

## Modeling of Education Performance Evaluation for Universities of Balochistan

*Social Sciences and Humanities*

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### Abstract

*With increased access to higher and tertiary education across the globe and in particularly the underdeveloped regions of the world, there is a strong need to incorporate the heterogeneity of socio-economic factors for education performance evaluation. The paper with the uniqueness of this concept is applied on the students of underdeveloped region and identified the key factors affecting students' overall performance in their Cumulative Grade Point Average (CGPA). Orbit Ptoibit Model is used with discrete regression and probabilities to achieve the objective of the study. Data was collected from the students of five selected universities in the most backward province of Pakistan. The result of the modeling demonstrates the strong correlation of socio-economic factors with the students' overall performance and CGPA. Marginal effects of these socio-economic factors revealed the strong impact and augment the students' performance in a significant manner. Interestingly, the education of the parents have significant role in students' performance especially with high impact of education of mothers'. This is followed by the other key variables like social background of families and the household income. The other factors like quality of teaching, study hours and technological facilities which are universally defined are also proven by the study. However, the impact of these factors is largely subject to former socio-economic features. This emphasizes on policies to create the culture of education from primary to tertiary level in the underdeveloped regions with focus on creating linkage from the bottom to top. The results of the study have important contributions for the universities, policy-makers, and other relevant stakeholders.*

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## **Introduction**

Globalization and the standardization of education performance do not influence the education standards in developed countries but have significant and identical impact on developing countries and their sub territories. However, it is noted that implementation of such standardization of education performance particularly in the higher education segment are being delayed to a large extent. For the most part, reasons behind are existing teaching modalities and slump education qualities particularly in the context of developing and underdeveloped countries. Proliferation of high standardization of education performance with low featured human capital, the disintegration and disconnection between secondary, higher and tertiary education and the adhocism in educational decision and policies are few of the rationale causes behind such failures. Beside these, shortage of resources, inconsistent policies and deficiency in political determination have made it difficult for the countries to achieve desired education standards and targets (Saeed, et al. 2015).

## **Study Rationale & Objectives**

Education policies have been the centre point and an important aspect of public policy in the new millennium. However, these policies have yet to address and overcome the obstacles for the standardization of education policies. One of the main reasons behind such failure is the heterogeneity that has emerged from different socio-economic conditions within a country or region. Beside individual characteristics, potentiality and abilities, the educational background, and quality of education with other social characteristics differs the human capital of one region with another. The existence of the educational gaps between various sub-regions and the twisting education standards led to a loss of social welfare. These indicators point towards the divergence of teaching modalities and performance indicators within the regions and sub-regions.

Contemporary Pakistan is facing many problems and one of them is low quality of human capital. Human capital is largely influenced by the governance framework and the environment within which it is deployed (Ali et. al , 2015). And education is the main ingredient of social capital that allows measuring of the level of development in a particular society (Saeed,

et al. 2015). Thus, the key and foremost input identifying the quality and the potential of a human capital is the education. Human capital is widely accepted and considered as the essential determinant of development and led to improved standards of living.

This study is an attempt to address these concerns which affect the overall education performance at tertiary level in the province of Baluchistan, Pakistan. Balochistan is one of the poorest and the most backward provinces wherein both absolute as well as relative poverty exists widely. Similarly, the quality of human capital in Balochistan is also worse as compared to other provinces of Pakistan. In the last one decade, there have been consistent policies at federal and provincial level to improve the quality of human capital in the province and attempt to eradicate poverty through education. In this context of tertiary education, the Higher Education Commission (HEC) had established number of universities in Balochistan that allow the province youth to access the tertiary education. This has led to consistent increase in university graduates in the recent years. However, the post university outcomes in the form of professional and executive work opportunity for these university graduates are considered dismal because of low education quality and performance indicators.

The main objective of this study is to highlight the socio-economic factors which have significant impact on the probability to attain and achieve high CGPA. This study also draw attention to those areas which affect students' CGPA and provide guidance to university administrators, policy makers, and other relevant stake holders to improve the capabilities and make the tertiary graduate competitive for the professional and executive work environment across country and beyond borders.

### **Literature Underpinning**

The standardization of education outcomes has largely affected the criteria to evaluate the education performances. Cumulative Grade Point Average (GPA) is one of the standard indicators to judge the ability and efficiency of the graduates. Generally, these indicators are the standard criteria in the employment factor of a university graduate. However, there are various factors which are responsible for students' higher or lower CGPA. Though very scarce literature exists on the issues of performance measures of tertiary education, research studies on the subject largely surround the identification of performance indicators as well as examining the CGPA as valid indicator for assessing students' capabilities. Even though there have been some efforts to identify the factors behind student's university success levels, uniqueness of this study is determination of the socio-economic factors behind university

education outcomes in the form of CGPA. To best of authors' knowledge, the study is the first effort with respect to existing literature on the subject as well as with respect to the developing countries.

