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LEAVING CERTIFICATE POINTS AND PERFORMANCE IN
FIRST ARTS ECONOMICS:
A STUDY OF THE 1987/88 U.C.D. CLASS

by
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and
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Introduction.

This paper is concerned with the relationship between the performance of students in the Leaving Certificate and their subsequent marks in the subject Economics in First Arts in University College, Dublin. It has been prompted by discussion of the failure rate among Arts students and the view that is sometimes expressed that it should be possible to select students on the basis of Leaving Certificate results who would be less likely to fail university subjects.

Before discussing the details of the present study, it should be recalled that for the following reasons a relatively high failure rate might be expected among Arts students:

i. the minimum number of points required for entry to the Faculty is not as high as that required in most other university courses in Ireland.

ii. the intake to the Faculty is undifferentiated by subject area and, unlike most other third level students, many of those entering the Faculty do not seem to have a clear subject area preference.

iii. the proportion of entrants to the Faculty who had given it as their first preference on the Central Applications Office (C.A.O.) form is one of the lowest of any of the CAO options.¹

These considerations suggest that many factors in addition to the students' performance on the Leaving Certificate will

¹In 1987/8, the minimum entry points to the Arts Faculty was 15 on the U.C.D. scheme, the lowest of any Faculty in the College; the ratio of first preference applications to places available in the Arts Faculty was 844:1000, the lowest of any of the courses in the C.A.O. form, and of the 1,147 students who were offered and accepted places in the Faculty, only 286 had given it as their first preference.
play a role in their performance in an Arts subject. This study is, however, confined to looking at the relationship between Leaving Certificate results and performance in the First Arts examination in Economics.

The Data.

The subject Economics has more First Arts students than any other subject in the Faculty. A total of almost 500 students sat the examination in Economics in the summer of 1988. 186 of these sat the repeat Economics exam in Autumn 1988. \(^2\) 68.3% passed in the summer and a further 17.1% in the autumn, so that the definitive failure rate for the year was just under 15%. While this is relatively high compared with the rate in other Faculties, it is much lower than is believed by students and outside commentators.

Data on the students' points were furnished by the U.C.D. Computer Centre from the admissions file, which contains data on total points and the subjects from which these were obtained. \(^3\) (Information was also obtained on the students' National University of Ireland Matriculation scores, but this was not used in any of the results reported here.) These data were matched with the Department of Political Economy's examination records and a usable file of 404 cases was built up. All repeat

\(^2\)Of these, 99 were students who had failed in the summer, and 87 students who had passed in the summer but had not reached the 50% mark required for entry into Second Arts honours.

\(^3\)We are grateful to John Lowe, Eoin Bairead and Michael O'Kelly of the Centre for making the data available to us.
students, mature students and students entering from the G.C.E or other examinations were omitted.

Figure 1 displays the distribution of Leaving Certificate points obtained by the students taking the economics exam in summer 1988. It is striking that only 30 students, less than 10 per cent, obtained 22 or more points. At least this number of points would be required for admission to Medicine, Veterinary Medicine, Engineering, Law and Commerce.

Figure 2 displays the distribution of examination marks in summer 1988. The concentration of results in the 40-44% interval, and corresponding deficit in the 35-39% interval, is accounted for by a tendency to raise students who obtain 38% or better to the pass mark (40%). Allowing for this effect, the distribution is a reasonable approximation to the normal curve, but is should be emphasised that the marks are not doctored to achieve this outcome. Nor is there any quota of the number who are awarded a pass mark or a "qualifying for honours" mark (50%).

Relationship between Points and Marks.

The first question we have addressed is the relationship between Leaving Certificate points and marks in the First Arts examination in Economics. The following shows the average mark and standard deviation of marks in the summer examination by Leaving Certificate points:
Points   | <16 | 16  | 17  | 18  | 19  | 20  | 21  | 22+
Average Mark | 35.7 | 38.6 | 40.0 | 45.2 | 48.5 | 45.5 | 48.0 | 51.8
Standard Dev. | 9.7  | 12.2 | 10.3 | 13.4 | 10.6 | 13.5 | 12.0 | 15.4

For those with 17 or more points the average mark was at or above the passing mark. There is a fairly clear tendency for marks to increase with points. However, the large standard deviations are very striking. It is also surprising that there is no tendency for the distribution of marks to become less dispersed at higher Leaving Certificate points. Even for those with 22 or more points, the mean was less than a standard deviation above the passing mark.

