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The Impact of Class Attendance on Student Performance: Evidence from the Tropics

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This paper investigates the impact of class attendance on student performance in an Intermediate Microeconomics class at the University of the West Indies (UWI), Mona. No other study has explored this relationship in this area of the world. The author controls for a comprehensive number of student characteristics as well as the university characteristic class size. Because of well known endogeneity issues, both OLS and 2SLS are used to estimate the model. The results indicate that class attendance does have a positive impact on the student's grade, and that it is possible to find suitable proxies for motivation and ability.

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I would like to thank Mr. Jonathan Archie from the Examinations section of the UWI, Mona as well as Mr. Garvin Gordon from Mona Information Technology Systems for their assistance in providing me with data for this study. I would also like to thank my research assistant Ms. Patrice Anderson for volunteering her services.

This paper looks at the impact of attendance on student performance in an Intermediate Economics course at the University of the West Indies (UWI), Mona. The UWI is the premier tertiary institution in the Caribbean. It serves 18 English speaking Caribbean countries and territories. It has four campuses – one at Mona in Jamaica, one at St. Augustine in Trinidad and Tobago, another one at Cave Hill in Barbados and lastly it has the Open Campus which is a virtual campus. Current enrolment across all four campuses stands at 56,000 students.

Several papers have been written on the impact of attendance on academic performance. The overall evidence suggests that attendance has a positive impact on how well the student does in the course. Romer(1993), Marburger(2001), and Stanca(2006) all look at how absenteeism affects learning in Economics courses. However, no such study has been done for the Economics courses at the UWI, the main source of tertiary education for the Caribbean region. This study aims to fill that void and does so using a large sample size and taking into consideration a large number of student characteristics as well as the university characteristic class size. It also addresses the important issue of motivation and utilizes reliable measures of attendance and student performance.

Currently, class attendance is not compulsory at the UWI. The purpose of this paper is to start a discussion about whether or not this policy needs to change. First and second year Economics courses at the UWI, Mona have relatively high failure rates. In academic year 2013/2014 the average pass rate for the first and

second year Economics courses was approximately 81%. The average pass rate weighted according to class size was approximately 75%, with some classes having pass rates as low as 51%. One of the possible explanations for this problem is the high levels of absenteeism both at lectures and at tutorials. For the course under study here, average class attendance is 65% while average tutorial attendance is only 55%. Students may be overestimating their ability to learn on their own and therefore underperforming in exams. If this is the case, then compulsory attendance could lead to an increase in learning and hence in pass rates. Investigating the effect that attendance has on the student's grade for the course will provide useful information for addressing the issue of whether or not attendance should be compulsory.

The results of the study indicate that attendance does, in fact, have a positive impact on student performance. The estimate of the attendance effect is similar to that found in other studies such as Stanca(2006). However, unlike Stanca, the author was able to find valid instruments for attendance and to use OLS to estimate a model that does not appear to suffer from the omitted variable bias problem plaguing most, if not all, earlier studies and thus provide a more reliable estimate of the effect that attendance has on student performance. This study uses over 40 control variables thought to be relevant to investigating student performance in the Caribbean context. The author utilizes the most comprehensive list of regressors used in any study of the impact of class

attendance on student performance. It was hoped that this approach would help mitigate the omitted variable problem and the results imply that this is the case. The paper continues as follows, the next section provides a review of the relevant literature, the following section gives a description of the data, the section after that describes the methodology applied, next the results are presented and the last section concludes by discussing and summarizing the results.

I. Literature Review

Several papers have examined the impact of attendance on student performance. The vast majority of which have found that attendance appears to have a positive impact on how well the student does in the course. Cultures vary from country to country. These differences in culture will affect the learning environment at tertiary institutions. As such, one might expect the relationship between absenteeism and grades to differ from country to country. This relationship has been examined across many different countries.

The United States of America (U.S.A.) has been the focus of much of the literature on the subject. The seminal paper in this area is Romer(2003). Romer addressed the question of how often students attend class and whether or not this class attendance appears to be beneficial. Romer measured attendance at three universities of different sizes – 'small', 'medium', and 'large'. He found that around 1/3 of students do not attend class. Romer also conducted regression analysis of the relationship between attendance and performance in a large

Macroeconomics class. Attendance a few weeks before the end of the semester was used to measure average attendance. He concluded that the evidence suggested a substantial impact of attendance on learning. One weakness of Romer's study is that it may suffer from omitted variable bias. There are a number of other student characteristics that may have an impact on how well the student does in the course. Subsequent papers have attempted to explicitly control for these characteristics.

