
THE ROLE OF HIGHER EDUCATION TOWARDS EFFICIENT GROWTH STRATEGY: AN ARDL BOUNDS TESTING APPROACH

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ABSTRACT

In this study the ARDL bound testing approach is used in order to investigate the impact of higher education on the working efficiency of Pakistan's economy. The study has used time series data analysis from 1990 to 2019 to estimate the model. The dependent variable of the study was the efficiency score which is calculated on the basis of the production function. Capital stock, labor force participation and energy consumption was used as inputs while GDP used as output. The key independent variable is the higher education index constructed by incorporating the variables of enrolments in the undergrad and graduate programmes. On the other hand, capital formation, unemployment, urbanization, public health expenditures and inflation rate are the important determinants of the model. On the basis of analysis, the study suggests that the higher education has positive and significant relationship with the working efficiency of the economy. Moreover, there is the existence of long run relationship and dampening movements will adjust the model in the long run. The study directed the need for policy makers to encourage the infrastructure development for the higher education in order to increase more graduates and provide more skilled personnel to the society.

KEYWORDS*Higher Education Index, Efficiency Scores***INTRODUCTION**

Over the last few decades, an unprecedented increase in the education has been witnessed by the world. As a result, expansions of general level of education have also taken a great jump in many of the world regions and are now at certain level than ever before. The improvements in the education levels not just bring material welfare in the regions but also benefit them in other social and cultural matters like women empowerment, crime reduction, public health improvement, lower mortality and greater participation in the politics (Lochner, 2011). Education worked as the main tool for the accumulation of human capital has long been reflected as the engine for economic growth (Manuelli and Seshadri, 2014; Galor and Moav, 2004; Barro, 1991; Lucas, 1988 and Schultz, 1961), and widely accepted as a government policy tool to develop society as a whole. Historically, the countries with government-led education expansion initiatives experienced long term growth and development.

So, over the period of time, with these increasing levels of education, debates have been started on two important but competing phenomena of human capital: productivity theory and the signaling hypothesis. Theories of human capital propagate the role of human capital with the view that education increases the productivity of students. On the other hand, signaling hypothesis advocates that the education identifies or a sign of high productivity but it does not necessarily foresee the actual productivity or the future productivity of employees. It is also indicating and explained that why the individuals with graduation earn more than those of non-graduates? The question arises that why this issue is important? As a matter of the fact, the issue is important for public sector: government, academic institutions like universities and the students themselves. First, it is very important for the public sector because of the aim to increase the material well-being of the individuals of the country by heavily investing on higher education (Chevalier et. al. 2004). So, an interested and much focused relationship between higher education and productivity is developed. Usually the education is used as signal of high productivity which implies that the education affects the earnings of the individuals. Higher the education, higher will be the wage rate. The Human Development Report of (UNDP 2010) stated significant and positive relationship between the level of income, productivity and human capital development through health and education not only as individuals but as a nation. International Institute for Educational Planning (2007) also validates the education in general, and higher education in particular, as a contributing factor towards increasing productivity, quality of welfare of individuals and bring equality into the society. However, to meet the latest development needs, it is important that the education, particularly, the higher education, must perform as a stimulating factor for human resource development by

focusing the improvement of analytical and intellectual skills of the graduates. In recent times, the graduates with good cognitive skills are valued more. Whatever is the discipline, it is important for a graduate to perform further than the academic sphere. It will develop skills of broad range that would also elucidates their value as future productive employees. On the other hand, the higher education institutions also have the responsibility to develop intellect level of our generation with certain skills than can prove their productive roles in the society. The progress and prosperity with long term development targets could not be achieved without the participation of skilled and qualified manpower. These are the reasons why the education is demanded increasingly in various parts of the world during the last one or two decades, Pakistan also being no exception to that.

The investigators subsequently explored the earning and education relationship with various estimation methodologies by using various sources of data and establish same correlational results (Mincer, 1970). Both theories of human capital productivity and signaling hypothesis cope with the argument of cost-benefit analysis. In economic sense, people obtain education up to the point, where the expected marginal benefit from the education (or wage earnings) equalizes the marginal cost associated with of education. However, theories explained that why it appears particularly that employers usually are ready to pay a premium for the education (Kroch and Sjoblom, 1993). Apart from all dimensions of signaling and earning-education components, an important research question arises, as previously discussed, whether the education enhances the worker's productivity at workplace? For instance, it is observe that many students choose subjects which have very tiny direct vocational syllabus, it is also observe that many university graduates who are in jobs, do not directly use technical skills from their university courses. As previously discussed in the literature that education raise wages paid to the individuals, not because of productivity but because of other reasons. Ashton and Green (1996) argued earnings and education into five ways:

Monetary returns or salaries are not an accurate proxy for the components of human productivity;

The growth related accounting approach couldn't accumulate the complete impact of educational attainment on the economic welfare;

The differentiation of quality of schooling is ignored;

The physical capital along with human capital as a complementary factor is ignored and couldn't take into consideration and

Education (solely) is also treated exogenous.

