	534.21	1024.27	2416.49
2008	486.76	693.89	1898.04	1191.74	7537.64	561.23	1020.62	2542.94
2009	556.13	720.91	1986.11	1267.31	6806.41	580.85	1028.13	2615.98
2010	558.20	752.60	2178.91	1356.33	7100.41	602.48	1023.15	2808.43
2011	588.17	792.08	2310.01	1408.82	7490.45	616.16	1029.39	3026.99
2012	631.45	833.90	2387.00	1467.07	7458.86	638.08	1043.17	3286.08
2013	650.41	873.70	2399.90	1541.84	7776.54	656.47	1066.25	3380.67
2014	649.34	915.99	2500.25	1636.52	8124.71	687.48	1093.04	3531.80
2015	619.22	965.14	2628.17	1749.42	8156.17	702.07	1121.57	3692.46
2016	624.24	1022.69	2801.26	1852.46	8559.35	697.03	1159.54	3841.81
2017	624.11	1085.74	2933.18	1954.08	8971.13	741.06	1201.67	3954.02

Cite this article:

Deeti Saha (2020). Comparative Analysis of Economic Performance of SAARC Countries Based on the Estimated Cobb-Douglas Production Function. *International Journal of Science and Business, 4*(10), 39-63. doi: https://doi.org/10.5281/zenodo.4026029

Retrieved from http://ijsab.com/wp-content/uploads/599.pdf

Published by

IJSAB International