Durden and Ellis(1995) investigated the impact of attendance on student learning in a Principles of Economics course at a comprehensive state university in the U.S.A. Attendance was measured using the student's estimate of the number of classes missed. The control variables added included math SAT score, verbal SAT score, high school Economics, calculus, GPA, race, membership in a sorority or fraternity, gender, participation in extra-curricular activities, etc. In particular, Durden and Ellis explored whether the impact of attendance is non-linear. Their findings suggested that absenteeism only matters after the student has missed 4 classes.

Marburger(2001) used a micro-approach to examine the relationship between absenteeism and exam performance in a Principles of Economics course at an American university. This approach involved taking note of the specific class times that the student missed as well as the specific class time when information pertaining to each multiple-choice test question was taught. Marburger used this

approach in order to address the endogeneity issue. Is it that students who are more motivated or more committed attend class more and perform better? In which case, we would need to explicitly account for or eliminate the impact of motivation. Other studies have addressed this issue by using prior GPA and other variables as proxies for motivation. Marburger(2001) used regression analysis to show that a student who was absent when the information pertaining to a particular question was taught, was significantly more likely to get that question wrong.

Marburger(2006) extended this method to show that mandatory attendance appears to significantly increase attendance and improve performance. First he estimated the impact of absenteeism on learning and then he estimated the impact of a mandatory attendance policy on absenteeism. He obtained the first estimate using the same methodology he used in Marburger(2001). To get the second estimate, he compared attendance in two sections of a course taught at the same time by the same instructor in comparable semesters. In one section, the university's attendance policy was not enforced and in the other section, it was.

Studies that have examined universities outside of the U.S.A. include Halpern(2007), Rodgers and Rodgers(2003), Stanca(2006) and Chen and Lin(2008). Halpern(2007) uses a methodology similar to that of Durden and Ellis(1995). He applies this methodology to a Business Management course at a university in London. He too included a number of student characteristics such as

gender, age, entry qualifications, etc., as independent variables. Halpern concluded that attendance only has a moderate impact on academic achievement. A'level entry actually had the biggest impact. British cultural background also had a significant positive impact. Naturally, a factor such as this would not be relevant for students at a U.S. institution. These results highlight the fact that the factors affecting student performance will differ from country to country, depending on the particular cultural and social environment.

Rodgers and Rodgers(2003), Stanca(2006) and Chen and Lin(2008) all used a panel data approach to address the issue of endogeneity. Panel data estimation methods allow the author to explicitly account for unobserved heterogeneity across students such as differences in levels of motivation. Rodgers and Rodgers(2003) in examining an Intermediate Microeconomics class at a medium sized Australian university found significant evidence that class attendance positively affects academic performance. The panel was formed by dividing the student's overall grade into separate grades, one for each assessment task. Therefore, for each observation, the authors measured the student's performance on a particular test and his or her attendance at the specific classes when the material covered in that test was taught.

Stanca(2006) used a technique similar to that of Rodgers and Rodgers(2003) in order to examine an Introductory Microeconomics course at the University of Milan in Italy. However, he used 4 independently pooled panels (over 4 years),

with a cross section of 200 students for each year, measured across 4 tests. This resulted in a panel with approximately 3,000 observations. Stanca addressed the endogeneity issue in 3 different ways. He used proxies for motivation, he used instruments for attendance, and he employed panel data estimation methods. Stanca concluded that, after controlling for student characteristics, attendance has a statistically significant impact on student performance.

Chen and Lin(2008) used a somewhat different, novel approach, in order to answer an additional question. The authors conducted a randomized experiment. This is because they were not only interested in the average attendance effect, they also wanted to calculate the average attendance effect on attendees. In other words, they wanted to measure the impact of "absenteeism" on students who attend class. In order to accomplish this they performed an experiment on 114 students in Taiwan in 2005. The same instructor taught the same course in two sections in the same semester. Experimental absenteeism was obtained by randomly selecting dates and sections for which some material would not be taught. Their panel of 12,028 observations consisted of 114 students and their responses to 107 exam questions. The authors' results were similar to those of Marburger(2001, 2006) and Stanca(2006). In terms of the additional question asked, they found that the average attendance effect on the attendees is much larger than the average attendance effect. That is, those who attend class would be more adversely affected by absenteeism.

