

# Industrial Placement and Degree Performance: Evidence from a British Higher Institution

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## Abstract

Using data from the University of Surrey's Economics Department, this paper explores the role of professional placement in degree performance. The list of control variables includes a measure of ability, A-level subject choice, gender and nationality. The statistical analysis offers evidence that participation in the placement scheme significantly increases the chances of obtaining an upper second or higher degree class. Ability, as captured by the student's second-year average mark, is also related to better academic performance. British students are also predicted to do better than their foreign peers.

JEL Classification: A22

## Introduction

A topic that has received relatively little attention in the economics of education literature is the effect of participation in industrial placement schemes on academic attainment. A potential explanation for this could be the unavailability of such programmes in most universities or their mandatory nature when they are in place. In contrast, the University of Surrey implements an optional professional placement scheme, which gives students the choice to work for a year upon completion of their level 2 studies. Students then return to university for a final year. Individuals opting out of the scheme proceed to the final year straight after their second year.

The stated aim of professional training is 'to enhance students' knowledge of Economics and their transferable skills and equip them for professional life'. [\(note 1\)](#) The Department of Economics assists students by arranging interviews with suitable

employers, but does not guarantee a placement. Students are normally required to spend a minimum period of 46 weeks on the job. The professional year is assessed by means of a report by an academic visiting tutor (who sees the students twice during the placement year), the professional supervisor's report, the student's report and an oral presentation. The possible outcomes of the assessment are fail, pass, merit or distinction.

The nature of the programme offers an opportunity to study the scheme's effects on student performance. In other words, it is an interesting question whether there is a significant difference in degree classifications between students who have worked for a year in a variety of economics-related jobs and those who went straight from level 2 to level 3. Does experience of the workplace increase focus and motivation? Despite the fact that the collected data consist of information purely on the University of Surrey's graduates, the findings presented here are not of sole relevance to this institution. It is hoped that this paper could generate more interest on the effects of industrial placement schemes on academic attainment, initiating more research in economics departments that run similar programmes.

The paper is organised as follows. Drawing on results in the economics of education literature, the next section discusses factors that have been found to play a significant role in determining educational outcomes. These factors are used as controls in the empirical analysis. The third section provides a detailed statistical description of the data and identifies key relations among the variables. In the fourth section, an ordered PROBIT econometric model is used to assess quantitatively the effects of industrial placement on degree classification. In the last section, I briefly discuss the results and their implications.

## **Formulation of the model**

Economists have historically shown interest in the statistics of degree classifications. [\(note 2\)](#) Changes in higher education (e.g. the recent introduction of top-up fees) ensure that this interest remains vibrant. This paper contributes to the economics of education literature by concentrating on the role of professional placement in academic attainment. To account for other factors that may affect academic performance, the effects of other potential determinants of educational outcomes are also analysed (gender, nationality, choice of A-level subjects, etc.).

Women studying economics in Britain are more likely than their male counterparts to obtain upper-second-class degrees, but less likely to obtain first-class degrees. The

result that female students are less likely to achieve firsts dates back to [Rudd \(1984\)](#). Differences in academic performance between the two genders are studied for 76 subjects. Rudd offers several possible explanations for the gender gap, including male prejudice, social pressures, medical conditions (e.g. menstruation) and psychological characteristics. In a recent study, using data between 1973 and 1993 for the 'old' universities, [McNabb et al. \(2002\)](#) also focus on the gender differences in academic performance. Their list of control variables includes A-level score, school type, age, marital status, nationality, subject studied, parental occupation and a number of universities' institutional variables (e.g. the number of students). The ordered PROBIT results indicate that females are more likely to achieve an upper-second-class degree but less likely to achieve a first-class degree than males. The authors rule out academic aptitude, male prejudice and subject-specific and institutional factors as significant determinants of the gender gap.

