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**The Impact of Family Background
and Socioeconomic Status on
University Admission in Iran**

Seyed Bagher Mirashrafi

PhD Candidate

Karlsruhe Institute of Technology

Germany

Georg Bol

Professor

Karlsruhe Institute of Technology

Germany

Ebrahim Khodaie

Associate Professor

National Organization for Educational Testing

Iran

Gholamreza Nakhaiezadeh

Professor

Karlsruhe Institute of Technology

Germany

Athens Institute for Education and Research
8 Valaoritou Street, Kolonaki, 10671 Athens, Greece
Tel: + 30 210 3634210 Fax: + 30 210 3634209
Email: info@atiner.gr URL: www.atiner.gr
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Seyed Bagher Mirashrafi

PhD Candidate

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Gholamreza Nakhaiezadeh

Professor

Karlsruhe Institute of Technology

Germany

Abstract

This paper analyzes the effect of different aspects of family background such as family income, parental education, parental job, the number of family members, and the socioeconomic status of parents on the university admission in Iran.

The Iranian university and college admission system involves prospective students listing up to one hundred majors in order of their preference in the application. Places in universities are offered to the applicants based on both their preferences and their entrance examination results.

The gathered data from the Iranian university and college applications in 2005 is analyzed using data mining methods to investigate the effects of family background variables on entrance examination grades.

The results of this analysis show that parental education, parental job and the socioeconomic status of family have large effects on entrance examination grades and as a result on university and college acceptance. The number of family members has a small and negative effect.

The proportion of acceptance in universities for high social class families are more than the proportion of candidates in the other categories. In other words, applicants who come from higher social classes have a significantly better chance of becoming admitted to university.

Contact Information of Corresponding author:

1. Introduction

The Iranian university and college admission system requires prospective college and university students ranking up to one hundred majors in order of their preference after receiving their examination grade. The National Organization for Educational Testing (NOET) processes applications for all different kinds of university admissions at all levels.

The nationwide exam is held in five groups: mathematics and physics, empirical sciences, human sciences, art and language. Typically, seven to ten subjects are examined in each group. Table 1 shows these examined subjects. Four general subjects are common in all groups: Farsi Literature, Arabic Language, Islamic Literature, and Foreign Language

Once assessed, for each subject, the examination results are used to produce a score between -33 and 100 per candidate. The structure of exams is based on multiple choices and every three wrong answers are considered as one negative point. In other words, if a candidate has three wrong answers and one correct answer, his or her mark is equal to zero.

Subsequent to examination grading, the NOET fixes a total mark for each candidate following a certain process. The points requirements are set so that applicants are offered a place in the highest preference major for which they are eligible; in the case of candidates being tied for the last position in a field, both are offered a place. It should be emphasized that candidates do not know the field point's requirement prior to completing their application or taking their examination. The point's requirement is influenced by the examination results of candidates who applied for each major and by the number of available positions in that major.

Some fields have minimum entry standards. For example, sufficient knowledge of mathematics may be required for an engineering level. A few fields in the Art group have interviews, but these are not common. The candidates who apply within the first three groups are also allowed to apply for the Art and Language groups, but not vice versa.

2. Review of Literature

After a brief review of the Iranian university and college admission system, the impact of family background on applicants' examination result is discussed. This paper is a contribution to general debate of educational attainment. Social scientists have developed sophisticated models for educational attainment using different causal variables ([1], [5]). Although there are variations regarding race and sex (e.g. [6] [10]), the same causal variables have been applied generally. Considerable variation in educational outcomes is not explained by the basic attainment model ([3]; [7]).

Past research has indicated an academic achievement gap between the sexes, with boys ahead of girls. However, more recent study has shown that the achievement gap has been narrowing and that in some instances girls have higher academic achievement than boys ([2]). Additionally, studies show that girls perform better in reading than boys. However, males are found to outperform females in mathematics and science ([4]). Research has found that socioeconomic status, parental involvement, and family size are particularly important factors ([11]). Lochner & Belley find that post-secondary (PS) attendance (and attendance at four-year PS

institutions) is strongly positively related to parental income in the U.S., even after controlling for similar measures of family background and adolescent cognitive achievement. The effect of parental income PS attendance relationship in Canada is also positive, but substantially weaker. The findings of Pedrosa and her colleagues indicate that students coming from a disadvantaged environment, in socioeconomic and educational terms, perform relatively better than those coming from higher socioeconomic and educational strata. More interestingly, from an educational public policy viewpoint, students who came from public schools had a relatively better performance than those who had studied at private schools.

