Evidence of Grade Inflation at an AACSB-Accredited Business School

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ABSTRACT

Grade inflation is the increase of students' average GPA due to the mere passage of time, unconnected with increased academic achievement. Past studies on grade inflation in higher education have demonstrated the need to control for variables that may mask increases in average GPA that are due strictly to time. This study provides some insight into the grade inflation problem by bringing more information to bear on the issue and by correcting for possible truncation bias in the sample of undergraduate students at an AACSB-accredited business school. The results suggest that controls for students' major and other characteristics are important in discerning the small degree of grade inflation that was found in this study.

INTRODUCTION

Grade inflation in higher education has been a topic of interest for at least a century.[1] Books and many articles have been written throughout the years and statistical studies have been done to come to grips with the phenomenon. Discussion and study have concerned all types of post-secondary schools, ranging from Ivy League schools such as Harvard and Princeton to community colleges. Academic arenas where most interest in the subject is shown are educational psychology and sociology, most notably K. A. Feldman (1989) A.G. Greenwald (1997), H.W. Marsh, L.A. Roche (2000), and, and education, especially business education, whose authors include C.F. Eiszler (2002) and B.S. Sonner (2000). Some major studies have been done on the issue, which get commonly cited in literature reviews.[2]

The definition of grade inflation hinges on the difference between grades and achievement. Eiszler (2002) quotes Stone (1995), that "grade inflation is evidenced when higher grades are unaccompanied by higher student achievement." Discerning this difference is admittedly a problem since it is difficult to determine whether higher grades are due to easier grading or increased achievement. Some researchers contrast grades with entrance examination scores such as the ACT, SAT, of the GMAT.[3] Others look to see whether other student

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[1] *See* Kezim, Pariseau, and Quinn (2005).

[2] *See* Johnson (2003).

[3] American College Test, Scholastic Aptitude Test, and Graduate Management Aptitude Test, respectively.

characteristics shown to account for higher grade point averages have increased or decreased over the time period; increases (decreases) of students with these characteristics might account for grade inflation (deflation). A few admittedly use anecdotal evidence and fail to account for the difference or to explain the basis of achievement.

Several issues have arisen as topics of interest to be studied and discussed at colleges and universities. Among them is whether grade inflation is related to faculty status, that is, whether the standing teachers have among their peers affects the grades students receive. Another, related issue is whether students' evaluations of their teachers tend to promote grade inflation. Does the longing for promotion, from adjunct, to junior professor, and then to tenured and full professor, influence younger college and university teachers to give higher grades than those of more senior faculty? Perhaps younger colleagues seek popularity among students, and better evaluations, by handing out higher grades. A third issue is the prevalence of grade inflation over the last several decades. Most agree that grade inflation began in the 1960s, became more acute in the 1970s, stabilized during the 1980s, but may have increased during the 1990s.

Another issue is how grade inflation has affected the various subjects taught in colleges and universities. Here the overall feeling is that grade inflation is most prevalent in the "softer" subjects, such as education, the humanities, and the social sciences, whereas mathematics, business, engineering, and science criteria are less involved. For instance, accounting professors in one recent study prided themselves in finding that grade inflation did not exist in their department, while the problem was shown to exist in the university as a whole (see Addy and Herring (1996) discussed later in this review). If this holds true in business schools generally then it should be expected that grade inflation would be most prevalent in management and marketing and least prevalent in finance, real estate, and accounting. A good study of this kind should control for determinants of grades that might mask grade inflation due to time alone.

This article will mostly address the literature from education and business education and will proceed as follows. The first section provides a review of the literature on grade inflation as it relates to different subject matters in the colleges and universities and to business schools in particular. Also covered here are the effects of other student characteristics on grades and the need to control for these variables in a successful study. The second section presents several statistical models for testing whether and to what extent grading inflation exists and how it differs in the departments of an east coast Association to Advance Collegiate Schools of Business (AACSB) accredited business school. The model will control for several factors that have been shown to be important in past studies. The third section describes the data used and the results of the analysis. The final section concludes and summarizes the paper.