[Mellanby et al. \(2000\)](#) argue that women possibly underperform in exams because they are more prone to negative feelings like anxiety. Other reasons why differences in performance between men and women could arise are given in [Hoskins et al. \(1997\)](#). In a recent study, [Smith and Naylor \(2001\)](#) analyse the determinants of educational attainment using a dataset that includes UK students who graduated in 1993. They find that degree performance is influenced by gender, age, marital status, A-level score, social class background and type of school (state or independent). They document that females outperform males in almost all sub-samples. [\(note 3\)](#) As will be shown later, gender is not a significant factor in our sample of graduating students. Controlling for other parameters affecting academic performance, women and men do not have significantly different probabilities of obtaining upper-second-class or first-class degrees.

Nationality is included as an explanatory variable for two reasons. First, foreign students may face language and/or adaptation problems that can have adverse effects on their studies. This consideration would suggest that British students should significantly out-perform their non-British peers. A second view is that students from abroad might exhibit a stronger determination to do well with their studies, as they face a higher opportunity cost for failing. This line of thought would be consistent with the prediction that foreign students have a higher probability of obtaining a good degree. The statistical analysis of the paper provides some evidence that being British is associated with a higher probability of achieving a better degree.

An additional issue that is addressed in the analysis is the link between the choice of A-level subjects and degree classification. Specifically, I ask whether students with

an A-level in mathematics or economics outperform students with a different choice of subjects. [\(note 4\)](#) The focus, however, is not the grade but rather the relevance of the chosen subject to the degree course. In other words, I do not include A-level scores in the specification; I confine myself to using dummy variables to control for the fact that some students have taken an A-level in mathematics or economics. Subject to some caveats, which I address in the conclusion, I do not find a significant relation between having an A-level in economics and obtaining a higher degree class. I do find, however, that there is a (counterintuitive) relation with A-level mathematics. [\(note 5\)](#)

In order to obtain reliable estimates, the analysis in the next section controls for prior performance (a proxy for ability). This is essential, as firms and organisations collaborating with the University of Surrey in the placement scheme might simply be choosing the best students. Interviewers have access to the applicants' second-year marks and, in the absence of other, perhaps more accurate, measures of ability (e.g. IQ tests), they are likely to make a decision on whether to employ a student partly based on them. Establishing that the employed students come back to university and do better without the inclusion of prior performance could just be capturing their ability rather than the 'added' effect of professional experience. Therefore, it is essential that all regressions include the second-year average grade as an explanatory variable. [\(note 6\)](#)

In this section, I have discussed the rationale for including certain determinants of academic performance in the model specification. In doing so, I have presented, where possible, evidence from the literature to support the argument for using a variable. In the next section, before proceeding with the actual econometric analysis, I report and comment on several aspects of the dataset.

## **The profile of economics graduates**

The Economics Department at Surrey offers two degrees: a degree in Economics (EC) and a degree in Business Economics with Computing (BEC). The dataset contains information on students who graduated in 2001 and 2002, providing a total of 124 observations. [\(note 7\)](#) In what follows, I examine the characteristics of the student population in relation to gender, nationality, placement status and previous study of mathematics and economics. All the statistical information used in the section is summarised in Table 1. [\(note 8\)](#)

In Britain, fewer women than men register for economics programmes. This observation goes hand-in-hand with the fact that the economics profession is regarded as being dominated by men. [\(note 9\)](#) This picture is confirmed here, as 59.7% of graduates in both degrees are men. This is mainly driven by the 2002 graduate profile, in which 65.6% of graduates are male. The 2001 graduation numbers portray a more balanced picture with 53.3% of graduates being female. A t-test, however, reveals that differences between the proportion of males and females across the two degrees are not significant. [\(note 10\)](#) The inequality is even more apparent – and perhaps striking – among the BEC graduates, where 61.6% are men and only 38.4% are women. A somewhat better balance is achieved among the BEC students, as the respective percentages are 56.9% and 43.1%. Compared to the median grade of 58.4 achieved by graduates, males achieved 57, whereas females achieved 59.5.