On the other hand, the expansion of universities caused some social changes in middle and low class categories. Hence, acceptance in the universities became one of the possible ways of having a better job and other economic opportunities. Getting a university degree may increase the chance of a change of social class from a low class to a high class. Therefore, as mentioned above in the literature, there is a variety of theories on the effects of family background in educational attainment. For example, Khodaei shows that parental education has positive effects on the children's success, from an educational point of view. Sacker and her colleagues set out to test the model shown in Figure 1. They set out to examine how inequalities in educational achievement and adjustment come about. It has been well known for decades that pupils' educational achievement is related to parents' social class yet the mechanisms that form this relationship are not well understood. How does social class influence school achievement?

Furthermore, the growth of the population rate and decline in the mortality rate at the same time, have led to an increased demand for education. Therefore, governments invest more in higher education. This situation happened in Iran after the Islamic Revolution of 1979. Because of some unsuccessful policies, the growth of the population rate went up sharply and, simultaneously, the demands for higher education increased considerably. Hence, the Iranian government started to expand universities to deal with the high demand for higher education. Nevertheless, the government could not handle this problem and as a result the number of candidates was 1782343 persons and the number of available places was 234832 in 2003. In other words, the demand for higher education was almost 8 times greater than the available places.

3. Methodology

This study deals with two main questions. First, does family background such as parental education, parental income, number of children in the family and parental job have any effects on Iranian universities admission? Second, is there any difference between percentages of becoming admitted among different social classes in Iran? In this study we consider acceptance in universities and total marks as dependent variables and parental education, parental income, number of children, gender and parental job as independent variables. As a result, we use data mining methods to answer those two questions. For univariate analysis, descriptive of the full sample and socioeconomic status of low, mid, and high levels were performed. The descriptive factors included min, max, mean, median and standard deviation. Furthermore, analysis of variance (ANOVA) was run across the low, mid, and high socioeconomic status levels for each family background factor.

4. Data and Descriptive Analysis

The dataset, which is used in this analysis, contains two parts. Part one consists of applicants' specifications such as gender, testing group, age, total grade as well as information about their application in 2005 from the NOET's original data file. The second part of data is extracted from a questionnaire with six questions regarding applicants' family background, which is filled by all applicants during the nationwide examination. These two files are merged into one dataset according to the applicants' ID. Table 2 shows a description of variables used in the analysis.

The used data file is the total number applicants and is not a sample. The variables in this study allow a reasonable replication of the educational attainment models, most commonly estimated¹.

In 2005 the total number of applicants in the Iranian nationwide university entrance examination was 1,488,040 persons. Language and art groups were floating groups and candidates could choose one of main groups (mathematics and physics, empirical sciences, human sciences) as well as either or both of these two groups. Therefore, after removing duplicated candidates 1,186,751 actual candidates were used in our analysis. Table 3 shows the number and percentages of candidates and entrants by each group. It can be seen from this table that from 1,186,751 candidates 286,071 persons were accepted in universities; of which 38.6% are from group one, 26.0% are from group two and 35.5% are from group three. Hence, the chance of entrance for group one, two and three are 33.4%, 19.3% and 21.5% respectively.

In the following section, we use the total grade of each candidate as a dependent variable and calculate cross-tabulations between the total grade and family background variables.

4.1 Parental Education

Table 4 and 5 compare total grade of applicants according to their parental education levels and the gender. The percentages of candidates according to their father education in four categories of university degree holders, high school certificate holders, primary school certificate holders and with no educations are 15.0%, 32.1%, 36.3% and 16.6% respectively. As can be seen from Table 4, the father's education has a positive effect on the total grades of candidates. With an increase in the father's level of education, the total grades of applicants increase. For example, the means of total grades in four categories are 5789.8, 5229.4, 5146.0, and 5060.8. This pattern is the same for both sexes and the only difference is that the mean of total grades for females is slightly higher than males. Table 5, shows the mean of total grades of applicants regarding their mother's education and the gender. In this table we have the same pattern as in Table 4. Hence, the education of mother has a positive effect on the mean of total grades of applicants. In other words, the higher level of parental education is, in almost every case, associated with a higher mean of total grades of male and female applicants. The likelihood of entering the university is, in particular, much higher for the children of university-educated parents compared to the children of parents with any other educational level.