Researchers uphold different opinions regarding high CGPA. They come up with a variety of explanations and held responsible different factors vis-à-vis higher CGPA. The following literature speaks up the uniqueness of study as explained in the previous paragraph and mostly explains the impact of academia related factors on students' educational performances.

Romer (1993) and Durden (1981) are of the opinion that student attendance matters very much to get a higher CGPA. They maintain that absenteeism on the part of the graduates from classes affect their performance such result in lower CGPA. Stricker and Rock (1995) examines the consequences of individual and school characteristics on Graduate Record Examination (GRE) results. They determine that individual characteristics have very little impact on the score while the education level of the parents has effective role in students' performance. Moreover, they also establish the argument that the school characteristics and quality strongly and positively correlated with GRE score.

Betts and Morell (1998) assert that the features like ethnic origin, socio-economic environment, gender, and family income are the main causes of the differences in the CGPA of the graduate students. Young and Fisler (2000) highlight that in SAT-M exam the performance of male students is much better than their female counterparts. It is because they both belong to different socio-economic backgrounds where most of the female students belong to such families whose incomes are high. Fertig and Schmid (2002) argue that there is a positive relationship between students' communication skills and parents' job and education. Urien (2003) establishes that study discipline, individual feature and family background have influence on the academic performance of students.

Smith and Naylor (2004) investigate the impact of school characteristics on CGPA. They discover that those students who have high school with high percent points (i.e. 5.9 percent) and came from a private school, gets higher CGPA at university level.

Horowitz and Specter (2004) uphold that those students who completed their undergraduate studies from religious schools have got higher CGPA as compare to those who came from public and private schools. Cohn *et al* (2004) investigate the impact of demographic and socio-economic factors on student performance in South Carolina University. They concluded that white students get higher scores than non-white. They also found that the

performances of female students are much better than their male counterparts and the majority of the female students are able to achieve 3.0 CGPA. Clifton *et al* (2004) indicate that the educational environment and the psychosocial characteristics also affect the students' CGPA. Dayioğlu and Türüt-Aşık (2007) determine that female performed much better than male students. They document that in Middle East Technical University there are significant gender differences in academic performance among students.

Kiriakidi *et. al.* (2011) assesses the effect on GPA due to modality choice of teaching i.e. face-to-face or online for the undergraduate working students in United States. The study investigates the impact of the academic factors and education modalities on students' performance. Meya *et. al.* (2014) investigates the impact of international student mobility on academic performance in a German university. They revealed that a temporary visit for studying abroad significantly improves the performance in the final due to their exposure to a better foreign university vis-à-vis the home institution. However, they also argued on the difference in grading and transfer of grades could result in change of academic performance at either institution.

### **Methodological Framework and Modeling**

As stated in the previous section that this study is unique with two aspects, one is the assessment of the socio-economic indicators i.e. gender, housing, family / household income, education of family members and the social and cultural environment etc. along with the other educational indicators such as hours allocated for studies, students attendance and teachers quality etc. The second important aspect of the methodological part is the investigation and modeling of performance indicator in a developing country Pakistan. Students were approached from the five universities located in the Province of Baluchistan. These include Lasbella University of Water and Marine Science (LUWAMS), University of Balochistan (UoB), Balochistan University of Information Technology, Engineering and Management Science (BUIITEM), Sardar Bahadur Khan Women's University (SBK) and University of Turbat (UoT).

Data was collected from 50 students in each university thus the total number of respondents were 250 students. The questionnaire was drafted to incorporate the study objectives and data was collected accordingly. To derive the objectives of the study, we applied the Ordered Probit Model (OPM). The OPM is revealed as follow:

$$Y_i^* = \beta'X_i + \varepsilon_i, \varepsilon_i \approx N(0,)$$

$$Y_i = 0 \quad \text{If } Y_i^* \leq \mu_0$$

$$Y_i = 1 \quad \text{If } Y_i^* \leq \mu_1$$

$$Y_i = 1 \quad \text{If } Y_i^* \leq \mu_1$$

And so on.....

$$Y_i = J \quad \text{If } Y_i^* \leq \mu_{J-1}$$

Where

$Y_i$  = is the observed complement of the  $Y_i^*$

$\beta$  = is the vector of the coefficient of explanatory variables

$X_i$  = is the vector of the all explanatory variables

$\mu_i$  = is distance variable while  $\varepsilon_i$  is random error term.

