Do tutorial programmes influence the performance of Economics students? A case study of the Economics 178 course at Stellenbosch University

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Do tutorial programmes influence the performance of Economics students? A case study of the Economics 178 course at Stellenbosch University[1]

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ABSTRACT

The deteriorating performance of first-year Economics students has become a concern at many South African universities. Addressing the issue requires a thorough understanding of the factors influencing students' success. Studies analysing academic performance usually use the education production function approach. This approach identifies inputs crucial to learning to achieve certain outputs. Factors that have been investigated in other studies include the impact of lecture attendance on performance, as well as other factors such as matric results (particularly performance in Mathematics), gender and the age of the student.

This study adds to existing literature by analysing the impact of the tutorial programme as an input. The case study investigates the tutorial programme for first-year Economics students at Stellenbosch University (SU) using both a quantitative and qualitative analysis. Results confirm what previous studies have found, namely that lecture attendance, gender and matric results contribute positively to performance in first-year Economics. The main finding of the paper is that tutorial attendance also contributes positively to academic performance.

Keywords: Tutor programme, Undergraduate, Academic performance
JEL codes: A2, A22, A29

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1 Introduction

The success rate of university students is problematic in South Africa (Pandor, 2006). The high failure rate of first-year Economics students is especially worrying and has become an escalating concern at most universities. The repeating of modules has financial implications for both the students and the institution and it also affects the number of students continuing to senior levels. An investigation into what affects the learning process of the student is therefore important for assessment, especially when developing initiatives to address the problem.

According to the education production function approach, some explanation of the factors affecting academic performance can be identified. Inputs such as prior knowledge, personal characteristics and technology contribute to potential success. Various studies have been done to investigate the impact of these factors, especially at first-year level. This study seeks to add to the existing literature by investigating the impact of tutorial programmes as one of the inputs contributing to academic performance. It hopes to offer a potential model for success by focusing on the impact of tutorial programmes on the learning activities of first-year students. The sample was a first-year Economics course at SU (Economics 178).

This paper begins with a description of the Economics 178 module and its tutorial programme. The next section provides a literature overview that commences with a more descriptive analysis of the education production function and provides an overview of some empirical studies in this field. This is followed by a description of the data used in this study and some statistical analysis. The regression results follow and lastly an overall summary of the findings is provided.

2 The Economics 178 module

Economics 178 is a first-year module in the Faculty of Economic and Management Sciences. This year's module has one of the largest enrolments amongst first-year modules offered at SU. Over the past five years enrolment has increased by 22%, from 1 668 students to the present 2 030 students in 2007. The number of lecture groups for this module has increased from six to seven groups with the venue size up to a maximum of 350 seats per lecture group (Stellenbosch University, 2007).

The module presents (at an entry level) Microeconomics in the first semester and Macroeconomics in the second semester.[3] The pass rate is relatively low: it was 65% in 2006 (after re-evaluation examinations) compared to the faculty's first-year average of 71%. This low pass rate is similar to what has been found at other higher education institutions (Edwards, 2000).

The tutorial programme

The Economics 178 tutorial programme is a structured academic support programme that was initiated in 2005. Tutorial classes are conducted weekly and commence two weeks after the formal academic programme. Attendance of tutorial classes is voluntary, although for some students attendance is in principle compulsory.[4]

Tutors are appointed from the pool of postgraduate students and undergraduate students (who take Economics as one of their majors in the final year of study). The tutors apply for tutorial positions and are interviewed and selected based on specific criteria, such as academic achievement, communication skills and enthusiasm. The process of selection is finalised towards the end of the previous academic year and appointments are confirmed once the tutors' final academic results are available.

Tutors attend training offered by SU's Centre for Teaching and Learning. The programme covers sessions ranging from how to approach tutorial classes for the first time, to how to work in groups and maintaining discipline. Mock tutorials are part of the training programme where tutors receive comments and feedback on their presentation skills. Compulsory sessions and meetings throughout the academic year address problems and issues pertaining to the programme.

3 Literature overview

A survey of the literature indicates that extensive research has been done on the factors impacting on the academic performance of first-year Economics students. Most of the studies come to similar conclusions, as summarised by Siegfried and Fels (1979) in their comprehensive survey on the literature pertaining to Economics education. The impact of a formal tutorial programme on the success of first-year Economics students appears to be one of the aspects that are covered less extensively in the academic literature.