LITERATURE REVIEW

The empirical studies have shown a strong and significant relationship between higher education and labor income as well. Mincer's (1958) estimated log-linear equations of

earnings and empirically identified on the US census cross section data that an additional year of schooling helped to increase annual earnings by 11.5 percent. Another recent study on UK data showed that every marginal year of full time higher education is associated with 6 percent increase in the annual earnings which is also mostly consistent with the estimated results of many OECD countries (Kirby & Riley, 2008; Walker & Zhu, 2001). Mora and Muro (2008) found that the salaries of university degree holders having an increment of 26% while there is 14% increment in the salaries of the individuals with secondary degrees in Colombia. On the similar ground, Gibson (2000) calculated the annual earnings by controlling the years of schooling and showed 50% increase in the postgraduate male degree holders compared to non-schooling individuals. Ferrer and Riddell (2002) also pointed out the educational returns for bachelor's degree holders are more than that of high school diploma holders in Canada. They also found that the parallel returning to professional degree surpassed by 35%. They further come up with the conclusion that 30% of the educational returns are for 16 years of schooling while it is more than half for the above 16 years. So, according to their results, both the schooling years and certificates or credentials influence the level of earnings.

Walker & Zhu (2003) studied the relationship between wage rate and the education level in the Labour Force Survey (LFS). They suggested that financial returns are large for education. However, the finding of LFS also explains that the nature of this phenomenon varies across individuals, in this regards, the degree and subject played a very important role, studying arts having little effects on the average earnings while studying Economics, Management and Law have larger effects on earnings. They were of the view that there is no evidence of falling of financial returns as a result of increasing higher education which implies that the increasing supply of graduates is also cop up with the increasing demand for them. Moreover, they did not find any evidence that increasing the minimum school leaving age made people who had not intended to leave at the minimum age raise their educational standard. So, their findings are consistent with the opinion that education helps to raise productivity but not with the opinion that productive people get more education. Chevalier et. al. (2004) studied the effects of educational attainment on productivity. They were of the opinion that the education raises the average wage rate but it is not clear to the researchers that whether the increased education also enhances the productivity or it is just a matter of signal of ability? The authors applied different test to explain the above research question to discriminate between these productivities and signaling, their findings suggested that they do not support the signaling hypothesis. However, they were having severe reservations regarding these results and proposed another methodology based on the education incentives and the minimum school leaving age in 1970's. By using this idea, the authors found significant support from the UK data regarding the human capital explanation.

According to Becker (1962) and Schultz (1971), the education directly enhances the productive efficiency of the student. As far as this human capital approach is concerned, the wages and salaries paid to workers signal or reflect the productivity of the workers and explain correlation between time in education and earnings. So, the signaling models posed a challenge for the human capital theory. While, the Arrow (1973) and Spence (1974) explored that the educational attainment of the employees used by the employers in order to identify the employees on the basis of certain valuable “distinctive” individualities that cannot be detected directly. According to this argument, the education doesn’t necessarily enhance worker’s productivity; rather it is used by the entrepreneurs or firms as a signal or a sign about the productivity potential of the individuals and their ability of learning by doing. According to perspective, it is arguably said that education rise wages or wages increase with education, because more educated people experience more utility. Particularly, its relevant with higher education which generally considered that the only those students reach to higher education levels who have higher cognitive ability (Spence, 1973). Moreover, the higher qualification of an individual provides other signals to employers for his relevance like; the quality of intuition generally perceived by general public where from the degree is obtained. Bowers-Brown (2004) and Harvey et. al. (1997), and the class of the degree obtained. In argument, these information provides more sights to the employers about the applicant’s working potential.

Schonewille (2001) argued that over the past decade, an increasing concern of researchers have been observed regarding the effects of training. According to Gary Becker, the employers pay for specific and employees for general training, as it is also argued that provision of general training also has a positive effect on labour productivity. So far empirical research does not indicate that only on-the-job training is beneficial to the firm and neither that only employee’s profit from general training. Their research developed a model at sector level and measures the effect of training on worker’s productivity. The said model has argued and pointed out the important benefits of general training, but it does not clarify that whether the benefit accrued is due to on duty or off duty training. According to Spence (1973), explained the sorting model of human capital. According to him the sorting model tells the employers about the indication of labor market and the capability about the innate productivity of workers. The sorting model explains two more models, namely signaling and screening hypothesis. The signaling hypothesis elucidates that the individuals are much informed about their productive efficiency productivity through their levels of education, intended at signaling their distinctive abilities to potential employers. On the other side, under the screening hypothesis, the employers are unaware about the employee’s productivity. So, they demand minimum education level from candidates or simply undertake or consider their given educational attainment screening forthcoming employees and then on the next stage infer the innate abilities of them.

Yao (2019) explored the effects of higher education expansion on the average labor productivity in China. They were of the view that an economy like as China, where the distortions in allocation are widely exist, the education policy affects both; the human capital stock and also on the human capital accumulation across different sectors. In case of misallocation the impact of policy following may be severe. The author build two-sector models of general equilibrium with the policy distortions favoring public sector and overlying generations of diversified households making occupational & educational choices. The empirical findings showed, given the policy distortions, the higher education expansion in China had small but adverse effect on its average worker's productivity (-2.5 percent). The factor which plays a role to driving down the productivity is the magnified misallocation of resources. However, the productivity effect would turn to be positive for the educational policy if the policy distortions were further removed or at least reduced. So, in the light of the above review of the literature, we will focus on the situational analysis of human resource development and state of educational attainment in Pakistan. Moreover, theoretical framework will also be discussed in order to in line with the economic literature.