As was previously stated, the existence of differences in learning environments across countries makes it important to examine the relationship between attendance and student performance across different countries before arriving at definitive conclusions. No such paper has been written for the U.W.I., the premier tertiary level institution in the Caribbean. Mlambo(2011) looks at factors affecting student academic performance in an introductory Biochemistry course at the U.W.I., St. Augustine. However, no regression analysis was conducted and attendance was not taken into consideration. The author found that none of the factors investigated, including age, gender, learning styles and entry requirements, had a significant impact on academic performance.

II. Description of Data

Data was collected on 362 students in the author's Intermediate Microeconomics course taught in the first semester of academic year 2013/2014. The class was divided into two streams, one of which met on Monday nights from 7-9 p.m. and the other one met on Tuesday afternoons from 3-5 p.m. Both streams were taught by the same lecturer. The Tuesday stream had 280 students while the Monday stream had 82 students. This difference in size allowed the author to also control for class size as an independent variable.

Attendance was taken at every lecture and every tutorial. Each student was expected to attend two lecture hours and one tutorial hour per week. Class attendance was measured as the percentage of the total number of weekly lectures

that each student attended during the semester. Tutorial attendance was measured likewise. As table 1 indicates, average class attendance was 65% while average tutorial attendance was 55%.

The dependent variable was the student's overall grade for the course. This was comprised of their grades on the midsemester exam (worth 30%), the final exam (worth 50%) and two quizzes (worth 10% each). The student characteristics controlled for were based on factors found to be important in other studies as well as factors viewed as relevant in the Caribbean context. Tables 1 and 3 illustrate that this resulted in quite a comprehensive list. These variables include gender, whether or not the student lives on campus, whether or not the student was taking the course for the first time, whether or not the student is Jamaican, the student's major, etc. See tables 1 and 3 for a complete list of regressors. This data was obtained by means of a survey that was administered at the end of the semester. The students were informed about why the data was being collected. Participation was voluntary and they were assured that their answers would be kept strictly confidential. A copy of the survey can be found in the appendix.

Prior GPA was used as a proxy for ability, and motivation or effort is measured using tutorial attendance. Intermediate Microeconomics is a fairly quantitative course so whether or not the student did the Caribbean Advanced Proficiency Examination (CAPE) in Economics, as well as whether or not the student did CAPE Mathematics were seen as important factors that would affect the student's

overall performance, and were also used as proxies for ability. The Caribbean Examinations Council (CXC) CAPE is taken by students at the end of their secondary schooling careers in preparation to pursue tertiary education. For the most part, UWI accepts or denies students on the basis of their CAPE results. Students who have taken Cape Mathematics tend to have stronger quantitative skills than those who have not. Therefore it is anticipated that this will have a positive impact on the student's grade.

The two most popular majors offered by the department of Economics are Economics and Banking and Finance. Therefore, these two are explicitly controlled for. Over the years, the lecturer has noticed an increase in the number of Actuarial Science students taking the course. It has also been noticed that those students tend to outperform the students majoring in Economics. Table 2 shows evidence of this. While the average grade for the course is approximately 56%, the average grade for Economics majors is 57%, the average grade for Banking and Finance majors is 49%, while the average grade for Actuarial Science students is 78%. As table 3 indicates, approximately 31% of the students were Economics majors, approximately 31% were Banking and Finance majors and approximately 14% were Actuarial Science majors. On the basis of this evidence, the Actuarial Science major was also explicitly accounted for.

The Actuarial Science programme is offered by the faculty of Science and Technology. Thus, the author was also interested in discovering if student

performance differed according to faculty. The summary statistics in table 2 indicate that the average grade for Social Science students was 54%, while the average grade for the students from the faculty of Science and Technology was 71%, and the average grade for students from the faculty of Humanities was 83.[2] Therefore dummy variables for Science and Technology and Humanities were included (with Social Science students as the reference group).

Not surprisingly, most (73%) of the students were from the faculty of Social Sciences. Interestingly, despite the fact that approximately 68% of the students at UWI, Mona are female, only 48% of students in the class were female. This may be because Economics has traditionally been a male dominated field (although this is changing now). Slightly more than half the class (about 57%) had taken CAPE Economics but only 36% had taken Cape Math. The vast majority (75%) of students were in the 18-21 age group, while only 4% of students were over the age of 30.

