



# The Role of Economic Factors in the Growth and Development of Human Resources in Open and Distance Universities of Iran

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Received 2018 January 31; Revised 2018 June 01; Accepted 2018 June 18.

## Abstract

**Context:** The demand for higher education is one of the main issues, which should be considered by managers and planners considering the reduced academic population. Currently, distance education institutions are among the most important centers of higher education according to their special mission. The main objective of this study was to identify the determinant economic factors in students' enrollment in open and distance universities.

**Methods:** This study utilized the documentary - analytical method, time series, and ordinary least square regression model. In this study, the sample size consisted of 500 Payam-E-Noor University (PNU) centers. The sample included the number of applicants of BA of the academic years 2001 to 2014 in PNU and the reliability of independent variables was confirmed using the Dickey Fuller Test. Effective variables for distance education were first derived using the Delphi method. In the Delphi method, the indices and variables were first extracted by examining the documents, distributed to 15 professors of higher education, economic sciences, and social sciences, and finally, the indicators were approved.

**Results:** This study showed that the earning per master's degree was 0.144 ( $P = 0.043$ ); student scholarship and loan (0.583,  $P = 0.035$ ) were significantly higher and had positive effects on the numbers of PNU applicants compared to other variables. Diploma degree income (-0.083,  $P = 0.038$ ) and gross domestic production (-22.10,  $P = 0.092$ ) had significantly higher and negative effects on students' entrance to PNU.

**Conclusions:** Expecting future income and students' scholarships and loans had a determinant impact on the entry of students in PNU. Therefore, educational planners in this university should pay attention to these points.

**Keywords:** Economic Factors, Open and Distance Education, Payam-E-Noor University

## 1. Background

Higher education is the underlying factor for economic, social, and individual growth and plays an effective role in increasing the number of university graduates (1). The demand for higher education depends on several factors. The concept of demand in economics is defined as the amount of product gained by customers at any time and at any price. Generally, factors determining demand include income level, satisfaction and value system, product price, and comparison of products with others (2). There are three major attitudes on the demand for higher education and the motivation to enroll in higher education.

The first attitude considers higher education as a consumptive commodity and regards students as economic-rational consumers, who analyze the cost/benefit of higher education against other consumptive commodities. In economic researches, scholars consider the theory of an-

alyzing the effect of tuition, expenses, and household income on the decision to participate in higher education (3, 4). It should be considered that high school graduates face the problem of decision making on whether to enter a university or the labor market. Individual cost/benefit estimation in the decision making of individuals is considered as a function of the determinant factor (5, 6). This is because continuing education will postpone entry to the labor market for several years (1).

The second attitude considers higher education as a capital commodity and considers students as rational investors, who analyze the current income value expected from investment in higher education with other types of investment. The third attitude considers sociology for enrollment in higher education. In order to use the theory, scholars emphasize on the individual and demographic information of students, such as economic and social basis,

race, parents' education level, and academic ability (3, 4).

The demand for higher education is one of the main issues, which should be considered by managers and planners facing reduced academic population (7). Currently, distance education institutions are among the most important centers of higher education according to their special mission. The emergence of these institutions has changed the pattern of the higher education system. Such a change requires flexibility, lack of centralization, and the creation of new strategies. Demographic information and behavioral traits could provide greater recognition of market and departments that universities tend to provide in the future for distance education (8). Candidates entering the Iranian universities and higher education centers take part in a national exam every year after completing high school education before entering these centers and their academic performance could be cleared in their total gained value in the exam (9).

Payam-E-Noor University (PNU) is one of the largest universities in the country, covering a significant number of applicants for admission to higher education. This university is based on the distance learning method, a semi-faceted approach, and has a special training method. Semi-teaching is the organization of the teaching-learning process so that each training center is capable of choosing and applying methods, which utilize one or more types of learning materials, media, and other mass media. Semi-teaching is an educational system that reduces the need for student attendance to classrooms by using educational technology, self-learning, and student oriented textbooks in learning. Furthermore, PNU has been operating since 1989, has about 40 years of educational experience and now has about 530000 students. Four departments, including humanities, basic sciences, engineering, and agriculture are part of this university. In this paper, PNU was investigated because it covers more courses and is at the graduate level with virtual training.