¹ The categorization of variables such as family's income, parental education, parental job and the number of family members were coded in the NOET.

4.2 *Parental Job*

Table 6 and table 7 show the mean of total grades of applicants relative to their parental job. The parental job is categorized into four categories: education related (teachers, university lecturers), governmental employee, private sector, and other jobs. Means of total grades were 5742.5, 5315.0, 5183.4, and 5178.6, for applicants, whose fathers' jobs are educational related, government employee, private sector employee, and other respectively. The mean of total grades for applicants whose fathers are teachers or university lecturers is more than other categories. However, the mean of total grades for those applicants whose father is a governmental employee is greater compared to the other two groups. Probably government employees provide better quality of care to children and try to construct a supportive environment for their children by encouraging them to study. We have a similar pattern for the means of total grades of applicants concerning their mothers' job. The category of the mother's job is slightly different from the father's job. The mother's job is categorized into teacher or university lecturer, private sector, government employee, and housewife. It can be seen from table 7 that the means of total grades for applicants whose mother has an education-related job or is a housewife, is more than other groups.

4.3 *The Number of Family Members*

Table 8 shows the means of total grades in 2005 relative to the number of family members and the gender of applicants. Family members include father, mother, sisters and brothers. This variable is categorized into four categories that they are four and less, five, six, and seven or more family members. The means of total grades are 5367.9, 5367.6, 5250.5, and 5150.6 for applicants, whose family members are four or less, five, six, and seven or more respectively. The analysis of variance shows that the means of total grades of applicants have been decreased if they come from a larger family.

4.4 *Family's Income*

Table 9 shows the means of total grades in 2005 regarding the applicants' family income and their gender. Family income is grouped into four categories which are weak (<2400 USD), average (2400-3250 USD), good (3250-4800 USD), and very good (>4800 USD) yearly. The means of total grades in four categories are 5080.3, 5183.9, 5396.3, and 5577.6 for applicants, whose family incomes are weak, average, good, and very good respectively. The means of total grades for applicants whose family income is good or very good are greater than the other categories. This pattern is the same for both sexes and the only difference is that the mean of total grades for females are slightly higher than for males'. The ANOVA shows that the means of total grades of applicants have gone up with the family income increase.

5 **Inferential Analysis**

In this section the result of some inferential analysis such as logistic regression, linear regression and neural networks are presented.

5.1 *Binary logistic regression*

In this analysis, the dependent variable is the acceptance in universities and colleges, while the independent variables or covariates are age, gender, mother's job, father's job, father's education, mother's education, the number of family members and family's income. In this analysis the stepwise method is used to determine the order of the variables importance.

Table 11 shows how two variables, namely age and the number of family members, have a negative effect on the acceptance in the universities. That means if the age of a candidate increased, he would have a less chance to get accepted in universities. The variables in table 8 are ordered according to their importance in the model. That means, in this model, the father's education is the most important factor affecting the acceptance in the universities and after that age has the maximum effect and the mother's education has the minimum effect.

5.2 *Linear regression*

The linear regression analysis is used in which the independent variable is the mean of total grade. This analysis is performed like the logistic regression in section 5.1, where the independent variables are age, gender, mother's job, father's job, father's education, mother's education, the number of family members and family's income. Table 12 shows the order of the variables according to their importance in the linear regression model. As can be seen in this model, the age is the most important factor affecting the acceptance in the universities and after that father's education has the maximum effect and the father's job has the minimum effect.

5.3 *Neural networks*

The neural networks have been used for predictive purposes, i.e. not only for classification but also for regression of continuous target attributes. Figure 2 shows the most important variables based on the final classification model, which are father's education, mother's education, family's income, the number of family members, father's job, mother's job and gender respectively. The analysis of this model has an approximate 62% accuracy in classification of the acceptance in the universities.

Figure 3 shows the neural networks results of prediction model, in which independent variable is the mean of total grade. Due to this model father's education, mother's job, mother's education, father's job, family's income, gender and the number of family members are considered the most important variables respectively. The analysis of this model has an approximate 51% linear correlation in prediction of the mean of total grade.

6 **Conclusions**

It can be concluded that, in most cases, the mean of total grades for male applicants fell further behind the total grades of their female peers according to the following variables: parental education, parental job, the number of family members and family's income. Additionally, female grades increased marginally at all higher parental education levels and increased substantially for applicants with university-educated parents. Thus, the data mining methods and regression models show that, all of the family background factors influence on participant's educational achievement.