[2] It should be noted that there was only one student from the faculty of Humanities, and that, as expected there were no students from the faculties of Law or Medicine.

Table 1 – Summary Statistics for non-binary Variables

Variable	Mean	Maximum	Minimum	Standard Deviation	Anticipated Impact
Course grade	55.7	99	0	22.7	-
Class attendance	64.7	158.3	0	31.2	+
Tutorial attendance	54.8	130	0	33.2	+
Prior GPA	2.4	4.3	0.4	0.99	+

Table 2 – Breakdown of Course Grade by Major and Faculty

Category	Mean	Maximum	Minimum	Standard Deviation
Overall	55.7	99	0	22.7
Economics	57.1	93	20	19.6
Banking and Finance	49.3	96	13	17.9
Actuarial Science	78.5	99	33	15.7
Other Majors	59.25	99	23	20.3
Social Science	54.2	99	13	19.1
Science and Technology	72.5	99	20	20.5
Humanities	83	83	83	-

Table 3 – Description of Dummy Variables

Variable	Description	% of sample
Female (?)	1 if the student is female	47.8
Cape Econ (+)	1 if the student took CAPE Economics	57.2
Cape Math (+)	1 if the student took CAPE Mathematics	35.6
Commuting (-)	1 if the student does not live on campus	70.7
Repeating (?)	1 if the student had taken the course before	9.7
Transfer (-)	1 if the student is a transfer student	1.1
Local (+)	1 if the student is Jamaican	89.8
FT Work (-)	1 if the student works full time	7.2
PT Work (-)	1 if the student works part time	22.7
Work Exp (+)	1 if student has ever had a job	75.1
Full-Time (+)	1 if student is registered as a full-time student	87.6
Free-Elective (?)	1 if the course is a free elective for the student	22.7
UWI Xcu (?)	1 if the student participates in any UWI extra-curricular activities	58.6
Non-UWI Xcu (?)	1 if the student participates in any non-UWI extra-curricular activities	44.8
Econ (+)	1 if the student is an Economics major	30.9

Bf (?)	1 if the student is a Banking and Finance major	31.2
Actsci (+)	1 if the student is an Actuarial Science major	14.1
Other major (?)	1 if the student has any other major	16.6
Sosci (+)	1 if the student is in the faculty of Social Sciences	73.2
Human (?)	1 if the student is in the faculty of Humanities	0.28
Science (+)	1 if the student is in the faculty of Science and Technology	19.6
T15 (+)	1 if it takes the student less than 15 minutes to get to school	11
T1530 (?)	1 if it takes the student 15-30 minutes to get to school	15.2
T3160 (-)	1 if it takes the student 31-60 minutes to get to school	21.8
T61120 (-)	1 if it takes the student 1-2 hours to get to school	22.9
T120 (-)	1 if it takes the student more than 2 hours to get to school	1.4
Pe_primary (-)	1 if the highest education of student's parents is primary	6.9
Pe_sec (-)	1 if the highest education of student's parents is secondary	53.3
Pe_tertiary (+)	1 if the highest education of student's parents is undergrad	23.8
Pe_grad (+)	1 if the highest education of student's parents is grad school	9.1
Repeat_once (-)	1 if the student has taken the course once before	9.4
Repeat_twice (-)	1 if the student has taken the course twice before	1.1
Repeat3 (-)	1 if the student has taken the course more than 3 times before	0.28
Age1821 (+)	1 if the student is between the ages of 18 and 21	74.8

Age2225 (?)	1 if the student is between the ages of 22 and 25	15.5
Age2630 (?)	1 if the student is between the ages of 26 and 30	1.9
Age30 (?)	1 if the student is older than 30	1.1
Large (-)	1 if the student attended the large stream	77.3

Note: The anticipated impact of each variable is in brackets beside the variable name

3. Methodology

The methodology used in this paper is similar to that of Durden and Ellis(1995) and Stanca(2006). OLS and 2SLS were used to estimate the following model:

$$grade_i = \beta_0 + \beta_1 ca_i + \beta_2 ta_i + \beta_3 priorgpa_i + \gamma_i D_i + \varepsilon_i \qquad (1)$$

where $grade$ = course grade

ca = class attendance

ta = tutorial attendance

D = vector of dummy variables

ε = error term

β_i = population coefficients

γ_i= vector of population coefficients

Table 3 gives the complete list of dummy variables controlled for. It includes several student characteristics viewed as relevant in the Caribbean context, as well as the university characteristic class size. Unobservable factors affecting the student's grade include motivation, effort and ability. Tutorial attendance is used as a proxy for motivation and effort. No new material is taught during these

sessions. A problem set is assigned to each tutorial session to be completed by the students beforehand. During the tutorial session, students volunteer (or are assigned) to share their results with the rest of the class, and the lecturer (or tutor) supervises the session to ensure that the answers are correct. Tutorials are usually attended by the more motivated students as they are expected to complete assignments before attending.