Several studies have been conducted in the field of analysis of factors affecting demand in higher education. Oliveira et al. (1) stated that public expenses in higher education caused by Gross Domestic product (GDP) have a positive correlation with demand. Vieira and Vieira (10) mentioned that the obtained economic indices, such as real GDP, annual and per capita GDP, and real net income were not statistically significant. Moreover, tuition has had a negative effect on the amount of demand. Nandeshwar and Chaudhari (11) believed that financial aid was the most important factor attracting students to enroll. Saiti and Prokopiadou (12), Webbink and Hartog (13), and Oosterbeek and Webbink (14) showed that one of the main reasons for choosing higher education is to obtain better opportunities in the future, so as to earn higher income. Har-

tog and Serrano (15) suggested that permanent income and life time income are the most important factors in decision making about entering higher education. The findings of Gallet (16) confirmed the negative tuition effects and it has been proven that the short-run elasticity is greater compared to the long-run. Gerlich et al. (8) claimed that in the demand for distance education, tuition has not significantly affected online enrolment.

Conton and de Jang (17) emphasized that students are insensitive to the amount paid as tuition, yet financial support and salary as a result of academic education and received wage, are the most important factors when registering for university. Stephanie (18) reported the high effect of family income variable. Albert (19) showed that a wage gap between having diploma and bachelor's degree and father's financial status were reasons for the increasing demand. Belzil and Hansen (20) found that there were no correlations between financial situation and the decision to continue higher education. Choi (21) found that the number of high school graduates, household income, tuition and expenses, Gross National Product (GNP), and portion of entrance enrollers have significantly affected the demand of students. Hsing and Chang (22) found that changeability of enrolment based on tuition, income, wage, and unemployment rate is obtained as -0.254, 0.675, 0.577, and 0.041, respectively.

In order to achieve the main objective of this study, the following question was analyzed: What are the determinant economic factors in students' enrollment in PNU?

## 2. Methods

This study applied the documentary - analytical method. The sample size consisted of all centers and branches of PNU in 31 provinces and about 500 centers. In this study, the Ordinary Least Square (OLS) regression model was used for data analysis. To obtain the variables, at first, a list of factors affecting demand in higher education was obtained using the Delphi method, literature review, and interview with scholars. In the Delphi method, the indices and variables were first extracted by examining the documents, followed by distribution to 15 professors of higher education, economic sciences and social sciences, and finally, the indicators were approved. After the required investigations and another interview with scholars, the data of effective variables were finally collected. In this study, the dependent variable was the number of enrollers (The required data for this section are obtained from PNU) during the BA course in PNU from 2001 to 2014, annually. The use of unsteady time series in common methods of econometrics, may result in the creation of false regression. Also, it is required to ensure the

steady nature of the applied time series, to estimate the parameters of the studied model. Among the most common methods for this purpose is the augmented Dickey Fuller Test. In this test, relevant statistics of Dickey Fuller test is compared with the critical value of the Mc Kinnon table. If the estimated absolute value is higher than the absolute value of the Mc Kinnon test, the null hypothesis based on existence of unit root is rejected, which refers to the steady nature of the time series. Otherwise, the time series is unsteady and the reliability of time series should be tested through differentiation. In the data analysis section, MICROFIT and MIPLE software were used.

In this research, the coefficient of determination and the adjusted coefficient of determination were used to select independent variables. Variable variations were dependent on two components that are divided according to the described and unexplained changes. The amount of variation described above affects and increases the coefficient of determination. Therefore, using coefficient changes, determining the type of variables is based on the variables that are redundant and effective. In addition, attempts have been made to reduce the variation and do not explain the number of independent variables. These variables are divided to economic, social, and cultural variables and are interpreted after the estimated impact on the number of students. Wald statistics are used as one of the indicators for selecting independent variables and then models are estimated using the OLS method. The reason is that the researchers were dealing with time series that are influenced by independent variables (number of students). Therefore, the use of Autoregressive (AR) or Autoregressive - Moving Average (ARMA) models was irrelevant. This is because independent variables are not interdependent. These data are derived from the time series data of the sources of the Iranian Statistics Center, Ministry of Science, Research and Technology, Ministry of Co-operation, Labor and Social Welfare and PNU.