[3] At most universities in South Africa, first-year Economics is presented as two separate modules; one in Microeconomics and the other in Macroeconomics.

[4] These students are identified early in the academic year by means of an early assessment test. Those students who perform poorly in this test receive e-mail messages encouraging them to attend tutorial classes. This system has not been entirely successful as no enforcement mechanism is in place.

3.1 The education production function approach

The Education production function approach is often used to explain results achieved by Economics students. It is seen as a helpful tool in determining the efficiency of the instructional method (Siegfried and Fels, 1979). According to Edwards (2000:459) the educational production process consists of three inputs. They can be summarised as 1) prior knowledge already acquired by students (human capital); 2) the students' personal characteristics and attitudes towards learning (utilisation rate); and 3) inputs from the institution or module (technology). During the education process the inputs are transformed into different outputs, of which some are not measurable as they are changes in social behaviour. This study applies more directly to changes in a measurable output, namely cognitive performance, which occurs because of direct changes in technology as a result of the tutorial programme.

In the educational production function the 'black box' (where the transformation process occurs) is often seen as containing the educational institution and students (Edwards, 2000; Parker, 2006;). This study assumes that the transformation process occurs because of inputs brought together by the educational institution. The transformation process cannot occur without these inputs. The educational institution is therefore exogenous to the transformation process and perceived as the facilitator of the process.

3.2 Class size, attendance and tutorials

The tutorial programme is an input technology that allows students to be involved in active learning. Active learning is defined as the engagement in meaningful tasks where students have ownership of the content (McCown, Driscoll & Roop, 1996:236). According to McCown *et al.* (1996), active learning improves the learning process, especially if the tasks are authentic to the specific discipline.

Hutcheson and Tse (2006) indicated that the class size of first-year modules inhibits students from freely asking questions. By having small tutorial classes, active learning can be encouraged via a multitude of activities. Tutorial attendance, even if not compulsory, should present an attractive alternative learning experience for students. Although it was found by tutors that students seldom prepare for tutorials, statistical results indicated that regular attendance of tutorials did lead to a better mark in exams (Hutcheson & Tse, 2006).

Romer (1993) also found that class size has an effect on attendance and that absenteeism was lower in smaller classes. Although a small sample was used in this study, Romer (1993) found a positive relationship between class attendance and performance. This result was echoed by Kirby and McElroy (2003), although absentee percentages in this study were greater. This could be because

tutorials and lectures were assumed to be complementary and were made available to students who then substituted the one for the other (Kirby & McElroy, 2003). Kirby and McElroy (2003) also found that tutorial attendance had a far greater effect on grades than does lecture attendance. According to them this could be due to the smaller class size which leads to a more effective active learning process. Contrary to the above, a study by Krohn and O'Connor (2005) found no relationship between class attendance and examination results. The better the test results were, the lower the class attendance of those students.

Stanca (2006), however, refers to the problem of assessing the effect of class attendance on performance when attendance is voluntary. If mandatory attendance is not enforced, attendance is not exogenous and it is the characteristics of the students that influence their attendance. Therefore, the more motivated student may attend lectures and tutorials regularly and also study harder, which should lead to better performance.

3.3 Gender

Both Van Walbeek (2004) and Parker (2006) found support for the gender bias in their studies. Van Walbeek (2006) found that in multiple-choice questions, females generally underperformed compared to their male counterparts, although there was no discrepancy in essay type questions between the genders. Parker (2006) found that females scored (on average) far lower in examinations than males in the same module. Van der Merwe (2006) however, found no significant relation between gender and performance in Economics as a subject. Greene (1997) indicated in his study that although females were better at verbalising their knowledge, it did not necessarily mean that they had a better comprehension of what they have studied. This could possibly explain why men do better than women in objective examinations and not in essay type examinations.

3.4 Race

Van Walbeek (2004) included race in his research, but found that the racial effect became insignificant as more independent variables were added to the equations. Most South African studies supported Van Walbeek's initial findings, namely that there were some discrepancies in the comparative performances of white and Indian, coloured and black students. This can be due to the remnants of the educational system prior to 1994. Borg and Stranahan (2002) concluded in their study that race cannot be isolated to measure performance. The personality type of the student as well as that of the lecturer (tutor) must be rather be seen as an indication of potential performance. This appears to be a logical explanation, but falls outside the scope of this study.