Prior GPA, Cape Econ, and Cape Mathematics are used as proxies for ability. Prior GPA is the standard proxy used for ability in the literature. This is because students who are more "able" are expected to perform better overall and therefore will have higher GPAs. Similarly, it is expected that students who have done Cape Econ and/or Cape Mathematics would be better able to perform well in the course.

Another solution to the endogeneity problem is to use an IV approach. Appropriate instruments must be correlated with the suspected endogenous variable and uncorrelated with the error term. Stanca(2006) used travel time, whether or not the student worked and whether or not the student had internet access at home as instruments. I will be using commuting, part time work and full time work. The argument is that students who live off campus or who work, whether part time or full time would be more likely to miss classes. Additionally one would expect commuting, ptwork, and ftwork to be uncorrelated with the error term.

OLS is used to estimate equation (1) using the proxy variables for motivation, effort and ability. Equation (1) is also estimated using 2SLS. As is well known, when using 2SLS, the validity of the instruments is always an important issue. As such, I calculate the Hansen's J statistic to test the validity of the instruments. I also check the endogeneity of class attendance using the Hausman test.

Like Durden and Ellis(1995), I am also interested in finding out whether or not the impact of class attendance is non-linear. To do so, I estimate a version of equation (1) with dummy variables indicating different levels of attendance. These are defined in table 4.

Standard diagnostic tests were performed. The residuals were tested for normality. I conduct the Ramey RESET test for omitted variables. In all regressions, the version of the standard errors robust to both heteroskedasticity and autocorrelation were calculated and reported. The VIF was calculated for all the variables in order to find out if there were any multicollinearity concerns. The beta coefficients were also determined, in order to get an idea of the relative impact of each independent variable.

Table 4 – Description of Attendance Dummies

Attendance Dummy	Description	% of sample
Att90	1 if the student has attended more than 90% of lectures	25.9
Att70	1 if the student has attended between 70% and 90% of lectures	27.3
Att50	1 if the student has attended between 50% and 70% of lectures	19.6
Att30	1 if the student has attended between 30% and 50% of lectures	4.8
Att10	1 if the student has attended between 10% and 30% of lectures	5.7
Attl10	1 if the student has attended less than 10% of lectures	11.4

4. Results

Several different versions of equation (1) were estimated. Table 5 reports the results omitting the dummies for faculty because of a high correlation between actsci and science. This high correlation is not surprising since most of the students from the faculty of Science and Technology taking Intermediate Microeconomics were Actuarial Science majors. The faculty dummies were also excluded because there was only one student from the faculty of Arts and Humanities. Table 5 also ignores the dummies for amount of time it takes to get to campus and for number of times the student had taken the course before, which were irrelevant once commuting and repeating were included.

In every specification, class attendance was significant at the 1% level even after controlling for tutorial attendance. Table 5 implies that a 1% increase in class attendance will increase the student's grade by 0.08%. Tutorial attendance is also significant at the 1% level, and the figures indicate that a 1% increase in tutorial attendance will increase course grade by 0.109%. Prior GPA appears to have a major impact on student performance with a 1 unit increase in GPA leading to a 12.485% increase in course grade. The beta coefficients in table 6 imply that priorgpa has the biggest impact of all the independent variables with a 1 standard deviation increase in prior GPA giving rise to a 0.551 standard deviation increase in course grade. The Actuarial Science dummy variable had the second largest beta coefficient.