Some factors have positive effects on the mean of total grades such as: parental education, parental job and family's income. Additionally, the number of family members has a negative effect on candidates' educational achievement. That means a candidate from a more than seven family members has a chance less than a candidate from less than four members number of family. Neural Net analysis indicated an additional point of view in this study. Due to this analysis the important factors on educational achievement are father's education, mother's education, family's income, mother's job, father's job, the number of family members, and gender respectively.

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Tables:

Table 1. Names of specialized subjects in each group

| Testing Group | Examined Subjects |
|-------------------------|--|
| Mathematics and Physics | Mathematics, Physics, Chemistry |
| Empirical Sciences | Mathematics, Physics, Chemistry, Biology, Geology |
| Human Sciences | Mathematics, Economics, History and Geography, Social Sciences, Philosophy and Logic, Psychology |
| Art | Mathematics, Art Information, Technical Drawing, Music, Picture and Imagination ability, Play Skills |
| Language | Specialized Language |

Table 2. Description of variables used in analysis

| Variable Name | Values | Measure |
|------------------------------|--------------------------------|---------|
| Acceptance | No: 75.9% | Nominal |
| | Yes: 24.1% | |
| Testing Group | Mathematics: 27.8% | Nominal |
| | Empirical Sciences: 32.4% | |
| | Human Sciences: 39.8% | |
| Gender | Female: 61.7% | Nominal |
| | Male: 38.3% | |
| Total Grade | Min: -4472.00 | Scale |
| | Max: 13517.00 | |
| | Mean: 5236.13 | |
| | Median: 4975.00 | |
| | Std. Dev.: 1481.15 | |
| Father's Education | No Education: 16.6% | Nominal |
| | Primary School: 36.3% | |
| | High School: 32.1% | |
| | University Degree: 14.9% | |
| Mother's Education | No Education: 25.4% | Nominal |
| | Primary School: 40.1% | |
| | High School: 28.1% | |
| | University Degree: 6.4% | |
| Father's Job | Workless or Other job: 25.7% | Nominal |
| | Private Sector Employee: 41.6% | |
| | Government Employee: 25.3% | |
| | Teacher or Lecturer: 7.4% | |
| Mother's Job | Housewife: 89.5% | Nominal |
| | Private Sector Employee: 2.1% | |
| | Government Employee: 3.0% | |
| | Teacher or Lecturer: 5.3% | |
| Family's Income (yearly) | Weak (<2400 USD): 30.8% | Nominal |
| | Average (2400-3250 USD): 34.0% | |
| | Good (3250-4800 USD): 22.2% | |
| | Very Good (>4800 USD): 13.0% | |
| The number of family members | Four or Less: 16.3% | Nominal |
| | Five: 21.2% | |
| | Six: 22.2% | |
| | Seven or More: 40.3% | |

Table 3. The number and percentage of candidates and entrants by Testing Group

| Group: | Mathematics and physics | | Empirical sciences | | Human sciences | | Total | |
|-------------|-------------------------|------|--------------------|------|----------------|------|-----------|------|
| | No. | % | No. | % | No. | % | No. | % |
| Candidates: | 329,829 | 27.8 | 384,184 | 32.4 | 472,738 | 39.8 | 1,186,751 | 100 |
| Entrants: | 110,284 | 38.6 | 74,303 | 26.0 | 101,484 | 35.5 | 286,071 | 100 |
| Chance: | | 33.4 | | 19.3 | | 21.5 | | 24.1 |

Table 4. The mean of total grades of applicants by Father's Education and the Gender of candidates

| | No educations | Primary school | High school | Uni. degree | F. | Sig. |
|---------|---------------|----------------|-------------|-------------|--------|-------|
| Male: | 5074.9 | 5114.4 | 5141.9 | 5644.0 | 2293.6 | 0.000 |
| Female: | 5050.2 | 5162.6 | 5276.1 | 5905.5 | 7601.9 | 0.000 |
| Total: | 5060.8 | 5146.0 | 5229.4 | 5789.8 | 9086.2 | 0.000 |

Table 5. The mean of total grades of applicants by Mother's Education and the Gender of candidates

| | No educations | Primary school | High school | Uni. degree | F. | Sig. |
|---------|---------------|----------------|-------------|-------------|--------|-------|
| Male: | 5101.9 | 5143.1 | 5241.3 | 5742.1 | 1580.4 | 0.000 |
| Female: | 5071.0 | 5204.2 | 5407.4 | 6181.2 | 7017.1 | 0.000 |
| Total: | 5083.8 | 5183.6 | 5346.8 | 5969.5 | 7529.1 | 0.000 |