3.5 Home language

Contrary to the belief that students who do not receive their education in their home language are at a disadvantage, Van Walbeek (2004) found that this viewpoint was not statistically supported. Parker (2006), in a study among different institutions, found at one institution that students whose home language was English and who received instruction in English performed worse than students whose first language was not English. These students were instructed by an lecturer whose home language was also not English. This result was not repeated at any of the other institutions in Parker's study where English as a home language, as well as good matric results in English, contributed positively to performance in Economics.

3.6 Matric Mathematics results

According to Siegfried and Fels (1979), Mathematics is not significant in predicting performance in Economics. This is contradicted by the findings of Parker (2006) and Van Walbeek (2004). They both found that good performance in matric Mathematics contributes positively to students' academic performance. In the case of Economics 178, the module has evolved over time to such an extent that the application of Mathematics has become a prerequisite for performing well.

3.7 Matric results

Matric results as a predictor of potential success is supported by all the literature. Students who performed well in these examinations had a greater chance of doing well in the introductory Economics module than those students who did not do as well.

3.8 Age

Van Walbeek (2004) found a positive relationship between age and performance. This was contradicted by Parker (2006) who found that the older the students, the worse they performed up to the age of 25 – after which performance again improved. Van der Merwe (2006) found no significant relationship between age and performance. This finding was supported by Siegfried and Fels (1979), who also found no significant correlation between age and performance in their survey of the literature. It may be that in South Africa, due to the transformation in the educational system after 1994, some remnants of the effect of the previous educational system may distort age-performance correlations. However, this is not specifically tested in this study.

3.9 Teaching assistants

Siegfried and Fels (1979) found that good teaching assistants did have a positive impact on students' performance. Van der Merwe (2006) also indicated that better-performing students would

prefer to have added help in the form of tutorial tasks/problems. Notwithstanding the above, Lamphear and McConnell (1970) found, in a study using a very small sample of students, that teaching assistants (tutors) are not as effective as assumed. They found a statistically significant result indicating that students taught by tutors performed significantly worse than two other groups of students – one group who did not receive any lectures while the other group received instruction via television.

4 Data description and statistical analysis

The data in this study focus on students registered for the first-year Economics module, Economics 178. The data are cross-sectional and conducted for the 2006 academic year. Information on the students was collected from SU's database of students registered for Economics 178. This includes information on the gender, race, and matric results (marks obtained and the grade, year and education department) and the number of years registered for the Economics 178 module. Some students were excluded due to unavailability of data.[5]

The Economics Department's statistics reflect a total of 1 928 students who were registered for the Economics 178 module in 2006.[6] Of this total, 1 450 students wrote the first examination. A total of 478 students did not write this examination – this group is comprised of students who failed to comply with the minimum requirement for entry to the examination, or who deregistered before even completing any of the assessments.[7]

Information on tutorial attendance was captured in 2006 using weekly attendance sheets. These were completed by the tutors and then captured by the programme's administrator. There were 27 tutorial groups comprised of 15 Afrikaans groups and 12 English groups. Students and tutors could choose the language of preference. In 2006, the maximum number of students attending tutorial classes was 1 226, with a range of students attending at least one to a maximum of all classes attended.[8]

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[5] Exclusion of these students is due to missing data for matric Mathematics and matric aggregate marks.

[6] This is more than the sample for this study (1 922) since it includes students who deregistered at a later stage.

[7] Students have to obtain a class mark of at least 40% and must have completed eight computerised tests to gain access to the examination. To include as many students in the sample students, who did not comply with these requirments, were included in the sample by calculating a final mark based on the course mark they obtained up to the point before examinations. The final mark for these students was based on the number of tests written during the academic year, taking into account the weighting of the course components. For example, for a student who wrote all four tests but did not obtain at least a course mark of 40%, a final mark was set equal to the course mark multiplied by the weight of the course mark (i.e. 50%).

[8] On average, a total of 23 tutorial classes were offered in the 2006 academic year.