Furthermore, PNU focuses on income and expenses. This means that the statistical community is comprised of the entire PNU students. The tuition fee for all students in centers and units is transferred to the Center's central account in Tehran, hence, the number of students can be considered as a national variable and the information of the independent national variables is used.

Regarding the type of effect of independent variables on the dependent variable, the choice of regression lines of the problem and the variables to be considered together, in addition to the theoretical ones, will also depend on the significance of the regression lines. This means that when only the effect of a set of variables on the dependent variable is considered, other effective variables are inevitably avoided and this may lead to deviations. Hence, attention

has to be paid to the choice of variables, because only factors affecting the number of students are not cultural or just economic factors that explain the changes in the dependent variable. Therefore, inevitably, and economic and labor market variables may be seen in a model together. This increases the R-squared and increases the explanatory power of the regression lines. For the purpose of data analysis, four regression models are used as follows:

- $DLNS1 = C + LBT + LYK + LU + DLNT + DLCPI + DLYF + DLN2 + DLBA$

$$DLNS1 = 2.604 - 0.016 + 0.006 - 0.766 + 0.146 + 0.375 + 0.144 + 0.399 + 0.294$$

$$R\text{-Squared} = 0.95; DW=1.956.$$

Where; DLNS1= number of enrollers in Bachelor course of PNU; C= intercept; LBT= total state budget; LYK= average income of manufacturing laborers; LU = unemployment rate of youth of age 15-24; DLNT= total state population; DLCPI= total consumer price index; DLYF= income per master degree; DLN2 = workforce graduated of high school; DLBA = higher education budget.

- $DLNS2 = C + DLSE + LSEE + DLCT + LGDP + LGNP + DLNEE + LYA + DLYD$

$$DLNS2 = 12.325 + 8.458 + 0.087 + 0.583 - 22.107 + 21.310 + 2.824 + 0.744 - 0.083$$

$$R\text{-Squared} = 0.95; DW = 1.376.$$

Where; DLSE= total employed portion in industry; LSEE = ratio of educated employees to total employees; DLCT = Student scholarship and loan; LGDP= gross domestic production; LGNP = gross national production; DLNEE = total workforce; LYA = average annual household income;

DLYD= income per diploma degree.

- $DLNS3 = C + LB1 + LS3 + LCA + LYL + LNE + DLN3$

$$DLNS3 = -0.418 + 0.412 + 0.111 - 2.918 - 0.598 - 0.078 + 0.045$$

$$R\text{-squared} = 0.41; DW = 2.$$

Where; LB1 = urban household dimension; LS3 = population of primary student; LCA = average household cost; LYL = Bachelor degree income; LNE = number of employed people in industrial workshops; DLN3 = academic graduated workforce.

- $DLNS4 = C + LB2 + DLS2 + LS1 + LSK + DLSA + DLSAE + DLN1 + LYE + LSF$

$$DLNS4 = -30.869 + 5.211 - 4.241 + 0.853 + 0.725 - 6.363 + 0.822 + 4.406 + 0.862 - 0.955$$

$$R\text{-Squared} = 0.65; DW = 2.07.$$

Where; LB2 = rural household dimension; DLS2 = number of secondary school students; LS1 = number of high

school students; LSK = agriculture department tuition; DLSA = basic science tuition; DLSAE = human science tuition; DLN1 = educating or graduated population in labor market; LYE = national income; LSF = technical and engineering department tuition.

### 3. Results

In this section, the descriptive statistics of these variables were first examined. For example, the first indicator evaluated as a dependent variable was the total number of undergraduate students at PNU, whose values were as follows: mean of 662863, median of 75637805, and standard deviation of 287264. Independent variables are also presented in the same way (Table 1).