Theoretical Framework & Situational Analysis

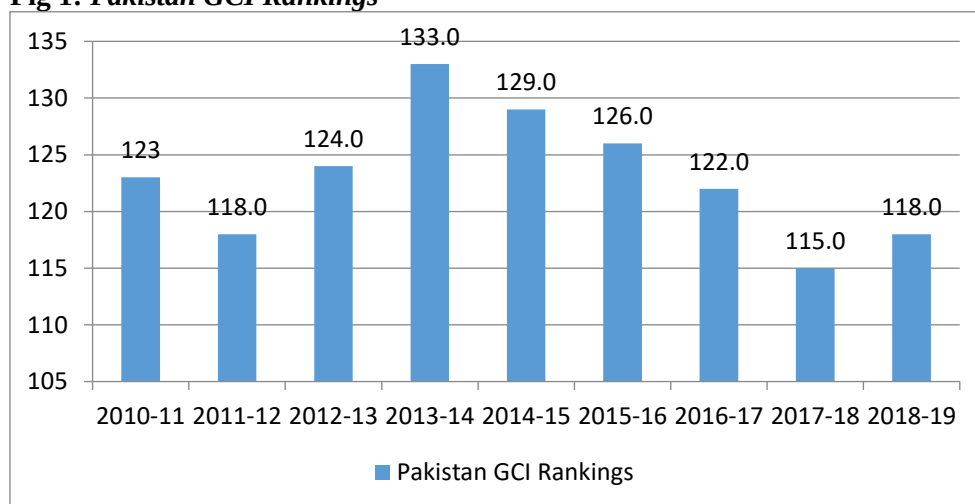
Human capital has a substantial importance in almost every economic school of thought and widely accepted as important determinant of growth literature. The economic literature is more explicit and wide-ranging in order to explain the importance of human capital not only for rapid but sustainable development both in developed and under developed world. Neoclassical theories consider human capital as vital input of their production function. According to Mankiw et al. (1992), Solow model augmented with human capital has the greater capability of describing differences in development among nations, and most of the nations converged at the rate which is predicted by Augmented Solow model.

Similarly, the proponents of endogenous growth models, hold investment on human capital as an important factor for economic growth. Various researches also advocates that steady state output of a worker is affected positively from R&D (human capital accumulation). In the same way, an additional educational year of an individual has positive and significant effect on the sustainable and long run income per worker. Moreover, the models also assume non-diminishing returns of human capital; which advocates the sustainable increment in the stock of knowledge that further triggers the economic growth (Pelinescu 2014; Fleisher and Zhao 2010; Chen and Hiau 2005; Segrestrom 1997 and Romer 1996).

Another approach which is globally used as an indication of productivity is the Global Competitiveness Index (GCI). This approach proposed by the World Economic Forum (WEF) in Switzerland and issues the Global Competitiveness Report (GCR) every

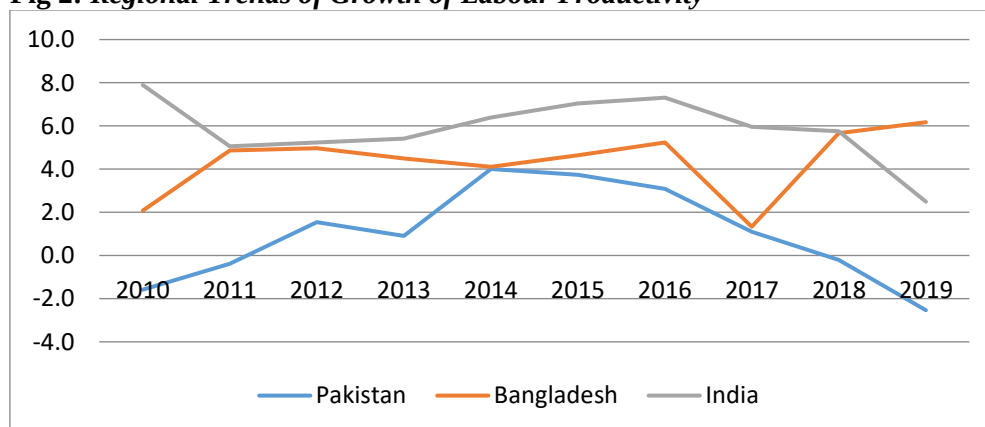
year. This report estimates the relative positioning of all the countries in terms of prosperity in the productivity. According to WEF competitiveness is the set of the institutions, policies, and factors that determine the level of productivity of a country. So, relating with productivity Fig 1 illustrated Pakistan's ranking trends in the competitiveness. The trend line shows declining trend in the competitiveness shows that Pakistan's has improved himself in terms of international rankings. But it is still lagging behind Bangladesh and India.