The majority of the students in the sample are British (70%). Nevertheless, the remaining 30% representing students from abroad is not negligible and enables a test to be carried out for a 'nationality effect' in the next section. Half of the foreign students are from EU countries and half from the rest of the world. [\(note 11\)](#) A larger percentage of males in the sample have UK nationality than females (77% and 60%, respectively). This difference is statistically significant at the 5% level. There is no variation across the two degrees or over the two years of the sample. The proportion of those who went on placement who are British is a remarkable 86.7%, indicating that foreign students are less likely to take the industrial year. This could be because of language considerations or because employers recognise that it will be more difficult for these students to rejoin them after graduation. Distinguishing among the non-UK students who went on placement and those who did not on grounds of their language skills would be interesting, but this avenue is not explored here as foreign students' language qualifications are diverse and not directly comparable (IELTS, TOEFL, attendance of English secondary schools, etc.). British students slightly outperformed their foreign peers in our sample as they achieved a median of 58.4% compared to 57%.

Half of the students in the sample joined university with an A-level in mathematics. The respective numbers for the EC and BEC degrees are 54.9% and 45.2%. A remarkable fact is that more men than women choose to study A-level maths: 72.1% of those with an A-level in maths are male. Another way to see this is that 59.5% of our male students have taken maths compared to 34% of the female population. This difference is significant at the 1% level. But despite the mathematical nature of economics in general, and the two degrees in particular, this

does not translate to a better academic performance by men. We saw earlier that the median grade achieved by females is higher than the one achieved by males. In fact, graduates with A-level maths obtained, on average, a lower final mark (58.4 compared to 58.9). This can be partly explained by the provision of a maths module in year 1 of the degree. Students with no A-level maths catch up with their peers (or even outperform them) in terms of their mathematical training.

**Table 1: Sample characteristics**

	Male	Female	UK	Non-UK	Grad 01	Grad 02	EC	BEC	A-level maths	No A-level maths	A-level econ	No A-level econ	Placement	No placement	Median mark
<b>Male</b>			0.655	0.459	0.467	0.656	0.569	0.616	0.721	0.476	0.641	0.550	0.6	0.592	57.0
<b>Female</b>			0.345	0.541	0.533	0.344	0.431	0.384	0.279	0.524	0.359	0.45	0.4	0.408	59.5
<b>UK</b>	0.77	0.6			0.75	0.7	0.706	0.699	0.852	0.556	0.906	0.483	0.867	0.449	58.4
<b>Non-UK</b>	0.23	0.4			0.25	0.3	0.294	0.301	0.148	0.444	0.094	0.517	0.133	0.551	57.0
<b>Grad 01</b>	0.432	0.56	0.483	0.595			0.471	0.493	0.443	0.524	0.516	0.45	0.587	0.327	59.1
<b>Grad 02</b>	0.568	0.44	0.517	0.405			0.529	0.507	0.557	0.476	0.484	0.55	0.413	0.673	56.9
<b>EC</b>	0.392	0.44	0.414	0.405	0.4	0.422			0.459	0.365	0.516	0.3	0.387	0.449	58.0
<b>BEC</b>	0.60	0.56	0.58	0.59	0.6	0.57			0.541	0.635	0.48	0.7	0.613	0.551	58.0

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<b>A-level maths</b>	0.59 5	0.34	0.59 8	0.24 3	0.45	0.53 1	0.54 9	0.45 2			0.64 1	0.33 3	0.56	0.388	58.4
<b>No A-level maths</b>	0.40 5	0.66	0.40 2	0.75 7	0.55	0.46 9	0.45 1	0.54 8			0.35 9	0.66 7	0.44	0.612	58.9
<b>A-level econ</b>	0.55 4	0.46	0.66 7	0.16 2	0.55	0.48 4	0.64 7	0.42 5	0.672	0.365			0.587	0.408	58.0
<b>No A-level econ</b>	0.44 6	0.54	0.33 3	0.83 8	0.45	0.51 6	0.35 3	0.57 5	0.328	0.635			0.413	0.592	59.7
<b>Placeme nt</b>	0.60 8	0.6	0.74 7	0.27	0.73 3	0.48 4	0.56 9	0.63	0.689	0.524	0.68 8	0.51 7			60.8
<b>No placemen t</b>	0.39 2	0.4	0.25 3	0.73	0.26 7	0.51 6	0.43 1	0.37	0.311	0.476	0.31 3	0.48 3			53.7