REVIEW OF THE LITERATURE

Differences in Grade Inflation between Different Types of Students

In McSpirit, et al., (2000) full-time, matriculated, freshmen entering college between 1983 and 1991 (the last graduating in 1995 or 1996) at Eastern Kentucky University were the subjects of the study. It was felt that this cohort method controlled for age and maturity changes (characteristics likely positively correlated with GPA) in the student population (n = 1,351) over time. Proceeding this way was also felt to better control for the number of students who were just "trying out" college and were not entirely serious. Using grade point average (GPA) on graduation as the dependent variable, the authors used Ordinary Least Squares (OLS) to determine grade increase over time. Three models were run using the data. The first used student entry year as the sole independent variable; the second added students' ACT score as a independent variable; the third added gender as a dummy variable. Results showed significant grade inflation, a 0.02 annual rise in GPA upon graduation since 1983, the result when gender and ACT score were held constant. Part of the increase in students' average graduating GPA over time was due to increasing ACT scores, and part of the increase over time was due to a relative influx of female students over the years studied. Of the three variables, ACT score was the most important determinant of a higher GPA, gender was the second most important factor, while year of entry was the least important (but still significant) factor for a higher average graduating GPA.

ACT scores were also found to have been a significant determinant of higher GPAs upon graduation, along with students' age, in Kwon, Kendig, and Bae (1997). Sonner (2000), using analysis of variance (ANOVA) and analysis of covariance (ANCOVA) on data from business classes of a small public university, found that class size, class subject, and class level were all significantly related to average class grade (n = 7,610). Smaller classes had the higher average grades. The "numbers" classes, such as statistics and quantitative methods, had the lowest average grades, while marketing and management classes had the highest. 400 level classes had the highest average grades, while lower average grades went to those numbered 300, 200, and 100, respectively.

Cluskey, Griffen, & Ehlen (1997) studied students' grade and ACT score data collected over a 15-year period (1980 – 1995) at a private mid-western university. The authors used Pearson Product Moment correlations and a simple Multiple Regression analysis of grade point average on time (semesters) and ACT scores. In the latter tests they used appropriate regression techniques to compensate for autocorrelation error. Results showed that for the business college as a whole and for the university as a whole there was significant negative correlation between GPA and ACT scores, holding time constant. The same negative correlation was not shown for accounting courses, which showed higher grades without a reciprocal increase in ACT scores, their definition for grade inflation.

In Addy and Herring (1996) the authors wanted to test the effects of imposing a minimum grade point average in upper division accounting at the School of Accountancy at Mississippi State University. Their business school had been requiring a minimum 2.0 grade point average across all classes when it was decided to require a 2.5 in upper division accounting classes in order to graduate with a major in accounting. They wanted to test whether the effect would be either to flunk out more students or to increase grade inflation so that lower performing students could remain in the program. They believed the latter case would prevail and grade inflation for lower performing students existed. A total of 444 students were included in the study, 217 graduates from the pre-period and 227 graduates from the post-period. An OLS regression was run with the accounting grade point average as the dependent variable. An independent, dummy variable was coded 1 for students in the post-period and 0 for students in the pre-period. Another independent variable was the average grades across non-accounting, business college courses. The third independent variable was a slope shift term to describe the difference in coefficient for other business grades between the pre-and post- period. From a positive, significant first variable the authors concluded that the average accounting grades were higher in the post-period than the pre-period, holding students' other grades constant. When the accounting students were split between those with above a 2.99 accounting grade average and those below, the first independent variable was no longer significant, showing that for the good accounting students there was no grade inflation.

Controlling for Faculty Bias

Researchers have also found grade inflation related to faculty status (Kezim, et al (2005), Sonner (2000)). A Relative Performance Index (RPI) was constructed by Nagle (1998) based on fictitious data in an attempt to come to grips with the problem of faculty grading differences. Here the professor's standards as reflected in the performances of other students in the class are considered for a better measure between students' scores. RPIs for a student are determined by comparing the student's grade in each class with the average grades for all students in the class. RPIs range from above 1 (better than the class average) to below 1 (worse than the class average). Cumulative RPIs are weighted, taking into account the different numbers of students in each class. The final grade point average for each student takes into account the average grade point average of each class and the RPIs (how the student did relative to other students) of that student.