Lecture attendance is included in the study since it adds value to the academic performance of students (see Van Walbeek, 2004). It also serves as a possible proxy for the students' level of motivation (to act as a control variable against the voluntary attendance of tutorial classes).[9] It is unfortunately not possible to capture more accurate data on individual motivation (such as the number of hours spent on Economics 178). This is not unique to this study. Van Walbeek (2004:865) also refers to the difficulty of including information on the students' level of motivation.

[9] At the time of including lecture attendance in the study (in the second semester), it was possible to complete only three lecture attendance lists.

Table 1. Statistical analysis of tutorial attendance

	All students	0–30% tutorial attendance	30–50% tutorial attendance	50–70% tutorial attendance	70–100% tutorial attendance
Number of students (sample)	1 922	1 303	242	207	170
Percentage students	100	68	13	11	9
Average matric final mark[10] (%)	77	76	76	79	80
Average matric Mathematics mark (%)	64	63	62	65	68
Average final mark: Economics 178* (%)	44	42	43	49	54
Average lecture attendance (%)	49	43.64	51.51	63.28	72.74
Average age	19.58	19.69	19.41	19.38	19.35
Average nr of years registered: Economics 178	1.19	1.24	1.12	1.05	1.04
Number of males	1 051 (55%)	794 (61%)	124 (51%)	77 (37%)	56 (33%)
Number of females	871 (45%)	509 (39%)	118 (49%)	130 (63%)	114 (67%)
Afrikaans home language (nr of students)	1 259	891	139	121	106
English home language (nr of students)	579	354	91	80	54

Table 1 provides information on the students' attendance of tutorial classes and some academic and personal information. It is evident from the table that there is a positive correlation between tutorial attendance and lecture attendance. Students who attended more lectures and more tutorials also performed better (on average) in the Economics 178 module and their matric results (for Mathematics and the matric final mark) were also relatively higher.

Table 1 reflects that there were more males (55%) registered for Economics 178 compared to females (45%). However, it is apparent that the females had higher tutorial attendance. In column 5 females comprised 67% of the total number of students attending more than 70% of the tutorial classes.

Another important factor emanating from the statistical analysis is that the number of years the student was registered for Economics 178 in 2006 increases as tutorial attendance decreases. This indicates that students who repeated the module in 2006 attended few tutorial classes. It is therefore apparent that students who perform weaker also have less moitivation to attend. Another possiblr

[10] The total number of students used to calculate the average matric final mark and the average Mathematics mark is 1 906 and 1 901 respectively.

explanantion may be that students experience timetable clashes between first- and second-year modules. They therefore tend not to attend lectures or tutorials.[11]

5 Regression analysis

5.1 Methodology

The regression analysis splits the sample into those students who were registered for Economics 178 for the first time (in 2006) and those repeating the module (repeaters).[12] The total number of first-time registered students in the sample was 1 632, and 290 repeated the module. Tables 2 and 3 provide descriptive statistics on the variables used in the regression analysis.

[11] This is also evident from the lecture attendance in Table 1. Lecture attendance is higher for students who are less prone to repeat the module.

[12] This is done to ascertain whether the impact of the explanatory variables has the same effect for first-time registered students and repeaters.

Table 2. Summary descriptive statistics on variables used in regression analysis (first-time registered students)

Variable	Description of variable	Observations	Mean	Std. dev.	Min	Max
Final mark	Final mark for Economics (final mark %)	1 632	44.29756	20.80557	0	94
Tutorial attendance (%)	Tutorial attendance (% attended)	1 632	25.1011	28.19074	0	100
Lecture attendance (%)	Lectures attended (% of three occurrences)	1 632	55.14706	32.06336	0	100
Matric Mathematics mark (%)	Final matric Mathematics mark obtained	1 614	64.75062	14.4533	15	100
Matric final mark (av. %)	Final matric mark obtained	1 617	77.76989	11.52704	43.3	112
Gender	Dummy: male = 1	1 632	.5441176	.4982025	0	1
Age	Number of years	1 632	19.394	1.129196	17	41
Dummy: Education dept. (Western Cape)	Education dept (Western Cape) = 1	1 632	0.6439951	0.4789634	0	1
Dummy: Education dept. (Eastern Cape)	Education dept. (Eastern Cape) = 1	1 632	0.0551471	0.228337	0	1
Dummy: Education dept. (Gauteng)	Education dept. (Gauteng) = 1	1 632	0.0698529	0.2549771	0	1
Dummy: Education dept. (Independent examination board)	Education dept. (Independent examination board) = 1	1 632	0.1029412	0.3039752	0	1
Dummy: Education dept. (other)	Education dept. (other) = 1	1 632	0.1280637	0.3342632	0	1
Dummy: Home lang. (Afrikaans)	Home language Afrikaans = 1	1 632	0.6476716	0.477842	0	1
Tutorial-lecture	Interaction variable: tutorial attendance x lecture attendance	1 632	1596.793	2 313.756	0	10 000