**Following Greene (2000), we also assumed that the variance of error term is 1.00.**

The variable  $Y_i$  is take a value of  $J$  if the value of  $Y_i^*$  falls in category of  $J : Y = J$  then  $\zeta_{j-1} < Y^* < \zeta_j$   $J = 1, \dots, J$ , where:  $\zeta$ , is unknown threshold parameters. However,  $\zeta$  and  $\beta$  will be estimated simultaneously by summing that:  $\zeta_{-1} = -\infty, \zeta_0 = 0, \zeta_j = \infty$ . Those observation which is  $Y = J$  its probability is equal to:  $\text{Pr ob}(Y = J) = F(\zeta_j - \beta'X) - F(\zeta_{j-1} - \beta'X)$ .

Where:  $F$ = cumulative standard normal distribution function, therefore, the effect of explanatory variable on the probability of  $J^{\text{th}}$  level is as follow:

$$\partial \text{prob}(Y = J) / \partial X = \beta [f(\zeta_{j-1} - \beta'X) - f(\zeta_j - \beta'X)].$$

Where:  $f$  = The standard normal density function (Tansel 2002).

Finally we estimated the following model by applying the maximum likelihood method.

$$\begin{aligned} PGPA = & \beta_0 + \beta_1 X_{1i} + \beta_2 X_{2i} + \beta_3 X_{3i} + \beta_4 X_{4i} + \beta_5 X_{5i} + \beta_6 X_{6i} + \beta_7 X_{7i} + \beta_8 X_{8i} + \beta_9 X_{9i} \\ & + \beta_{10} X_{10i} + \beta_{11} X_{11i} + \beta_{12} X_{12i} + \mu_i \end{aligned}$$

**Where**

Percentile Grade Point Average (PGPA), to get the PGPA of the students, first we rank the CGPA of all the universities in descending order and then

we divide the CGPA in five categories from last 20 percent to top 20 percent. Thus, the percentile of grade point average is (1=last 20 percent, 2=fourth 20 percent, 3=third 20 percent, 4=second 20 percent, 5= top 20 percent).

- $X_1$  represents the students study hours in a week. We rank the study hours in the form of: 01 to 06 i.e. (1= 1-5 hours, 2= 6-10, 3=11-15, 4=16-20, 5= 21-25, 6 = 26 and above). As we know that study hours is positively related to CGPA. If the students study hours are high, his/her CGPA will be high. Thus the expected sign of  $X_1$  will be positive.
- $X_2$  indicates educational level of students' mother wherein 1=uneducated, 2=basic school, 3=Matric, 4=SSC/ FA/ FSc, 5=University education and above. The expected sign of mother education will be positive because educated mother give much importance to her children education and character building.
- $X_3$  captured the educational level of students' fathers wherein 1=uneducated, 2=basic school, 3=Matric, 4=SSC/FA/FSc, 5=university education and above. Here, like in case of mother education, it is also expected that father education have positive impact on students CGPA. It is because educated parents give more importance to their children education and help them through consoling and guidance.
- $X_4$  denotes those students they have their own laptop/computer (Dummy variable) (1= student has own laptop/computer, 0=otherwise), laptop/computer help the students to get more and more information from internet, therefore, it is expected that own laptop or computer will have positive impact on students CGPA.
- $X_5$  shows the students participation in social activities in university. We categories the strength of activities such as: (1=minor, 2=less, 3=moderate,4=more, 5=much more). Generally, it is believed that those students who participated in social activities are good students and getting higher CGPA.
- $X_6$  represents the book reading habit of the students wherein 1=none, 2=small, 3=moderate, 4=high. Book reading habits also help a student to achieved high CGPA.
- $X_7$  attendance of the students in classes. We can rank the students attendance as (1=20% and below, 2=25-40%, 3= 40-60% 4=60-80%, 5= 80% and above). Moreover, it is expected that students' attendance is

highly and positively associated with students CGPA because more the students will attend the classes more they will be learn and hence higher CGPA.

- $X_8$  characterizes family living place wherein 1=village, 2=town, 3=city. Those families who are living in cities, the CGPA of students belong to such families is expected to be or will be high. It is due to the reason that in cities standard schools and qualified teachers are easily available as compare to rural areas of Pakistan.
- $X_9$  represent average income of the family. It is expected that income of the family is positively related to CGPA of the students. The reason behind this assumption is that families with high income level have higher opportunity to invest money on students and admit/enroll them in standard school for education. Furthermore, rich families provide all other necessary accessories to their children related to education.
- $X_{10}$  represent living place of the student, dummy variable wherein 1=dormitory,0= otherwise. Edwards and McKelfresh, (2002) showed that those students who are living in University accommodation have positive impact on their CGPA.