Half of our graduates have also studied economics at A-level. Some 64.7% of the EC students have an A-level in economics. This percentage drops significantly for BEC graduates (42.5%). We therefore see a difference of more than 20 percentage points between EC and BEC graduates. Are students who choose maths also more likely to choose economics? The answer from inspection of the data is positive: 36.5% of the individuals without maths chose to do economics compared to 67.2% of those with maths. In relation to the graduate's final mark, prior study of economics does not seem to be an advantage, as the achieved mark of those with an A-level is lower than of those without (58% and 59.7%, respectively).

The focus of this study is industrial placement. The students are given the opportunity in their third year to work with organisations (private firms, policy-making institutions, etc.) that operate in areas relevant to the offered degrees. The pooled sample shows that 60% of our 2001/2 graduates went on professional placement (and all of them returned for their final-year studies). BEC students (63%) seem slightly more likely to choose to do this than EC students (56.9%). The variation across genders is quite small. However, more 2001 graduates (73.3%) than 2002 graduates (48.4%) gained the professional experience (a statistically significant difference). Here, there is a clear indication that such experience is indeed relevant to the final grade obtained, as the median for graduates with placement is 60.8, whereas the median for those without placement is 53.7. A t-test ( $t = -5.925$  with equal variances) indicates that we should strongly reject the null of common average grades in the two sub-samples. In the next section, we test whether this indication is validated when we control for other variables.

## Estimation results

The objective of the econometric analysis is to measure the effect of industrial placement on degree classification. In particular, I want to measure the probability differential between a placement student and a non-placement student in obtaining a 'good' degree (i.e. upper second class and above). Consistent with the literature (e.g. [Smith and Naylor, 2001](#); [McNabb et al., 2002](#)), I adopt an ordered PROBIT methodology that allows me to extract the required information. The model can be expressed as follows:

$$y_i = \beta'x_i + \varepsilon_i$$

where the error term  $\varepsilon_i \sim N(0, 1)$ , and  $\beta'$  is a vector of estimated parameters. The dependent variable  $y_i$  (the dependent variable's name for reporting purposes is

CLASS) assumes the value 0 if a degree was terminated, a 'pass' mark was awarded etc., the value 1 if a third-class degree was awarded, the value 2 if a lower-second-class degree was awarded, and so on. The vector  $x$  includes a constant, the placement variable (PLACE), [\(note 12\)](#) the average mark in year 2 (PPERF), nationality (UK), gender (MALE) and prior study of mathematics (ALMATH) and economics (ALECON) at A-level. To improve the comparative analysis and control for cross-degree and over time variation, I also take into account the choice of the degree (DEG) and the year of graduation (YEAR). Other variables that have been found to affect degree performance, such as age, marital status, and socioeconomic status, are not included here, either because there is no significant variation in our sample or because they were unavailable. Table 2 details the names and definitions of the variables used in this study.

**Table 2: Construction of variables**

Variable	Value
ALECON	1 if the individual has taken A-level economics, 0 otherwise
ALMATH	1 if the individual has taken A-level mathematics, 0 otherwise
DEG	1 if the individual is an EC student, 0 if a BEC student
YEAR	1 if the individual graduated in 2002, 0 if in 2001
MALE	1 if the individual is male, 0 otherwise
PLACE	1 if the individual has been on placement, 0 otherwise
UK	1 if the individual is British, 0 otherwise
PPERF	Average mark at the end of level 2

Estimation of the model indicates that variables YEAR, DEG, MALE and ALECON are not significant. Further LM tests also show that we can drop these regressors from the estimated equation. [\(note 13\)](#) Gender and prior knowledge of economics do not affect significantly the probability of obtaining a better degree. Our main equation then includes a constant, UK, ALMATH, PPERF and PLACE in the RHS. Results are reported in Table 3.