Leaving Certificate Economics and Marks.

The second issue we addressed was the influence of taking the subject Economics in the Leaving Certificate on performance in the First Arts exam. Just over 40% of our students had taken Economics in the Leaving Certificate. On average they received 3 points from this subject towards their overall Leaving Certificate points. That is, the average grade obtained in Economics was a C on the Higher Paper. In the U.C.D. summer examinations the average mark of those who had taken Economics in Leaving was 47.0%, compared with 42.2% for those who had not taken Economics. However, this difference does not measure the net effect of studying Economics before entering college because those who took Economics obtained more Leaving Certificate points than the students who did not take Economics. To establish the net effect it is necessary to proceed beyond cross-tabulations to a regression analysis of the data.
Regression Results.

We have applied a similar methodology to that used by Moran and Crowley (1978/79). However, whereas they studied university performance by Faculty only, we are concerned with performance in a specific subject (Economics) and with the association between university performance in this subject and marks in the Leaving Certificate. Furthermore, their study used the results of the summer examination only, whereas we have been able to incorporate the autumn results as well.

In order to study the association between overall Leaving Certificate points and points on individual Leaving Certificate subjects, on the one hand, and performance in the First Arts Economics examination, on the other, the following dependent variables were defined:

(i) the percentage mark on the summer examination (Summer Mark),
(ii) the higher of the summer or autumn percentage mark (Better Mark).

These variables are continuous, bounded between 0 and 100. We applied Ordinary Least Squares using them as dependent variables\(^4\). The variables we used to explain these marks were:

\(^4\)We also applied probit analysis with \(\ln \left( \frac{p}{1-p} \right) \) as the dependent variable, where \(p=\)probability of passing. This approach added little to the basic insights obtained from the regression analysis of marks.
(a) Points. That is, the student's total Leaving Certificate points score, based on the U.C.D. scheme.\footnote{This is 543221 (for Higher A,B,C,D, Lower A, B, respectively, with Higher Mathematics receiving 7542).}

(b) Mathematics, Economics, Irish and English Points (separately). This is, the contribution of each of these subjects to the student's overall points.

(c) Residual Points. That is, Points \textit{minus} whatever set of subject points is also included in the equation.

and

(d) A (1,0) variable for Female, Male.

Our main findings have been grouped and summarised in Table 1. Among the conclusions suggested by these results are:

(a) The Leaving Certificate results are significantly associated with performance in the university examinations in Economics. It is of interest to note that the $R^2$ shown in Table 17 of Moran and Crowley range from about 0.1 for Arts students (N=342), to 0.2 for Commerce, Law and Medical students (N=114, 57, 100 respectively) and 0.4 to 0.5 for Science and Engineering students (N=201 and 110). The Educational Testing Service of Princeton, New Jersey, reports correlations between Graduate Record Examination scores and students' first year averages in graduate school (G.R.E. Bulletin, 1984). These vary between 0.28 and 0.39 in the social sciences and 0.17 and 0.32 in the Humanities (using much larger samples). Thus, the correlation between Leaving Certificate points and First Arts Economics performance in U.C.D. is higher than those obtained in other
studies of Arts/Humanities/Social Science students. However, the correlation is nonetheless very low and the standard errors of the estimates are high, ranging from 12 (equation A) to 10.6 (equation F). Using all the information available from the Leaving Certificate, a 95% confidence interval on predicted marks spans +/- 21%!

(b) The association between L. C. points and university examination performance is weaker when the autumn results are taken into account than when the summer examination results are considered on their own. The influence of secondary school performance seems to decay quickly. Presumably the influence of other factors, especially motivation, increases with the passage of time.