Table 5 shows that priorgpa, class attendance, tutorial attendance, female, Cape Math, Repeating, bf, and actsci are all significant at the 1% level. Full time is significant at the 5% level and age30 is significant at the 10% level. The results suggest that female students had a course grade 4.028% higher than male students and that, students who had done Cape Mathematics had grades 8.95% higher than those who had not. Interestingly Cape Econ was not significant. This underscores the importance of a solid Mathematics foundation when it comes to excelling in Intermediate Microeconomics. Surprisingly, (or not), students repeating the class had grades 0.086% higher than those who were taking it for the first time. This may be because they are more comfortable with the material the second time around. Full time students had grades that were 7.558% higher than part time students. This is expected since full time students presumably have fewer distractions and are better able to focus on learning the material.

The results intimate that the banking and finance students do worse than the Economics students while the Actuarial Science students do better than the Economics students. The grades for the banking and finance students are 4.775% lower than those of the Economics students while those of the Actuarial Science students are 12.792% higher than those of the Economics students, even after controlling for priorgpa and Cape Math. This implies that this difference is not caused by differences in ability (as captured by priorgpa) or by variation in Math foundation (as captured by Cape Math). However, it may be the case that the

Actuarial Science students are exposed to more rigorous first year Mathematics courses at UWI, (in the faculty of science and technology), than the Economics students are (in the faculty of social sciences).

Table 5 – Main Regression Results

Course Grade	Coefficient	t-statistic	P-value
Prior Gpa***	12.485	13.41	0.000
Large	-1.405	-0.71	0.476
Ca***	0.080	2.76	0.006
Ta***	0.109	4.26	0.000
Female***	4.026	2.71	0.007
Cape Econ	0.414	0.27	0.788
Cape Math***	8.950	4.60	0.000
Commuting	-1.066	-0.6	0.550
Repeating***	10.086	3.95	0.000
Transfer	0.653	0.08	0.94
Local	2.382	0.62	0.534
Ftwork	6.135	1.64	0.103
Ptwork	1.619	0.94	0.347
Workexp	0.641	0.38	0.703

Fulltime**	7.558	2.46	0.014
Freeelective	-1.844	-0.48	0.631
Uwixcu	0.822	0.55	0.582
Nonuwixcu	0.491	0.35	0.726
Bf***	-4.775	-2.67	0.008
Actsci***	12.792	2.84	0.005
Othermajor	0.250	0.08	0.934
Pe_sec	-0.250	-0.10	0.923
Pe_tertiary	1.859	0.65	0.514
Pe_grad	-1.391	-0.37	0.709
Age2225	0.420	0.19	0.851
Age2630	1.095	0.20	0.845
Age30*	12.370	1.75	0.081
Constant	-0.886	-0.22	0.826
R-squared	0.700		
F-statistic	47.110		
P-value	0.000		

Note:*, **, *** denote significance at the 10%, 5%, and 1% level respectively

Table 6 – Beta Coefficients

Course Grade	Beta
Prior Gpa	0.551
Large	-0.026
Ca	0.110
Ta	0.159
Female	0.090
Cape Econ	0.009
Cape Math	0.192
Commuting	-0.021
Repeating	0.133
Transfer	0.003
Local	0.030
Ftwork	0.069
Ptwork	0.030
Workexp	0.012
Fulltime	0.107
Freeelective	-0.035
Uwixcu	0.018

Nonuwixcu	0.011
Bf	-0.099
Actsci	0.201
Othermajor	0.004
Pe_sec	-0.006
Pe_tertiary	0.035
Pe_grad	-0.018
Age2225	0.007
Age2630	0.007
Age30	0.051

The parents' educational background appears to have no impact on the student's performance. Interestingly, students who were over the age of 30 performed better than those in the 18-21 age group. However, it should be noted that only 3 students were over the age of 30.

The IV results in table 7 tell a different story. While priorgpa, female, Cape Math, repeating, bf and actsci are all still significant, class and tutorial attendance are not. Table 8 shows the results for the tests for validity of the instruments as well as endogeneity of class attendance. The Hansen's J statistic indicated that the instruments were valid. Thus, the author went on to test the endogeneity of class attendance. The results of the Hausman's test showed that class attendance is not,

in fact, endogenous. Hence, the OLS results are more reliable than the IV results. Therefore, attendance does appear to affect student performance even after ability, effort and motivation have been controlled for.

Like Durden and Ellis(1995), I too find that excessive absenteeism is that which is important. Table 9 shows the results of the regression analysis including the dummy variables for different levels of attendance. The results indicate that, compared to those who attended more than 90% of lectures, those who attended less than 10% of lectures have grades that are 6.64% lower. The other variables maintain their significance.