**Table 3: Estimation results** <sup>(note a)</sup>

Variable	Ordered PROBIT	OLS
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C	-10.50* (2.01)	12.50* (2.17)
UK	0.83* (0.34)	1.23** (0.74)
ALMATH	-0.69* (0.32)	-1.31* (0.60)
PPERF	0.25* (0.04)	0.77* (0.04)
PLACE	0.77* (0.39)	3.04* (0.69)

<sup>a</sup> Dependent variable is GRADE for OLS and CLASS for the ordered PROBIT.

\* indicates significance at the 5% level, \*\* indicates significance at the 10% level. Standard errors in parentheses.

As can be seen, the results indicate that there is a significant positive relationship between placement and academic attainment, which is measured in terms of degree classification. The probability of obtaining a higher degree class is positively affected by the decision of the student to go on professional placement. This result is significant at the 5% level. As expected, prior performance also affects this probability. Nationality plays a role, as British students have a higher probability of doing better compared to their foreign peers. These results are intuitive and, in the case of the placement variable, particularly interesting. However, our estimation produces the puzzling result that students with an A-level in mathematics underperform students with no such qualification. There is no easy explanation for this counter-intuitive result. However, a feature of the data may be responsible. Non-UK students who have not taken an A-level in maths are automatically allocated a zero irrespective of whether they have studied maths in some form prior to university entry. In practice, this means that, for example, a Chinese student with a good background but no A-level in maths is allocated a zero whereas according to his/her knowledge of the subject they should have been allocated a 1. However, estimating our equation with variable ALMATH containing information only on British students (and thus reducing our sample by the number of observations corresponding to the foreign population) delivers the same surprising outcome. Two further suggestions are made here. First, students with no A-level in mathematics may be more motivated to 'catch up' in terms of their knowledge in maths and take full advantage of the first-year maths module that is available to them. Second, the binary nature of the variable may not be appropriate and it may be that A-level performance should be taken into account instead. In any case, more research is needed to clarify this.

To check these results I also use an OLS estimation. The dependent variable (GRADE), in this case, is the average mark over the last two years of the course achieved by the graduate. Results are reported in Table 3 and are generally consistent with the ordered PROBIT estimations. The placement variable is significantly associated with a higher average mark.

The estimated coefficients of a PROBIT cannot be interpreted as marginal effects. To tackle this – taking into account the binary nature of the independent variables – I need to find the change in the probability of achieving an upper-second-class degree associated with the values of the binary independent variables PLACE, ALMATH and UK while the other variables are at their sample means. This change in probability is the marginal effect of the binary variable. Denoting the dependent variable with  $y$ , the standard cumulative normal distribution with  $\Phi$ , the vector of estimated coefficients with  $\beta'$ , and the vector of independent variables with  $x$ , I have the following probabilities (see [Greene, 2003](#), p. 737):  $Prob(y = 0) = \Phi(-\beta'x)$ ,  $Prob(y = 1) = \Phi(\mu_1 - \beta'x) - \Phi(-\beta'x)$ ,  $Prob(y = 2) = \Phi(\mu_2 - \beta'x) - \Phi(\mu_1 - \beta'x)$ ,  $Prob(y = 3) = \Phi(\mu_3 - \beta'x) - \Phi(\mu_2 - \beta'x)$ , and  $Prob(y = 4) = 1 - \Phi(\mu_3 - \beta'x)$ , where  $\mu_j$  for  $j = 1, 2, 3$  are parameters to be estimated. Recall that  $Prob(y = 2)$  is the probability of achieving a lower second,  $Prob(y = 3)$  is the probability of achieving an upper second, etc. Now, to examine the effect of each binary variable on these probabilities, I calculate two probabilities for each variable of interest: a corresponding probability when the variable takes the value 0 and a corresponding probability when the variable takes the value 1. As mentioned earlier, taking the difference of these probabilities gives the marginal effect of the variable on the probability.