Fig 1: Pakistan GCI Rankings



Source: Global Competitiveness Report (Pakistan Various Issues)

Fig 2: Regional Trends of Growth of Labour Productivity



Source: CEIC Global Data 2020 (Pakistan, India & Bangladesh)

The fig 2 depicts the regional trends of labor productivity growth. In terms of labor productivity, India and Bangladesh are far better than Pakistan. The growth rate for productivity in Pakistan is in negatives. The persistence of such performance will tends to decrease the competitiveness in the international market. The fig 3 shows Pakistan's rankings in terms of human development.

The situation worsens after 2015 and Pakistan stands at 154 out of 189 nations, though in 2015 Pakistan at 147 positions. The regional positioning of our country again is worsening and falls below India and Bangladesh. So, what are the reasons behind for such declining tendency of Pakistan in terms of human capital? There may be several reasons for such state but most important is the performance in terms of educational attainment.

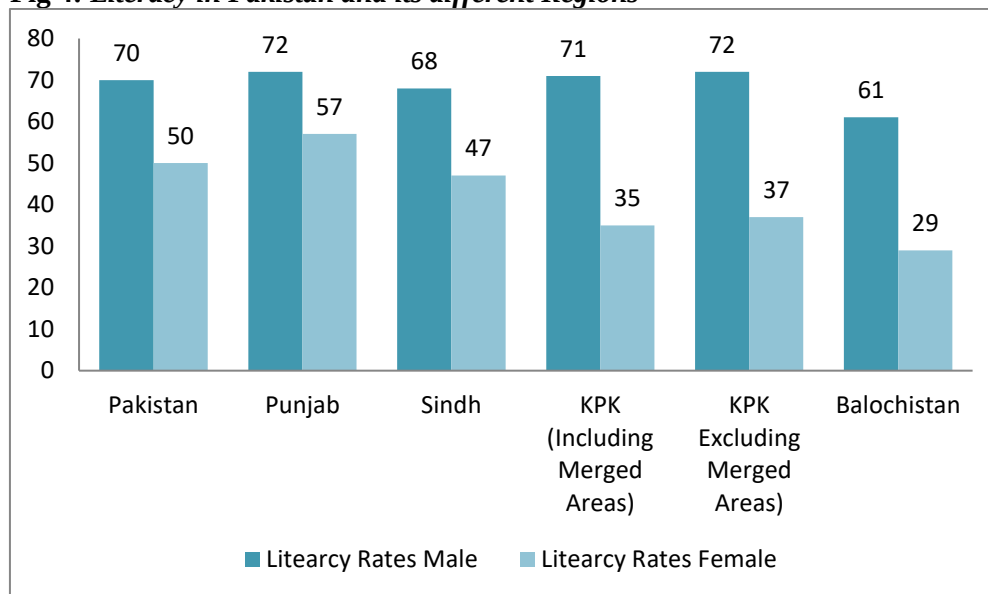
It is quite evident from the situational analysis that Pakistan is still performing less in terms of education indicators within the region. Although, Pakistan's individual ranking has improved but it is still far less in the region. In other words, the labor productivity is low in Pakistan in the region as compare to Bangladesh and India. Moreover, the regional picture of educational attainment also confirms the low literacy rate in Pakistan.

Fig 3: Rankings of Human Development (Out of 189 Countries)



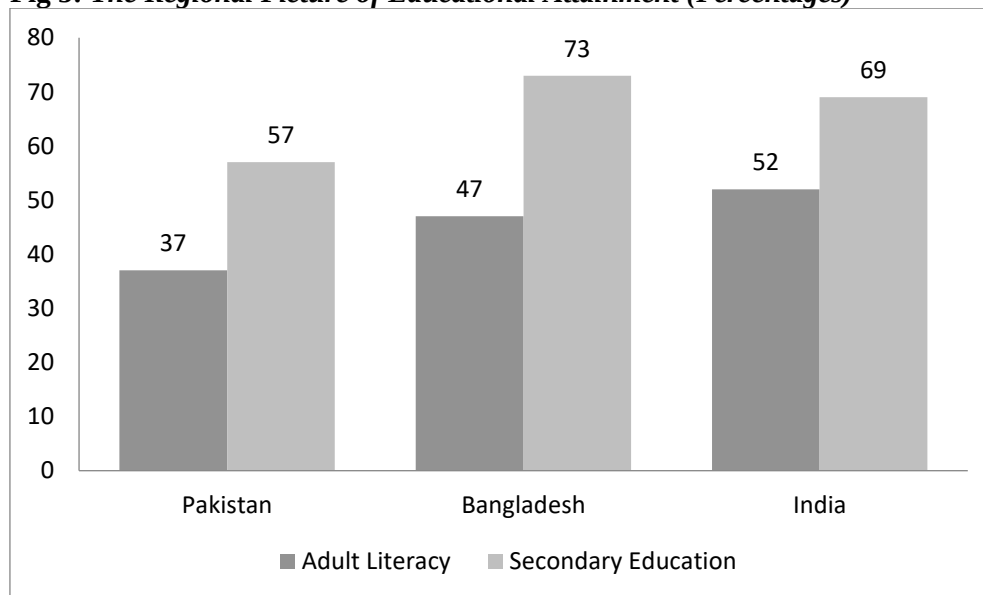
Source: Human Development Reports, (UNDP various issues)