RESEARCH METHOD

Data Sample

To investigate factors that may be related to grade inflation in an AACSB-accredited business school, a sample of 6,229 grade point averages was obtained from the official university records system at Florida Atlantic University (FAU) for recent graduates along with their year of graduation, whether they were enrolled in the traditional or "weekend" bachelor program, their age, gender, major, whether or not they graduated with a minor, and their total number of hours completed at graduation.

The students included in this sample are graduates from the Barry Kaye College of Business at FAU, a Southern Association of Colleges and Schools (SACS) accredited, public university located in southeast Florida. As of 2006, FAU had enrollment of just over 26,000 students, including more than 6,300 full- and part-time business students at the graduate and undergraduate level. The business school is fully accredited through the doctoral level by AACSB International. The school can be characterized as a regional, urban, commuter school serving a diverse population at multiple campuses over a geographic area along the I-95 corridor of southeast Florida from Port St. Lucie in the north to Fort Lauderdale in the south.

Students can be admitted to the FAU College of Business only after they reach junior status (60 complete credit hours) and have a minimum grade point average of 2.0 on a 4.0 scale. Business students at FAU can choose to major in one or more of the following fields of study: Accounting, Computer Information Systems, Economics, Finance, Health Administration, International Business, Management, Management Information Systems, Marketing, and Real Estate. A variety of minors (usually 9 credit hours) are also available that allow business students to combine courses from different majors and create customized plans of study.

Empirical Models

The empirical models considered in this study are given below. The dummy variable *Year* indicates the year of graduation (2000 – 2005, with 2000 being the omitted category). This variable is the primary variable of interest in this study. A significantly positive (negative) coefficient on *Year* will support (refute) the contention that grades are increasing over time.

The remaining control variables are *Weekend* (a dummy variable equal to 1 if student graduated from the weekend program rather than the tradition program), *Age* (in years at time of graduation), *Female* (a dummy variable equal to 1 if the graduate is female), *Black* (a dummy variable equal to 1 if the graduate identifies his or her ethnicity as Black), *Hispanic* (a dummy variable equal to 1 if the graduate identifies his or her ethnicity as Hispanic), *Asian* (a dummy variable equal to 1 if the graduate identifies his or her ethnicity as Asian), *Native American* (a dummy variable equal to 1 if the graduate identifies his or her ethnicity as Native American), *Other* (a dummy variable equal to 1 if the graduate identifies his or her ethnicity as "Other"), *Economics* (a dummy variable equal to 1 if the graduates major is economics), *Health Administration* (a dummy variable equal to 1 if the graduates major is health administration), *Finance* (a dummy variable equal to 1 if the graduates major is finance), *Accounting* (a dummy variable equal to 1 if the graduates major is accounting), *Marketing* (a dummy variable equal to 1 if the graduates major is marketing), *Management* (a dummy variable equal to 1 if the graduates major is management), *Management information systems* (a dummy variable equal to 1 if the graduates major is management information systems), *International Business* (a dummy variable equal to 1 if the graduates major is international business), *Computer Information Systems* (a dummy variable equal to 1 if the graduates major is computer information systems), *Real Estate* (a dummy variable equal to 1 if the graduates major is real estate), *Minor* (a dummy variable equal to 1 if the graduates with a minor), and *Hours* (the number of credits completed by the student at the time of graduation). Table 1 presents summary statistics for each variable.

<u>Model 1</u>

$$\text{GPA} = \beta_0 + \beta_1\, Year + \beta_2\, Weekend + \beta_3\, Age + \beta_4\, Female + \beta_5\, Black + \beta_6\, Hispanic + \beta_7\, Asian + \beta_8\, Native\ American + \beta_9\, Other + \beta_{10}\, Economics + \beta_{11}\, Health\ Administration + \beta_{12}\, Finance + \beta_{13}\, Accounting + \beta_{14}\, Marketing + \beta_{15}\, Management\ Information\ Systems + \beta_{16}\, International\ Business + \beta_{17}\, Computer\ Information\ Systems + \beta_{18}\, Real\ Estate + \beta_{19}\, Minor + \beta_{20}\, Hours + e.$$

Because the impact of the primary variable of interest in this study, *year*, may not be linear across the time frame of this study, a second empirical model is considered that uses dummy variables for each year to consider year-by-year grade inflation. Significantly positive (negative) coefficients on these variables (*D2000 – D2005*, with *D2000* as the omitted category) will indicate whether grade inflation (deflation) is evident over the study period on a year-by-year basis. In this model, of course, the *Year* variable is omitted from analysis because it is perfectly correlated with the dummy variables for each year.