The obtained results indicate that opting to do the professional placement increases the likelihood of an upper-second-class degree by 30 percentage points. The probability of obtaining a lower second is also lower for a student who has been on industrial placement. The probability of a lower second is 69% for a non-placement student compared to 39% for a placement student. It is also confirmed that being British increases the chances of getting an upper-second-class degree by 31 percentage points. UK students are more likely to achieve a good degree, as non-UK students have a higher chance of getting a lower second (73% compared to 41%). Consistent with the estimation results, having an A-level in mathematics reduces the chances of an upper second by 27 percentage points.

The above analysis seems to convey a strong message that the professional placement programme is beneficial to the students in more ways than one. Apart

from the obvious effect of having a value added on the employability of the graduate, it also seems to enhance significantly the chances of achieving an upper-second or first-class degree. The mechanism through which this link comes into effect is not the subject of this paper, but some brief potential explanations are given. First, it is possible that the placement experience enables the students to mature more quickly than they otherwise would. Spending a year working in often-competitive environments makes them realise that their future professional development is – to a certain extent – related to their academic performance. Hence, as their ambition is stimulated, they come back to university more focused and determined to do well. Second, the responsibilities they take up at work enhance their reliability. As a result, coursework and exams are treated more seriously, perhaps similarly to a work deadline. In any case, academic studies become more relevant and the idea of the value of time becomes better understood. It should also be noted that there might exist spillover effects for nonplacement students. Even though this study does not explore this issue empirically, theoretically there is a strong case for it, as better performance by placement students can trigger more intense competition.

## **Conclusions and discussion**

Using data from the University of Surrey's Economics Department, I have attempted to shed some light on factors that influence academic performance, paying special attention to the role of industrial placement. I find that the choice to go on professional placement is a wise one: it significantly increases the likelihood of a higher-class degree, possibly through links of maturity and increased reliability and focus. British nationality is also associated with a higher probability of a good degree.

Taking into account other factors, such as gender and A-level economics, does not alter the above findings. Surprisingly, students with an A-level in mathematics have a lower probability of achieving an upper-second-class degree. As I discuss in the text, students with no such qualification are offered an intense maths course in level 1, which may explain this result. Other controls have also been used, such as the year of graduation or the title of degree.

Of course, there are certain limitations in this study. The first is that there is no measure of performance in the A-levels in mathematics and economics: for example, I do not distinguish between someone who achieved an A in the exam and someone who achieved a C. This is a serious restriction, limiting our scope to the simpler

question of whether having taken mathematics or economics at A-level, irrespective of a good result or not, increases the chance of getting a good degree.

Second, the width and depth of the dataset is rather limited for the conclusions to be generalised. Thus, conclusions should be interpreted as applying to the University of Surrey's Economics Department. Despite this fact, the relevance of this exercise is broader: the importance of professional placement for attainment has been established and it will be interesting to compare the results presented here with findings from other economics departments in Britain and elsewhere. To this end this study has contributed.

## References

Borg, M. O. and Stranahan, H. A. (2002) 'Personality type and student performance in upper level economics courses: the importance of race and gender', *Journal of Economic Education*, vol. 33, no. 1, pp. 3–14.

Chapman, K. (1996) 'Entry qualifications, degree results and value-added in UK universities', *Oxford Review of Education*, vol. 22, no. 3, pp. 251–64.

Greene, W. H. (2003) *Econometric Analysis*, Upper Saddle River, NJ: Prentice Hall.