Table 6. The mean of total grades of applicants by Father's Job and the Gender of candidates

| | Other jobs | Private sector | Gov. emp. | Teacher or lecturer | F. | Sig. |
|---------|------------|----------------|-----------|---------------------|--------|-------|
| Male: | 5130.1 | 5160.8 | 5238.9 | 5632.9 | 1042.6 | 0.000 |
| Female: | 5190.1 | 5212.3 | 5360.4 | 5829.6 | 2886.0 | 0.000 |
| Total: | 5178.6 | 5183.4 | 5314.9 | 5742.5 | 3673.1 | 0.000 |

Table 7. The mean of total grades of applicants by Mother's Job and the Gender of candidates

| | Housewife | Private sector | Gov. emp. | Teacher or lecturer | F. | Sig. |
|---------|-----------|----------------|-----------|---------------------|--------|-------|
| Male: | 5166.0 | 5102.9 | 5336.3 | 5743.1 | 1156.5 | 0.000 |
| Female: | 5233.1 | 5186.1 | 5533.9 | 6125.0 | 4280.8 | 0.000 |
| Total: | 5208.7 | 5147.9 | 5447.7 | 5952.2 | 4917.4 | 0.000 |

Table 8. The mean of total grades of applicants by the Number of Family Members and the Gender of candidates

| | Four or less | Five | Six | Seven or more | F. | Sig. |
|---------|--------------|--------|--------|---------------|--------|-------|
| Male: | 5303.4 | 5301.9 | 5200.9 | 5115.5 | 380.1 | 0.000 |
| Female: | 5412.2 | 5409.0 | 5278.5 | 5170.4 | 1266.3 | 0.000 |
| Total: | 5367.9 | 5367.6 | 5250.5 | 5150.6 | 1533.9 | 0.000 |

Table 9. The mean of total grades of applicants by Family's Income and the Gender of candidates

| | Weak | Average | Good | Very good | F. | Sig. |
|---------|--------|---------|--------|-----------|--------|-------|
| Male: | 5076.5 | 5126.9 | 5336.4 | 5482.6 | 1192.4 | 0.000 |
| Female: | 5082.6 | 5215.1 | 5431.6 | 5639.0 | 3964.1 | 0.000 |
| Total: | 5080.3 | 5183.9 | 5396.3 | 5577.6 | 4882.8 | 0.000 |

Table 10. The Analysis of Variance Results, Dependent Variable: Total Grade

| Source | Sum of Squares | df | Mean Square | F | Sig. |
|-------------------|----------------|---------|-------------|-------------|------|
| Corrected Model | 7.942E10 | 18 | 4.412E9 | 2073.880 | .000 |
| Intercept | 4.414E12 | 1 | 4.414E12 | 2074746.597 | .000 |
| Mother_Job | 2.754E9 | 3 | 9.180E8 | 431.457 | .000 |
| Father_Job | 1.548E9 | 3 | 5.161E8 | 242.587 | .000 |
| Mother_Education | 3.126E9 | 3 | 1.042E9 | 489.801 | .000 |
| Father_Education | 1.035E10 | 3 | 3.449E9 | 1620.835 | .000 |
| No_Family_Members | 3.562E8 | 3 | 1.187E8 | 55.804 | .000 |
| Family_Income | 6.795E9 | 3 | 2.265E9 | 1064.614 | .000 |
| Error | 2.244E12 | 1054765 | 2127620.752 | | |
| Total | 3.145E13 | 1054784 | | | |
| Corrected Total | 2.324E12 | 1054783 | | | |

Table 11. The coefficients and variables in the Logistic Regression model

| Variable name | B | S.E. | Wald | df | Sig. | Exp(B) |
|---------------|--------|-------|--------|----|-------|--------|
| Father's Ed. | 0.117 | 0.003 | 1161.0 | 1 | 0.000 | 1.124 |
| Age | -0.112 | 0.001 | 8718.0 | 1 | 0.000 | 0.894 |
| Family's Inc. | 0.106 | 0.003 | 1742.2 | 1 | 0.000 | 1.112 |
| Mother's Job | 0.109 | 0.003 | 1219.8 | 1 | 0.000 | 1.115 |
| No. of Family | -0.033 | 0.002 | 205.4 | 1 | 0.000 | 0.968 |
| Mother's Ed. | 0.056 | 0.004 | 205.5 | 1 | 0.000 | 1.058 |
| (Constant) | 0.399 | 0.028 | 209.9 | 1 | 0.000 | 1.490 |