Table 3. Summary descriptive statistics on variables used in regression analysis (repeaters)

Variable	Description of variable	Obs	Mean	Std. dev.	Min	Max
Final mark	Final mark for Economics (final mark %)	290	40.542	15.8741	0	80
Tutorial attendance (%)	Tutorial attendance (% attended)	290	10.4897	17.0526	0	91
Lecture attendance (%)	Lectures attended (% of three occurrences)	290	16.5517	26.0494	0	100
Matric Mathematics mark (%)	Final matric Mathematics mark obtained	287	58.0653	11.123	30	92.75
Matric final mark (av. %)	Final matric mark obtained	289	71.0809	8.67332	49.5	97.1
Gender	Dummy: male = 1	290	0.56207	0.49699	0	1
Age	Number of years	290	20.6862	1.05628	19	30
Dummy: Education dept. (Western Cape)	Education dept (Western Cape) = 1	290	0.68276	0.46621	0	1
Dummy: Education dept. (Eastern Cape)	Education dept. (Eastern Cape) = 1	290	0.05172	0.22185	0	1
Dummy: Education dept. (Gauteng)	Education dept. (Gauteng) = 1	290	0.03793	0.19136	0	1
Dummy: Education dept. (Independent examination board)	Education dept. (Independent examination board) = 1	290	0.08621	0.28115	0	1
Dummy: Education dept. (other)	Education dept. (other) = 1	290	0.14138	0.34901	0	1
Home lang. (Afrikaans)	Dummy: home language Afrikaans = 1	290	0.68966	0.46343	0	1
Tutorial-lecture	Interaction variable: tutorial attendance x lecture attendance	290	262.759	905.861	0	9 100

From tables 2 and 3 it is evident that first-time registered students and repeaters are more likely to attend lectures than tutorials, although the difference is smaller for repeaters. This could possibly indicate that repeaters generally only attend tutorials (if they choose only one of the two options, i.e. attending lectures or tutorials). This is made more prominent by the interaction variable Tutorial-

lecture (which indicates students attending both lectures and tutorials). For repeaters, the average for Tutorial-lecture is very small, indicating that it is unlikely that students attend both lectures and tutorials.

The initial model applies ordinary least squares (OLS). However, since the dependent variable (final mark in Economics) is expressed as a percentage, the OLS model may cause predictions to fall outside the 0–100% feasible range. Therefore, other econometric models were also explored in an effort to ensure the accuracy of the results.

The Tobit model is also considered, as certain students obtained a zero final mark, which was not directly the result of their performance in tests. The Tobit model was originally developed by James Tobin for cases where the dependent variable is censored (Gujarati, 2003). For example, the dependent variable in this study is final mark performance (expressed as a percentage) and values below zero are not observed, though the underlying latent variable might suggest that these students had the productive characteristics to achieve less than zero. The results for the OLS and the Tobit models are reflected in tables 4 and 5. [13]

Another possibility explored was to change the dependent variable (final mark) from a continuous variable (expressed as a percentage) to a binary variable indicating a pass in Economics, represented by a final mark of 50% and above. A Probit model with the same regressors is used as in the case of the OLS model. The results for the Probit model are also shown in tables 4 and 5.

5.2 Results

Tables 4 and 5 below indicate the results for all the econometric models explored in this analysis. All regression models use robust standard errors.[14]

[13] As will be apparent when the results are analysed, there is little difference in the results for all the econometric models.

[14] A robust regression was performed for all econometric models as heteroscedasticity was detected. Performing the Breusch-Pagan/Cook-Weisberg test after regressing on the sample of first-time registered students, indicated a chi2(1) = 104.20 with Prob>chi2 = 0.0000. Therefore the null hypothesis of constant variance is rejected.