(c) There are highly significant differences between the value of individual subjects as predictors of university performance in Economics. Irish is only marginally significant in predicting performance in the Summer examination, and not significant at all when the better of the summer and autumn marks is the dependent variable. English also ceases to be significant when the results of the autumn examination are taken into account. At the other extreme, a point gained from Mathematics or Economics on the Leaving Certificate is associated with an average gain of 3.6% in the summer mark and 2.9% in the better of the summer and autumn marks. A point gained on any other subject is worth 1.5% on the summer, and 1.1% on the better, mark.
(e) Our findings regarding the relative importance of Mathematics echoes the conclusion reached by Moran and Crowley, who state that

if selection of students who will do well in first year is of primary concern, then special weighting for Mathematics is indeed justified and . . . the recent [i.e. 1978] NUI modification to double scoring for Mathematics has been in the wrong direction in this regard at least (p. 253).

However, our results suggest that the Economics mark should also receive extra weighting if prediction of performance in the university Economics exams is the objective.

(f) The female/male variable was not significant in any of the equations (these results are not shown in the Table). It appears that when Leaving Certificate points are taken into account, gender has no effect on marks in the Economics examinations. There is no evidence of conscious or unconscious discrimination in the university examinations.

In relation to point (d), above, there is a complication in using Leaving Certificate points in Economics to measure the effect of studying Economics before college on performance in the First Arts examination. A value of zero for the variable "Economics points" in Table 1 can occur in two ways: (i) if the student did not take Economics in the Leaving Certificate and (ii) if the student took Economics but did not reach a D on the Higher Paper or a B on the Lower Paper. To try to separate the influence of the actual grade obtained in Economics from the
fact of having studied Economics, we estimated an equation including the variable "Economics points" and a 0,1 Economics Dummy for whether or not the student took Economics. (There is a high correlation between the Economics Points and the Economics Dummy variables.) In none of the results was the coefficient of the Economics Dummy significant. It was, however, always negative. The interpretation of this is that if a student took Economics but failed to obtained any Leaving Certificate points from the subject, their First Arts exam results were on average worse than students who had not taken Economics previously. It seems that it is not so much studying Economics in secondary school that matters as standard reached in the subject.

Autumn Resits.

A question that is frequently asked by students who failed, or did not reach the qualifying mark, in the summer is "What are my chances in the Autumn exam?" To try to shed light on this question, we regressed the autumn score on the summer score and on some of the Leaving Certificate variables. The results are shown in Table 2. It may be seen that the association between summer and autumn scores is quite close. The coefficient of the summer mark is, however, significantly less than unity. This indicates a "regression towards the mean", which could reflect the fact that the random influences (luck, variation in marking, etc) on marks are not correlated over time.

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6This approach was suggested by Cormac O Grada.
Leaving Certificate points have little influence on the autumn score once the effect of the summer score is taken into account, although the coefficient of the combined Mathematics and Economics Leaving Certificate points variable is significant, but not very large.

The relationship between the summer and autumn scores is shown in Figure 3, for the average value of the other variable. On the strength of this, we can now tell the students that if they did not reach 30% in the summer their chances of passing in the autumn are poor, and if they did not get over 40% in the summer they are unlikely to reach the qualifying mark in the autumn!

Conclusions.

Leaving Certificate performance is associated with performance in the university Economics examination, but the association is quite weak. The optimal scoring scheme for the Leaving Certificate results as a basis for entry to the university subject Economics would attach a higher weight to the Mathematics and Economics marks than to marks on other subjects.\(^7\) Irish marks would be give a lower weight than marks on all other

\(^7\)This statement has to understood in light of the fact that we only explored whether Economics, Mathematics, English and Irish differed from "Residual" subjects.
subjects or none at all.

The influence of performance in the Leaving Certificate on university performance diminishes markedly between the summer and autumn examination. Performance on the combined summer and autumn examinations is the criterion for admission into second year, so the contribution of Leaving Certificate points, collectively and by subject, to the latter is the most important consideration. Our results show that Leaving Certificate results are very poor predictors of this performance.

This finding highlights the dangers inherent in relying heavily on the Leaving Certificate as the criterion for admission to University. While the weakness of the association between points and subject marks may be partly due to the relatively narrow range of points obtained by the students in the Faculty of Arts, the wide variation in marks in the university examination even for students with over 20 or under 16 points is striking.