Table 12. The variables and coefficients in the Linear Regression model

| Variable name | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|--------------------|-----------------------------|------------|---------------------------|--------|-------|
| | B | Std. Error | Beta | | |
| Age | -66.9 | 0.5 | -0.124 | -127.2 | 0.000 |
| Father's Education | 94.5 | 2.3 | 0.060 | 41.3 | 0.000 |
| Mother's Job | 134.6 | 2.1 | 0.066 | 63.3 | 0.000 |
| Family's Income | 83.3 | 1.6 | 0.057 | 52.5 | 0.000 |
| Gender | -62.5 | 2.9 | -0.020 | -21.3 | 0.000 |
| Mother's Education | 15.1 | 2.4 | 0.009 | 6.2 | 0.000 |
| Father's Job | -6.2 | 1.9 | -0.004 | -3.2 | 0.001 |
| No. of Family | 4.4 | 1.4 | 0.003 | 3.1 | 0.002 |
| (Constant) | 6071.5 | 14.1 | | 432.3 | 0.000 |

Figures:

Figure 1. Sacker et al (2002) model of the relationship between family social class, and pupil achievement and adjustment

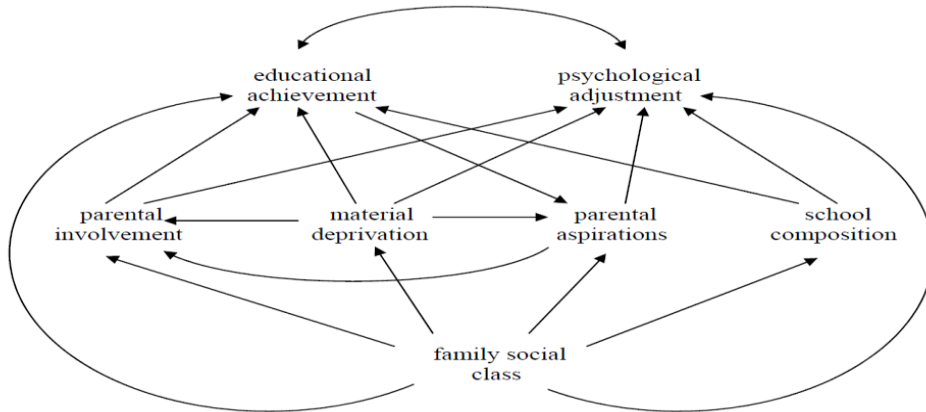


Figure 2. The neural networks results for classification

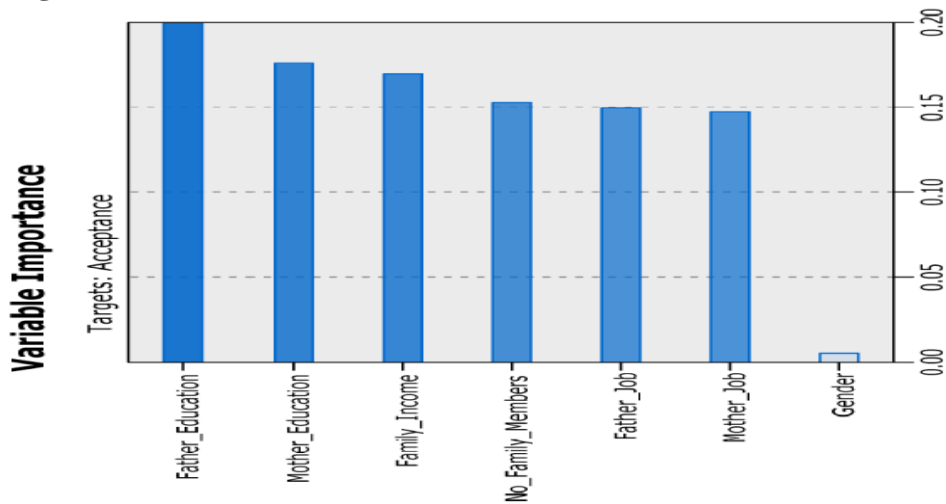


Figure 3. The neural networks results for prediction