Table 4. Robust regression results for first-time registered students

Variable	**OLS**	**Tobit**	**Probit**
Tutorial attendance	**0.145**	**0.154**	**0.01**
	*0.000****	*0.000****	*0.001****
Lecture attendance	**0.151**	**0.156**	**0.008**
	*0.000****	*0.000****	*0.000****
Tutorial-lecture	**-0.001**	**-0.001**	**0**
	*0.009***	*0.004***	*0.285*
Matric final mark	**0.816**	**0.807**	**0.062**
	*0.000****	*0.000****	*0.000****
Matric Mathematics mark	**0.319**	**0.332**	**0.017**
	*0.000****	*0.000****	*0.000****
Gender	**4.967**	**5.013**	**0.444**
	*0.000****	*0.000****	*0.000****
Age	**0.813**	**0.678**	**0.09**
	0.149	*0.271*	*0.015**
Dummy: Home lang. (Afrikaans)	**-2.933**	**-2.927**	**-0.272**
	*0.001****	*0.001****	*0.001***
Dummy: Education dept. (Western Cape)	**-0.785**	**-0.802**	**-0.149**
	0.518	*0.518*	*0.193*
Dummy: Education dept. (Eastern Cape)	**2.804**	**2.887**	**0.329**
	0.124	*0.115*	*0.091*
Dummy: Education dept. (Gauteng)	**-0.722**	**-0.836**	**0.043**
	0.695	*0.659*	*0.805*
Dummy: Education dept. (Independent examination board)	**1.907**	**1.93**	**0.067**
	0.266	*0.269*	*0.674*
Constant	**-66.492**	**-64.555**	**-8.003**
	*0.000****	*0.000****	*0.000****
R^2	**0.509**		
N	**1 614**	**1 614**	**1 614**

Note: The probability values are indicated in italics below the coefficients. Levels of significance are indicated as: 1% - ***, 5% - ** and 10% - *.

Table 5. Robust regression results for repeaters

	OLS	**Tobit**	**Probit**
Tutorial attendance	**0.216**	**0.222**	**0.016**
	*0.000****	*0.000****	*0.036**
Lecture attendance	**0.103**	**0.107**	**0.007**
	*0.001***	*0.001****	*0.058*
Tutorial-lecture	**-0.002**	**-0.002**	**0**
	0.101	*0.086*	*0.251*
Matric final mark	**0.664**	**0.684**	**0.051**
	*0.000****	*0.000****	*0.000****
Matric Mathematics mark	**0.092**	**0.085**	**0.016**
	0.393	*0.435*	*0.106*
Gender	**2.177**	**2.167**	**0.37**
	0.211	*0.216*	*0.031**
Age	**2.122**	**2.205**	**0.175**
	*0.004***	*0.003***	*0.038**
Dummy: Home lang. (Afrikaans)	**-0.029**	**0.183**	**-0.039**
	0.988	*0.929*	*0.837*
Dummy: Education dept. (Western Cape)	**2.118**	**2.219**	**0.134**
	0.455	*0.443*	*0.563*
Dummy: Education dept. (Eastern Cape)	**10.807**	**11.05**	**1.039**
	*0.002***	*0.002***	*0.010**
Dummy: Education dept. (Gauteng)	**-9.742**	**-11.278**	**-0.253**
	0.126	*0.112*	*0.605*
Dummy: Education dept. (Independent examination board)	**6.379**	**6.761**	**0.36**
	0.08	*0.065*	*0.317*
Constant	**-62.889**	**-66.077**	**-8.711**
	*0.001****	*0.000****	*0.000****
R^2	**0.259**		
N	**287**	**287**	**287**

Note: The probability values are indicated in italics below the coefficients. Levels of significance are indicated as: 1% - ***, 5% - ** and 10% - *.

The most important result reflected in all the models is that tutorial attendance has a positive effect on the final mark for Economics 178. This confirms the hypothesis that students who regularly attend tutorial classes strengthen their understanding of the subject matter, which contributes positively to their performance. For the OLS model, for first-time registered students, if a student attends all tutorial classes (but no formal lectures), the final mark increases by 14.5%. This result is even more pronounced for repeaters. A 100% attendance increases the final mark by 21.6%. This may indicate that repeaters who do attend lectures, are more likely to attend the tutorial classes. The coefficients for the Tobit model are interpreted in the same manner as those of the OLS model.