Table 7 – IV Results

Course Grade	Coefficient	z-statistic	P-value
Prior Gpa***	11.001	5.82	0.000
Large	-2.318	-1.03	0.301
Ca	0.347	1.30	0.192
Ta	0.028	0.34	0.735
Female***	4.489	2.66	0.008
Cape Econ	-0.374	-0.18	0.859
Cape Math***	11.978	3.59	0.000
Repeating***	9.604	3.58	0.000

Transfer	-1.892	-0.23	0.821
Local	0.806	0.22	0.827
Workexp	-1.219	-0.47	0.64
Fulltime	4.466	1.54	0.124
Freeelective	-3.691	-0.85	0.394
Uwixcu	-0.184	-0.11	0.914
Nonuwixcu	-0.330	-0.20	0.845
Bf**	-4.583	-2.30	0.022
Actsci***	15.735	2.87	0.004
Othermajor	1.465	0.43	0.671
Pe_sec	-2.776	-0.77	0.443
Pe_tertiary	0.890	0.27	0.785
Pe_grad	-1.636	-0.44	0.657
Age2225	-1.235	-0.39	0.695
Age2630	0.531	0.07	0.942
Age30	14.593	1.28	0.201
Constant	-2.209	-0.47	0.638
R-squared	0.604		

Note:*, **, *** denote significance at the 10%, 5%, and 1% level respectively

Table 8 – Testing Validity of Instruments

Test	Test Statistic	P-value
Hansen's J	0.059	0.809
Hausman	1.049	0.306

Table 9 – Regression Results Showing Non-linear Impact of Attendance

Course Grade	Coefficient	t-statistic	P-value
Prior Gpa***	12.608	13.53	0.000
Large	-1.322	-0.68	0.498
Att70	-0.394	-0.21	0.836
Att50	-2.351	-1.23	0.218
Att30	-2.928	-0.72	0.472
Att10	-5.321	-1.43	0.154
Attl10**	-6.640	-2.26	0.025
Ta***	0.113	4.33	0.000
Female**	3.818	2.48	0.014
Cape Econ	0.416	0.27	0.790
Cape Math***	8.654	4.43	0.000

Commuting	-0.917	-0.50	0.617
Repeating***	9.989	3.89	0.000
Transfer	0.837	0.09	0.925
Local	2.895	0.73	0.467
Ftwork	6.007	1.60	0.110
Ptwork	1.532	0.86	0.392
Workexp	0.732	0.43	0.668
Fulltime**	7.549	2.36	0.019
Freeelective	-2.331	-0.60	0.547
Uwixcu	0.793	0.52	0.603
Nonuwixcu	0.652	0.46	0.644
Bf***	-5.026	-2.79	0.006
Actsci***	13.402	2.89	0.004
Othermajor	0.420	0.13	0.893
Pe_sec	-0.407	-0.16	0.876
Pe_tertiary	1.588	0.56	0.579
Pe_grad	-1.813	-0.47	0.638
Age2225	0.262	0.12	0.908
Age2630	1.144	0.20	0.839
Age30**	12.584	1.85	0.066

Constant	5.333	1.21	0.226
R-squared	0.699		

Note:*, **, *** denote significance at the 10%, 5%, and 1% level respectively

5. Conclusion

The results indicate that class attendance does, in fact, have a positive impact on student performance. Unlike Stanca(2006), I was not able to reject the null hypothesis of instrument validity. Hence, whether or not the student lives on campus and whether or not the student works appear to be valid instruments for class attendance. Having been able to find valid instruments, I was able, unlike Stanca, to go on to test the endogeneity of class attendance. Once again, I was unable to reject the null hypothesis. In this case, the null hypothesis is that the variable is exogenous. I argue that the reason I was able to achieve exogeneity is because of the comprehensive nature of the regressors used. This paper controlled for more independent variables than any other study on the impact of attendance on student performance. Thus, I was able to avoid the reduce the difficulties arising from omitted variable bias. The results of the Ramsey Reset test also imply that there were no omitted variables in the model[3]. It is important to note that while there were over 40 control variables, each variable was added because it was thought to be relevant in the Caribbean context.

[3]Note that the results of the diagnostic tests are in the appendix.