**Table 1.** Descriptive Statistics of Variables

Variable	Mean	Median	Standard Deviation
Number of enrollers in Bachelor course of PNU (DLNS) (People)	662863	75637805	287264
Total consumer price index (DLCPI) (Rial)	62.58	53.3	44.438
Income per master degree (DLYF) (Rial)	337611660.6	296569747	199113204
Student scholarship and loan (DLCT) (Rial)	1800000	1500000	600000
Gross national production (LGNP) (Billion Rials)	3170435.25	2757028	2002802.3
Average annual household income (LYA) (Rial)	138599466.8	125101206	82431201.18
Income per diploma degree (DLYD) (Rial)	170296049.8	154721350	96108302.92
Gross domestic production (LGDP) (Billion Rials)	3151266.5	2773780.5	1978814.43
Average household cost (LCA) (Rial)	146350904.5	130135184	83498900.05
Bachelor degree income (LYL) (Rial)	229429775.8	218441036	129282618.2
Agriculture department tuition (LSK) (Rial)	6893219.73	6962010	3190549.25
Basic science tuition (DLSA) (Rial)	3642090.2	2805468	2750122.93
Human science tuition (DLSAE) (Rial)	2394036.5	1859715	1784913.43
National income (LYE) (Billion Rials)	2691670.75	2395523	1675812.148
Technical and engineering department tuition (LSF) (Rial)	6893219.73	6962010	3190549.254

What are the determinant economic factors in students' enrollment in PNU?

**Table 2.** Determinant Economic Factors in Students' Enrollment in PNU

Variable	Coefficients	S.E	T	Prob
DLCP1	0.375	0.307	1.22	0.289
DLYF	0.144	0.049	2.91	0.043
DLCT	0.583	0.185	3.13	0.035
LGNP	21.31	10.001	2.13	0.100
LYA	0.74	0.396	1.87	0.133
DLYD	-0.083	0.027	-3.06	0.038
LGDP	-22.10	10.032	-2.20	0.092
LCA	-2.918	1.419	-2.055	0.079
LYL	-0.598	1.012	-0.590	0.573
LSK	0.725	0.813	0.891	0.423
DLSA	-6.363	4.587	-1.387	0.238
DLSAE	0.822	0.716	1.148	0.315
LYE	0.862	0.719	1.200	0.296
LSF	-0.955	0.559	-1.709	0.163

Table 2 shows that master degree income (DLYF) had a positive and significant effect (0.144,  $P = 0.043$ ) on the number of students. In other words, for every 1% increase in DLYF, the number of students increased to 14%. Students' scholarship and loan (DLCT) had a positive and significant effect (0.583,  $P = 0.035$ ) on the number of students. To this end, for every 1% increase in DLCT, the number of students increased to 58%. Diploma degree income (DLYD) had a negative and significant effect (-0.083,  $P = 0.038$ ) on the number of students. This means that for every 1% increase in DLYD, the number of students decreased to 8%. The gross domestic production (LGDP) had a negative and significant effect (-22.10,  $P = 0.092$ ) on the number of students. In other words, for every 1% increase in LGDP, there was a 22% decrease in the number of students.

### 4. Discussion and Conclusion

This study utilized the data of 2001 to 2014 by using documentary-analytical method and the OLS model to determine economic factors affecting the growth of the academic population in PNU. According to the obtained results, it was found that the income of master degree holders, student scholarship and loan had a positive effect on the number of enrolments in PNU and resulted in an increase in the number of students. The research by Saiti and Prokopiadou (12), Webbink and Hartog (13), Oosterbeek and Webbink (14), and Albert (19) were consistent with the results of this research on the earnings of a Master's degree holder.

The studies of Canton and de Jang (17) and Nandeshvar and Choudhari (11) were consistent with the results of the study on scholarship and student loans. Students chose universities based on whether necessary and supportive scholarships were available.

Diploma degree income and gross domestic production had negative effects on the number of students in the master course in PNU and have resulted in a decreased number of students. The researches of Vieira and Vieira (10) were consistent with the results of this study on the earnings of diploma and gross domestic product. Increasing economic growth will lead to a drop in entry to higher education, as working conditions for those with lower education qualifications are more appropriate and the cost of higher education opportunities for them is high. Therefore, they prefer to seek a job rather than studying at a university. Economic factors have an important effect on the demand for higher education as well as open and distance education.

## Acknowledgments

The authors wish to thank the participants for their cooperation.

## Footnotes

**Authors' Contribution:** Study concept, design, and critical revision of the manuscript for important intellectual content were developed by the authors who participated through the overall process.

**Conflict of Interests:** Authors declared no conflict of interest.

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