Further research is required to shed light on the factors other than Leaving Certificate results that affect performance in university examinations. It would be desirable to extend the research to cover other subjects and to try to include socio-economic and psychological factors among the explanatory

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8The influence of the bonus given to students who sit the Leaving Certificate papers through Irish is a factor that we have not been able to examine.
variables.

References


Leaving Certificate Performance

Note: The 22 points block contains all who scored 22 points or more.

Figure 1
Distribution of Summer Examination Scores

Figure 2
Relationship between Summer and Autumn based on OLS regression

Figure 3
**TABLE 1: Ordinary Least Square Regressions**

<table>
<thead>
<tr>
<th>dependent variable</th>
<th>eqn(A)</th>
<th>eqn(B)</th>
<th>eqn(C)</th>
<th>eqn(D)</th>
<th>eqn(E)</th>
<th>eqn(F)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Summer % mark</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>number of observations</td>
<td>404</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Points Score</td>
<td>2.01</td>
<td>(7.14)</td>
<td>1.379</td>
<td>(5.26)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Residual Points</td>
<td>1.54</td>
<td>(5.15)</td>
<td>1.123</td>
<td>(4.04)</td>
<td>1.08</td>
<td>(4.09)</td>
</tr>
<tr>
<td>Maths Score</td>
<td>3.827</td>
<td>(8.23)</td>
<td>2.928</td>
<td>(6.78)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Economics Score</td>
<td>3.408</td>
<td>(7.3)</td>
<td>2.917</td>
<td>(6.72)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>English Score</td>
<td>1.499</td>
<td>(2.2)</td>
<td>0.513</td>
<td>(0.81)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Irish Score</td>
<td>0.853</td>
<td>(1.77)</td>
<td>0.921</td>
<td>(2.01)</td>
<td>0.0068</td>
<td>(-0.072)</td>
</tr>
<tr>
<td>Maths &amp; Economics</td>
<td>3.609</td>
<td>(10.34)</td>
<td></td>
<td>(8.84)</td>
<td>2.869</td>
<td></td>
</tr>
<tr>
<td>constant</td>
<td>7.095</td>
<td>(1.36)</td>
<td>11.45</td>
<td>(2.21)</td>
<td>10.63</td>
<td>(2.12)</td>
</tr>
<tr>
<td></td>
<td>23.22</td>
<td>(4.77)</td>
<td>26.48</td>
<td>(5.5)</td>
<td>25.67</td>
<td>(5.5)</td>
</tr>
<tr>
<td>(t-statistics are in parentheses)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Adjusted R-square</td>
<td>0.1104</td>
<td>0.2025</td>
<td>0.2055</td>
<td>0.062</td>
<td>0.1660</td>
<td>0.1681</td>
</tr>
<tr>
<td>S.e.e.</td>
<td>12.0</td>
<td>11.4</td>
<td>11.4</td>
<td>11.3</td>
<td>10.6</td>
<td>10.6</td>
</tr>
</tbody>
</table>
**TABLE 2: OLS Analysis of Autumn Results**

<table>
<thead>
<tr>
<th></th>
<th>eqn(M)</th>
<th>eqn(N)</th>
<th>eqn(0)</th>
<th>eqn(P)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>dependent variable</strong> =</td>
<td>Autumn % mark</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>number of observations</strong> = 186</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Points Score</strong></td>
<td>0.954</td>
<td>0.162</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(2.44)</td>
<td>(0.47)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Summer % Grade</strong></td>
<td>0.671</td>
<td>0.625</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(8.56)</td>
<td>(7.77)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Maths + Economics</strong></td>
<td>0.906</td>
<td>0.754</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(1.88)</td>
<td>(2.19)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Residual Points</strong></td>
<td>0.154</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(0.45)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>constant</strong></td>
<td>29.54</td>
<td>18.62</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(4.19)</td>
<td>(3.05)</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Adjusted R-square</strong></td>
<td>0.026</td>
<td>0.3009</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>0.3149</td>
<td>0.3179</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>S.e.e.</strong></td>
<td>10.3</td>
<td>9.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>9.4</td>
<td>9.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(t-statistics are in parentheses)