Fig 4: Literacy in Pakistan and its different Regions

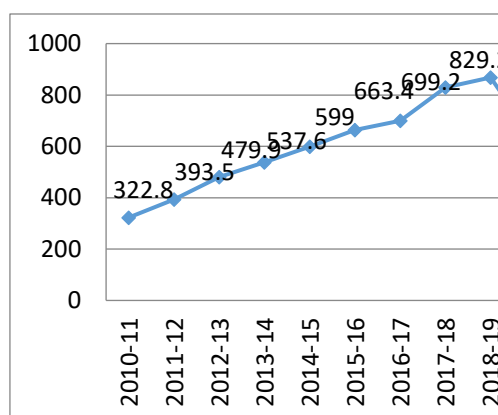
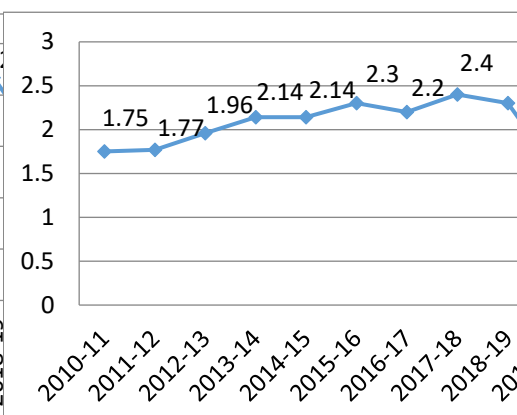


Source: Pakistan Economic Survey (2019-2020)

Fig 5: The Regional Picture of Educational Attainment (Percentages)



Source: Economic Survey of Pakistan (2019-20); Human Development Indicators (2019)

**Fig 6: Education Expenditures
(in Billion Rs.)****Fig 7: Education Expenditures
(% of GDP)**

Source: Pakistan Economic Survey

As far as the public spending on education is concerned, Pakistan spends very tiny share of its GDP in education. Pakistan is among those nations whose GDP spending share on education is lowest in the world. Most of the time the share was just less than 2 percent of the GDP, which is insufficient and illegitimate for human resource development.

RESEARCH OBJECTIVE

1. To analyze the role of human capital development (through higher education attainment) towards productivity.

RESEARCH QUESTIONS

1. To examine whether the education performs its role in human capital development in Pakistan?
2. Is it productive for the labor market in order to improve the per capita income or just signaled the employers to offers job?

RESEARCH METHODOLOGY

The Data

The study used Time series data from 1990 to 2019 for the analysis. The secondary data regarding urbanization, capital formation, inflation and unemployment was obtained from various issues of Pakistan Economic Survey, World Development Indicators (WDI), Pakistan Bureau of Statistics, and Handbook of Pakistan Economic Statistics. The data for the construction of Higher Education Index was obtained from Pakistan Education Statistics. While, the data used for the efficiency estimates was

capital stocks and labor force participation rate is obtained from WDI, while the data about energy utilization, was obtained from the Ministry of Petroleum (HDIP).

Methodological Framework

As the study used time series data, so, in order to analyze data with appropriate econometric methodology we first examine the stationarity of the time series data.

In practice, Augmented Dicky Fuller (ADF) test is used to identify the stationarity of the data. If the variables are stationary at first difference $I(1)$, which means the series is co-integrated so the error correction model can be used to estimate the model. On the other hand, if some variables are integrated of order one and some are integrated of order zero, then the ARDL methodology will be used to analyze the long and short term associations among the model variables.

Auto Regressive Distributed Lag Approach to Co-integration

ARDL methods is used to apply on the single equation model and useful for small sample Narayan (2004). It has the ability to estimate both long and short run parameters simultaneously. It also helps to obtain unbiased and efficient parameters of the model. Whether the variables are of $I(0)$ or $I(1)$ or the combination of both orders, this approach can be applied. The ARDL methodology is consisted of two stages. First, the long run association is examined between variables through F-statistics by determining the lagged values of the variables and their significance. Second, the coefficient of both long and short run relationship examined.

Bound Testing Procedure

The bound testing approach is based on three assumptions; first, after identifying the stationarity use ARDL approach, Pesaran *et al.* (2001). Second, the order of integration is not assured to keep the same order i.e., whether the variables are of $I(0)$ or $I(1)$. Third, this approach gives better estimated results while using small sample. The vector auto regression (VAR) of order p , for the economic growth function can be narrated as Pesaran *et al.* (2001);

$$EFF_t = \mu + \sum_{i=1}^p \beta_i z_{t-i} + \epsilon_t$$

Where the independent variable xt and dependent variable yt are incorporated in vector zt .