Hoskins, S., Newstead, S. and Dennis, I. (1997) 'Degree performance as a function of age, gender, prior qualifications and discipline studied', *Assessment and Evaluation in Higher Education*, vol. 22, pp. 317–28.

Jensen, E. J. and Owen, A. L. (2001) 'Pedagogy, gender, and interest in economics', *Journal of Economic Education*, vol. 32, no. 4, pp. 323–43.

McNabb, R., Pal, S. and Sloane, P. (2002) 'Gender differences in educational attainment: the case of university students in England and Wales', *Economica*, vol. 69, pp. 481–503.

Mellanby, J., Martin, M. and O'Doherty, J. (2000) 'The "gender gap" in final examination results at Oxford University', *British Journal of Psychology*, vol. 91, pp. 377– 90.

Nevin, E. (1972) 'How not to get a first', *Economic Journal*, vol. 82, no. 326, pp. 658–73.

Rudd, E. (1984) 'A comparison between the results achieved by women and men studying for first degrees in British universities', *Studies in Higher Education*, vol. 9, pp. 47–57.

Sear, K. (1983) 'The correlation between A level grades and degree results in England and Wales', *Higher Education*, vol. 12, pp. 609–19.

Smith, J. and Naylor, R. (2001) 'Determinants of degree performance in UK universities: a statistical analysis of the 1993 student cohort', *Oxford Bulletin of Economics and Statistics*, vol. 63, no. 1, pp. 29–60.

## Notes

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[1] The terms 'professional/industrial year', 'training' and 'placement' are used interchangeably throughout the text. They all refer to the same programme.

[2] For an early contribution, see [Nevin \(1972\)](#).

[3] Research has expanded in the direction of examining the role of personality types. For example, [Borg and Stranahan \(2002\)](#) study personality types (both as stand-alone factors and in relation to other characteristics like gender and race) and find that 'female introverts' among others actually perform better than other students.

[4] Note that the department offers a comprehensive introductory module in mathematics in the first year for those with no A-level maths. The material covered is similar to an A-level. In addition, all students take a separate 'Mathematics for Economics' module. Nearly half of the students in the sample have an A-level in mathematics.

[5] For more comprehensive studies on the correlation between A-level grades and degree results, see [Sear \(1983\)](#) and [Chapman \(1996\)](#) among others.

[6] For evidence on the importance of previous academic ability, see [Sear \(1983\)](#), [Rudd \(1984\)](#) and [Smith and Naylor \(2001\)](#), among others.

[7] Two students were excluded from the sample because information on one or more variables was not available in their case.

[8] The table reads vertically. For example to check what percentage of British students is male, one needs to read the element in column 4, row 1 of the matrix. To check what percentage of male students are British, one needs to read the element in column 2, row 3, etc. The table was constructed using Excel's IF-AND commands.

[9] See the Guardian Education website (<http://www.EducationGuardian.co.uk/>) for data on female enrolment in British economics programmes. Only 19 out of the 77 economics departments in the country have a female/male ratio that exceeds 40%. See also the Royal Economic Society website for data on female participation in the economics job market: <http://www.res.org.uk/society/women.asp> . [Jensen and Owen \(2001\)](#) use American data to make the same claim about economics classes across the Atlantic.

[10] Equal variances have been tested for using Levene's test. All t-tests were performed with SPSS.

[11] Note that Hong Kong students are considered to be foreign, as what is important for the purposes of this study is the effect of factors such as relocation and change of cultural environment.

[12] PLACE is a binary variable and just captures whether the student went on placement or not. Hence, I do not examine the 'type' of placement (e.g. whether the student worked as a policy analyst or a research analyst). This would undoubtedly be an interesting addition to the analysis. However, the job titles are not consistent across firms and examining the job specifications in detail would be beyond the scope of this paper.

[13] The LM statistics are 1.08, 1.67, 0.29 and 0.68, respectively. An LM test for omitting all four variables gives 5.03 and thus we cannot reject the null.

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