Therefore unlike Stanca, I argue that it is possible to use the proxy variable approach to address the omitted variable problem. It should also be noted that my estimates of the impact of attendance are similar to those of Stanca(2006). I found that a 1% increase in class attendance will increase the student's grade by 0.08. Stanca's OLS estimate of the impact of a 1% increase in attendance is 0.09, his FE estimate is 0.04 and his RE estimate is 0.07. The instruments that Stanca used for attendance were similar to mine – travel time, whether the student works and whether or not the student has internet access at home. It may be that, in Italy, these factors do not have a substantial impact on whether or not the student attends class, thus making them invalid instruments. However, it appears that in Jamaica, proximity to the university and whether or not the student works, influence the student's ability to attend class. This highlights the need to take into consideration cultural and institutional differences across countries when doing studies of this nature.

There is scope for further work in this area. As mentioned in the introduction, the purpose of this study is to initiate a conversation about whether or not class attendance should be mandatory at the UWI. The results of this study do not provide enough information to answer that question. However, I believe it shows that the question is one that should be asked. In order to answer that question, one needs to examine the impact of a mandatory attendance policy. To do so, a

controlled experiment similar to that of Marburger(2006) and/or Chen and Lin(2008) should be conducted.

Choice is one of the basic tenets of Economics and many economists firmly believe in the student's right to choose whether or not they should attend class. However, I argue that the students are either overestimating their ability to understand the material on their own and/or underestimating the amount of work necessary to do well in the course. Therefore, their estimate of the opportunity cost of absenteeism is inaccurate. It is possible that this is an information problem, the solution to which is not to make attendance compulsory but to find some mechanism to provide the students with better information so that they can calculate a more accurate opportunity cost. Chen and Lin(2008) found that the students who attend class would suffer more from missing class than those who do not attend. The opposite may be true at the UWI.

Appendix

Table A1 - Diagnostic Tests

Test	Test Statistic	P-value
Ramsey Reset	2.21	0.087
Shapiro Wilk	-0.282	0.611

Table A2 – Variance Inflation Factors

Variable	VIF
Actsci	4.66
Freeelective	4.22
Pe_sec	3.50
Pe_tertiary	3.06
Othermajor	2.40
Fulltime	2.05
Local	2.02
Pe_grad	1.96
Capemath	1.76
Ftwork	1.73
Bf	1.62
Ta	1.57

Priorgpa	1.48
Ca	1.47
Commuting	1.33
Capeecon	1.30
Age2630	1.27
Large	1.27
Repeating	1.26
Uwixcu	1.26
Age2225	1.22
Nonuwixcu	1.20
Female	1.17
Ptwork	1.15
Workexp	1.13
Transfer	1.13
Age30	1.11
Mean vif	1.83

Questionnaire

1. What is your gender?
   A. Male
   B. Female
2. What is your major?
   A. Economics
   B. Banking and Finance
   C. Actuarial Science
   D. Other
3. What faculty are you in?
   A. Social Sciences
   B. Humanities and Education
   C. Science and Technology
   D. Medical Sciences
   E. Law
4. Did you do Cape Econ?
   A. Yes
   B. No
5. Did you do Cape Mathematics
   A. Yes
   B. No

6. Do you live on campus?
   A. Yes
   B. No
7. If no, how long does it take you to travel to school?
   A. Less than 15 minutes
   B. 15 – 30 minutes
   C. 30-60 minutes
   D. 1-2 hours
   E. More than 2 hours
8. What is the highest educational level of your parents?
   A. Primary
   B. Secondary
   C. Tertiary
   D. Graduate School
9. Is this the first time you are taking this course?
   A. Yes
   B. No
10. If no, how many times before have you taken it?
   A. Once
   B. Twice
   C. Thrice

D. More than three times

11. How old are you?

A. Less than 18 years old

B. 18-21 years old

C. 22-25 years old

D. 26-30 years old

E. More than 30 years old

12. Are you visiting UWI for a semester/year (are you a transfer student)?

A. Yes

B. No

13. Are you Jamaican?

A. Yes

B. No

14. Do you work full-time?

A. Yes

B. No

15. Do you work part-time?

A. Yes

B. No

16. Have you ever had a job?

A. Yes

B. No

17. Are you registered as a full time student?

A. Yes

B. No

18. Is this course a free elective?

A. Yes

B. No

19. Do you participate in any of UWI's extra-curricular activities?

A. Yes

B. No

20. Do you participate in any extra-curricular activities not connected to UWI?

A. Yes

B. No

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