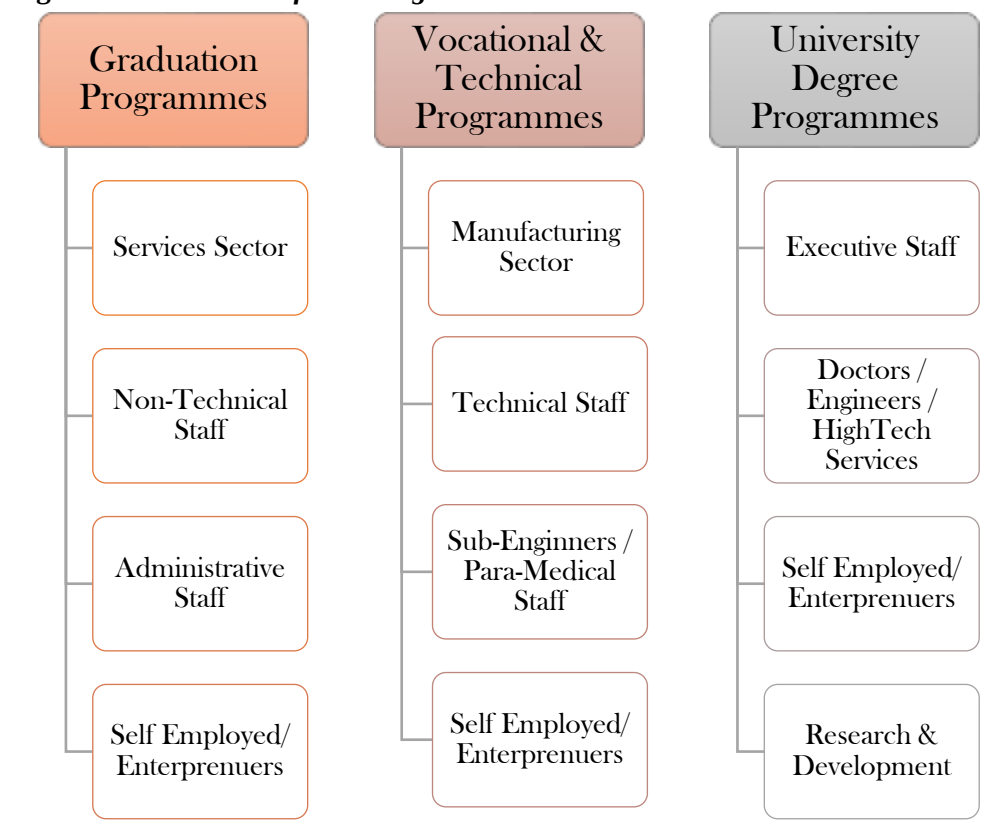
Construction of the Dependent Variable

In Pakistan, usually a person entered into the labor market when he completed his graduation. There are three main types of graduation programmes in which the students enrolled themselves. The graduation programmes at college level. Vocational and technical degree programmes and university or the degree awarding initiates programmes. We have incorporated three programmes in our analysis to understand

that weather the graduates produced.

Pakistan are contributing their role in human development. The figure below shows the areas of working based on above mentioned graduate programmes as follows: The dependent variable EFF is the estimated efficiency score for Pakistan economy. The scores were estimated through Data Envelopment Analysis (DEA) by using Capital, Labor and Energy as inputs while the GDP taken as output variable. The DEA technique is widely used in economic literature. The production efficiency analysis is presented by Charnes et al. (1978) and Fare et al. (1985) based upon the linear programming models. Farrell (1957) provided the grounds for these methods. DEA is a non-parametric technique and does not necessitate the assumption of functional description / specification of the inputs and outputs. Moreover, the distributions assumption pertaining to the error term is also not required. It helps to generate efficiency frontiers for all observation of the model. It enables us to attain the maximum level of output empirically given the set of inputs.

Fig 8: The Framework for the Higher Education Index



The Key Independent Variable & Control Variables

In Pakistan, after intermediate education, the undergrad level and above is constituted under higher education department. So in this respect the study generated an index named higher education index (HEI) by incorporating the growth rate of students in the programmes of associate degree, technical & vocational education and University / degree awarding institutes. So, it is assumed that the higher education index would help increase the working efficiency of the economy.

Moreover, the study used control variables; inflation rate (percentages), capital formation (logarithm), urbanization (log of urban population), health expenditures (percentages) and the unemployment rate (percentages) as determinants of the economic efficiency.

Model Specification

The model is specified into a functional relationship is given as under:

$$EFF_t = \alpha + \beta_1 HEI_t + \beta_2 CF_t + \beta_3 INF_t + \beta_4 UN_t + \beta_5 URBAN_t + \beta_6 HEALTH_t + U_t$$

Where, EFF_t denotes efficiency score at particular time t) and α is intercept term β 's are coefficients used in the model, HEI stands for Higher Education Index, CF stands for Capital Formation, INF refers inflation rate, UN is the unemployment rate, $URBAN$ is the proxy used for urbanization and $HEALTH$ is the public sector expenditures on health.