Thus, for tutorial attendance, a student attending all tutorial classes (and no formal lectures), will increase his/her final mark by 15.4%.

Lecture attendance has a positive coefficient (as expected), confirming what previous studies have found (see Van Walbeek, 2004). For first-time registered students, if a student attends all lectures, the final mark increases by 15% (for both the OLS and the Tobit models). For repeaters, a 100% attendance increases the final mark by 10.3%. This can be an indication that for repeaters it is more important to attend the tutorials than the lecture sessions. This result is expected, as supported by the existing literature that indicates a positive relationship between lecture attendance and academic performance.[15]

An important finding from the regression analysis points to some substitutability between lectures and tutorials. There is also some support for this substitutability in the literature (see Kirby & McElroy, 2003). The interaction variable Tutorial-lecture has a negative coefficient (although the coefficient is very small and zero in the case of the Probit model). This indicates that students who attend both lectures and tutorials receive relatively less benefit than students who attend either of the two. This could be due to a diminishing marginal effect. Therefore, a student who attends all lectures and tutorials experiences less additional gain from the tutorials (or lectures) than those students who attend only one of the two. During informal discussions, students have indicated that they use the tutorials as a substitute for lectures. This cuts back on the time spent attending lectures.[16] The same result applies to repeaters, and the coefficient is more pronounced than in the former case. For repeaters the interaction variable is actually zero, indicating that they are less likely to attend lectures and tutorials. This could possibly be explained by repeaters attending some second-year subjects and then ending up having timetable clashes with Economics 178 lecture or tutorial timeslots. They therefore tend to choose the type of session that suits their needs best and the tutorial-lecture combination is cancelled by their choices.

The gender variable (in all regression models) indicates that male students tend to perform better than female students. However, this result is not significant for most of the models in the case of repeaters. This finding has also been reported in other studies (see Parker, 2006). Age is positively related to final mark, contrary to the findings of Parker (2006) but similar to those of Van Walbeek (2004). Contrary to expectations, the coefficient for the dummy variable home language (Afrikaans) is negative in most cases. It is, however, only statistically significant for first-time registered students. The implication of this result is that, after controlling for all other factors, Afrikaans-speaking students generally perform worse than other students (whose home language is predominantly

[15] The correlation between these two variables is 0.29.

[16] There are usually three lectures slots per week, whereas tutorial classes are only once per week.

English). This indicates that matric performance is a better indicator of the performance of Afrikaans-speaking students. This may also possibly be explained by students' receiving their instruction in Afrikaans but then having to study from an English textbook. At SU, classes in Economics are lectured separately in both English and Afrikaans..

The variables relating to the student's schooling background also provide some interesting results. As in previous studies, a student's performance in school Mathematics and the average matric mark contribute positively to the student's performance in first-year Economics. The education department from which the student matriculated is mostly insignificant for both first-time registered students and repeaters.

6 Conclusion

The concern about the academic performance of first-year students in Economics has prompted many researchers to investigate the factors that impact on students' performance. The education production function approach identifies three inputs, of which a tutorial programme forms part of the technology input. The main objective of this study was to test the hypothesis that a formal tutorial programme, as implemented at SU, will make a positive and substantial contribution to the academic performance of students. The main finding of the regression analysis confirms this hypothesis. This is the case for both groups investigated, namely repeaters and first-time registered students. The results reflect that both lecture and tutorial attendance contribute positively to the performance of Economics 178 students. Another important result is the substitutability between tutorials and lectures. This may be an indicator to the Economics department to revisit the tutorial programme in an effort to make it complementary to lectures. In the cases of repeaters, it seems that tutorials are relatively more important since they tend to substitute tutorials for lectures.

Regarding other variables, the results confirm what other studies have found: male students tend to perform better than female students at Economics. Age is positively related to academic performance and the matric performance of students is statistically significant in explaining academic performance.

In summary, a formal structured tutorial programme run on set guidelines can improve the performance of first-year Economics students. However, it must be indicated that attendance of the tutorial programme by students investigated here remains voluntary and that different results may be found with compulsory tutorial attendance.

7 Reference list

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