### Results and Discussion

We reported the results of Ordered Probit Model in Table 1 which shows that study hours, parent education, personal laptop/computer, family resident, family income, gender, interest in major are positively related to CGPA and having correct sign as expected. In addition, all of the variables are statistically significant at different critical levels except social activities participation and book reading habits; though, the variables social activities and book reading habits are negatively associated with CGPA but statistically insignificant.

<b>Table-1: Results of Ordered Probit Model</b>			
<b>Explanatory variable</b>	<b>Coefficient</b>	<b>Explanatory Variable</b>	<b>Coefficient</b>
<i>Constant</i>	2.1702*	$X_7$	0.0210**
$X_1$	0.7203*	$X_8$	0.0160*
$X_2$	0.2310**	$X_9$	0.0302*



$X_3$	0.0170*	$X_{10}$	0.4101*
$X_4$	0.4102*		
$X_5$	-0.3601		
$X_6$	-0.1302		
Where: *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.10$ $X_1$ = study hours, $X_2$ = Mother Education, $X_3$ = Fathers' Education, $X_4$ = Own Laptop, $X_5$ = Social Activities, $X_6$ = Book Reading Habits, $X_7$ = Family Resident, $X_8$ = Family Income, $X_9$ = Gender, $X_{10}$ = Interest in Major			

The major influence on probability of receiving a higher CGPA comes from the variables of study hours, parents education, own laptop/computer, family resident, family income, gender and interest in major as exhibited in Table 2. Thus, the coefficient of study hours, mother education and father education show that a marginal growth augment the probability of receiving high CGPA by 21.92, 10.26 and 14.32 percent, respectively. Similarly, an incremental rise on personal laptop/computer, family resident and family income leads to an increase in the probability getting upper 20 percentile CGPA by 11.02, 17.02 and 16.20 percent, respectively. Likewise, a marginal increase in gender increases the probability of getting high CGPA in the upper 20 percentile by 16.52 percent which is quite high as compare to impact of other variables on CGPA. The gender variables have very strong impact to getting high CGPA. Similar results are found by Turuta Dayioglu and IK-AS (2007) and Cohn (2004), which argue that CGPA of the female students are more than male students. In the same way, interest in major leads to increase the probability of getting high CGPA by 2.01 percent.

<b>Table 2: Ordered Profit Model for Marginal Effect</b>					
	<b>PCGA(Y=00)</b>	<b>PCGA(Y=01)</b>	<b>PCGA(Y=02)</b>	<b>PCGA(Y=03)</b>	<b>PCGA(Y=04)</b>
$X_1$	0.2010	0.8210	0.0010	0.0771*	0.2192*
$X_2$	-0.0651*	0.1061*	0.0620	-0.3014	0.1026*
$X_3$	0.1069	0.0821	0.0652	0.0711	0.1432
$X_4$	0.7190	0.1090*	-0.2120	-0.8902	0.1102**

$X_7$	-0.3400	0.0312	0.6110*	0.3041	0.1702*
$X_8$	0.0710	-0.3101	0.2110*	0.1032	0.1620*
$X_9$	0.2621*	0.0431*	0.2130	0.6031	0.1652
$X_{10}$	0.0612	0.0431	0.1270	0.5102	0.0201**
Where: *** $p < 0.01$ , ** $p < 0.05$ , * $p < 0.10$					
$X_1$ = study hours, $X_2$ = Mother Education, $X_3$ = Fathers' Education, $X_4$ = Own Laptop/Computer,					
$X_7$ = Family Resident, $X_8$ = Family Income, $X_9$ = Gender, $X_{10}$ = Interest in Major					

## Conclusion

As discussed in the previous section, the results revealed the importance of the socio-economic indicators on educational achievement particularly in the underdeveloped regions. Two main aspects of education performances are revealed. Firstly, the socio-economic background has significant impact on the student's performances. Thus, higher the socio-economic profile and betterment led to higher CGPA and marginal impacts on the students' performance. The other factors' like quality of teaching, study hours and technological facilities which are universally defined are also proven by the study. However, the impact of latter factors is largely subject to former socio-economic factors. This emphasizes on policies to create the culture of education from primary to tertiary level with focus on creating linkage from the bottom to top. The probability of getting a high CGPA depends upon parents education is strongly correlated with student CGPA thus reveal the importance of education culture. Another interesting fact is that the families' income and residence which matters for getting higher CGPA. It is also figured out that if a student devoted more time to study the courses will increase his/her chances to attain higher CGPA, as similar results shown by the earlier studies. The results of the study have important contributions for the concerned universities, policy-makers, and other related stakeholders.

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