Estimation Method:

For long run analysis the association of efficiency and its predictors is originated through ARDL bound testing method by following the given model;

$$\begin{aligned} dEFF_t = & b_{11} + b_{12} (HEI)_{t-1} + b_{13} (CF)_{t-1} + b_{14} (INF)_{t-1} + b_{15} (UN)_{t-1} + \\ & b_{16} (URBAN)_{t-1} + b_{17} (HEALTH)_{t-1} + b_{12} \sum_{i=0}^n d(ERR)_{t-i} + b_{13} \sum_{i=0}^n d(CF)_{t-i} + \\ & b_{14} \sum_{i=0}^n d(INF)_{t-i} + b_{15} \sum_{i=0}^n d(UN)_{t-i} + b_{16} \sum_{i=0}^n d(URBAN)_{t-i} + b_{17} \sum_{i=0}^n d(HEALTH)_{t-i} + \mu_{11} \end{aligned}$$

In the above, i indicates lag length, d is a Symbol used as first difference operator, b_{11} is the component of drift and μ_{11} is the error term.

The Error Correction Term (EC_{t-1})

The error correction term (EC_{t-1}) is the instrument used for the speed adjustment of dynamic models towards equilibrium. Bannerjee et. al, (1998) claimed that high and significant error correction value is also an evidence for stable and long term relationship. Its value with negative sign also gives uni-directional outcome of variables.

FINDINGS & DISCUSSION

After discussing the data sources, the analysis and results are discussed as follows.

Table – 1: Descriptive Statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
EFF	30	.9785065	.0149822	.955808	1
HEI	30	0.0000000021	1.000009	-2.812383	1.255105
UN	30	1.277	1.255246	.4	4.08
HEALTH	30	.7453333	.1910539	.44	1.2
URBAN	30	18.16573	1.045606	16.7211	20.2089
INF	30	8.409801	4.070647	2.52933	20.2861
CF	30	15.66082	1.764673	12.5206	19.1123

Source: Author's own calculations

The Unit Root Test

The statistics of ADF test are presented in the Table 2 below. According to the results, some model variables are integrated at level and some are at first difference. So, the findings justify the application of ARDL.

Table 2: ADF Test Results

Z (t)	Test Statistic	Probability
Eff _t	-5.642*	0.0000
HEI _t	-3.050**	0.0305
Health _t	-4.032*	0.0013
CF _t	-4.593*	0.0001
UN _t	-6.676*	0.0000
INF _t	-6.178*	0.0000
URBAN _t	-4.264*	0.0005

Note: ** is sign of having stationary at level and * is a sign of stationary on 1st difference or more

The Optimal Lag Selection

On the basis of Matrix Criterion, the optimal lag length is selected. After this, long term dynamics of the model were evaluated.

Table 3: Results of ADF Test (Bound Testing Model)

Variables	(1) ADJ	(2) LR	(3) SR
HEI _t		0.00194* (0.000963)	
HEALTH _t		0.0247*** (0.00473)	

CF _t		0.000724*	
		(0.000410)	
UN _t		-0.00161	
		(0.00133)	
INF _t		0.000262	
		(0.000158)	
URBAN _t		-0.0115***	
		(0.00167)	
EC _t	-1.178***		
	(0.228)		
D.URBAN			-0.0707**
			(0.0329)
Constant			1.373***
			(0.277)
Observations	29	29	29
R-squared	0.638	0.638	0.638

Standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.1

The HEI (higher education index) shows positive and significant relationship. The error is correction term also significant and identifies short run to long run adjustments. The value of error correction coefficient is -1.178 which shows that equilibrium will be adjust in a dampening manner towards long run. Below table 5 shows the values of the F-Stat and t-Stat and the critical values from L_1 to L_0.1. As the F-stat is greater than the all critical values and t-stat is less than the lower bound critical values, so it indicates the existence of the long run relationship.

Table 4: The Existence of Long run relationship

L_1 to L_01	k_6	Model Value
[I_0] & [I_1]	2.12 & 3.23	F = 4.892 & t = -5.167
[I_0] & [I_1]	2.45 & 3.61	F = 4.892 & t = -5.167
[I_0] & [I_1]	2.75 & 3.99	F = 4.892 & t = -5.167
[I_0] & [I_1]	3.15 & 4.43	F = 4.892 & t = -5.167

accept if F < critical value for I(0) regressors
 reject if F > critical value for I(1) regressors

L_1 to L_01	k_6	Model Value
[I_0] & [I_1]	-2.57 & -4.04	F = 4.892 & t = -5.167
[I_0] & [I_1]	-2.86 & -4.38	F = 4.892 & t = -5.167
[I_0] & [I_1]	-3.13 & -4.66	F = 4.892 & t = -5.167
[I_0] & [I_1]	-3.43 & -4.99	F = 4.892 & t = -5.167

accept if $t > \text{critical value for } I(0) \text{ regressors}$ reject if $t < \text{critical value for } I(1) \text{ regressors}$ **Table 5: The ARDL Results**

VARIABLES	EFF _t
EFF _{t-1}	-0.178 (0.228)
HEI _t	0.00229* (0.00117)
HEALTH _t	0.0291*** (0.00706)
CF _t	0.000853* (0.000443)
UN _t	-0.00190 (0.00154)
INF _t	0.000309 (0.000204)
URBAN _t	-0.0842** (0.0338)
URBAN _{t-1}	0.0707** (0.0329)
Constant	1.373*** (0.277)
Observations	29
R-squared	0.975

Standard errors in parentheses

*** $p < 0.01$, ** $p < 0.05$, * $p < 0.1$

The results presented in the table 6 of the above also recognized the existence of positive relationship between higher education and the working efficiency of the economy. Moreover, health, capital formation are also the improving factors of the working efficiency. While the urbanization shows negative impact on the working efficiency. The result is consistent with the findings of Finney & Kohlhase (2008). The cities are engine of economic growth but in case of Pakistan the absence of the urban planning and inefficiency or wastage of urban resources the results comes in negative.

Table 6: The Diagnostic Tests

Source	chi2	df	p
Heteroskedasticity	29.00	28	0.4125
Skewness	6.92	8	0.5458

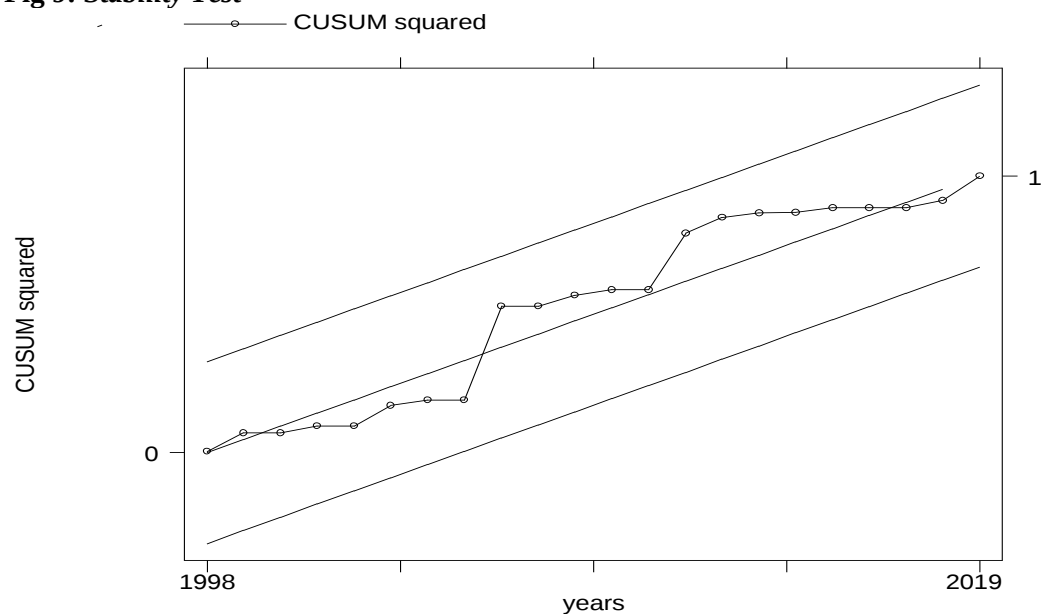
Kurtosis	0.03	1	0.8658
Breusch-Godfrey LM test for autocorrelation	0.008	1	0.9298
Total	35.94	37	0.5184

Table 6 shows the diagnostics for the model. All the confirms that the model is specified and accurately fit.

The Stability Test

The stability of the model and its long run coefficient has presented through the cumulative sum of recursive residuals (CUSUM). The CUSUM plot shows that the model is stable.

Fig 9: Stability Test



RECOMMENDATIONS

Over the last few decades, an unprecedented increase in the education has been witnessed by the world. As a result, expansions of general level of education have also taken a great jump in many of the world regions and are now at certain level than ever before. The improvements in the education levels not just bring material welfare in the regions but also benefit them in other social and cultural matters like women empowerment, crime reduction, public health improvement, lower mortality and

greater participation in the politics. Education worked as the main tool for the accumulation of human capital has long been reflected as the engine for economic growth and widely accepted as a government policy tool to develop society as a whole. Historically, the countries with government-led education expansion initiatives experienced long term growth and development. Higher education is valued as a widely accepted instrument for attaining economic growth. In particular, for Pakistan, to get out from the poverty trap, it is essential focus on the higher education development. Pakistan has put a great emphasis on primary and secondary education levels. But the area of tertiary education is particularly neglected as a productive source of economic prosperity. So, in this regard, primary objective of this research was to classify and establish a link between the higher education and working efficiency of the economy as a signal of economic prosperity. In this study the ARDL bound testing approach is used in order to investigate the impact of higher education on the working efficiency of Pakistan's economy. Time series data over the period of 1990 to 2019 is used to estimate the model. On the basis of analysis, the study suggests that the higher education has positive and significant relationship with the working efficiency of the economy. Moreover, there is the existence of long run relationship and dampening movements will adjust the model in the long run. The study directed the need for policy makers to encourage the infrastructure development for the higher education in order to increase more graduates and provide more skilled personnel to the society. It is essential that the provision of higher education must be correlated with the requirement of the labor market.

Specialized policy framework must be adopted to increase the enrollment rate in higher education. Awareness campaigns must be adopted and scholarship schemes or the soft loans scheme through banking system must be instigated for the engagement of the society.

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