Model 2

$$GPA = \beta_0 + \beta_1 D2001 + \beta_2 D2002 + \beta_3 D2003 + \beta_4 D2004 + \beta_5 D2005 + \beta_6 Weekend + \beta_7 Age + \beta_8 Female + \beta_9 Black + \beta_{10} Hispanic + \beta_{11} Asian + \beta_{12} Native\ American + \beta_{13} Other + \beta_{14} Economics + \beta_{15} Health\ Administration + \beta_{16} Finance + \beta_{17} Accounting + \beta_{18} Marketing + \beta_{19} Management\ Information\ Systems + \beta_{20} International\ Business + \beta_{21} Computer\ Information\ Systems + \beta_{22} Real\ Estate + \beta_{23} Minor + \beta_{24} Hours + e.$$

We estimate each of these models using a truncated regression model rather than the traditional OLS model. OLS is well-suited for drawing inferences about the sample, but it is inappropriate to use OLS to draw inferences about all graduates from this College of Business because the sample only includes those students who actually graduate from the program. In essence, the data sample is truncated at the GPA of 2.0 because students with lower GPA cannot graduate from the program. Some of these students may take additional courses to raise their GPA or they may drop out of the degree program prior to graduation. Because the sample is missing "inputs" for the students who withdrew (voluntarily or involuntarily) from the Barry Kaye College of Business before graduation as well as the "output" (GPA) upon, the data used in the current study is "truncated."

Inferences drawn from OLS analysis of truncated data samples can be biased by the omission of information in the truncated observations. The classic example of the impact of such bias is the dramatic failure by political forecasters to accurately predict Truman's presidential victory over Dewey in the 1948 U.S. presidential election. As described by Kennedy (2003, p. 286), surveys were taken via telephone prior to the election at a time when telephones were more likely to be owned by wealthy voters. These surveys indicated that Dewey would win the election, but the unmeasured variable "wealth" affected both the survey answers and the probability of the respondents being selected to participate in the survey. The surveys suffered from selection bias because the responses were drawn from a truncated sample.

Truncated data samples present sample selection bias that is addressable using truncated regression. A truncated regression model (following Long (1997)) is summarized below. Assume that the truncated variable x has a normal distribution with mean μ and standard deviation σ. The density function of the truncated normal distribution is

$$f(x \mid a < x < b) = \frac{f(x)}{\Phi\left(\frac{b-\mu}{\sigma}\right) - \Phi\left(\frac{a-\mu}{\sigma}\right)} = \frac{\frac{1}{\sigma}\phi\left(\frac{x-\mu}{\sigma}\right)}{\Phi\left(\frac{b-\mu}{\sigma}\right) - \Phi\left(\frac{a-\mu}{\sigma}\right)},$$

where φ and Φ are the density and distribution functions of the standard normal distribution. When the truncation is "from below" (with a in this situation equal to 2.0), the mean of the truncated variable is <u>greater than</u> the true mean of the distributed and the variance is <u>less than</u> the true variance.

In the presence of truncation, Ordinary Least Squares is not an appropriate regression estimator when the goal is to draw inferences about the full population. (OLS is, however, adequate if the goal is to draw inferences only from the restricted population). Unlike the case of censored data samples, neither TOBIT (Tobin (1958) nor Heckman's (1976) two-stage procedure addresses truncation as a form of sample selection bias. Both of those methods make use of known independent variable values for observations with unknown dependent variable values (censored data). In the case of this study, neither the independent nor dependent variables are known for the students who start a degree program in the business school but do not graduate from the school with a business degree.

Fitting a regression function with a truncated dependent variable can be accomplished with Maximum Likelihood Estimation (MLE). The log likelihood function when *a* is the lower limit and *b* is the upper limit is:

$$L = -\frac{n}{2}\log(2\pi\sigma^2) - \frac{1}{2\sigma^2}\sum_{i=1}^{n}(y_i - x_i\beta)^2 - \sum_{i=1}^{n}\log\left[\Phi\left(\frac{b - x_i\beta}{\sigma}\right) - \Phi\left(\frac{a - x_{i\beta}}{\sigma}\right)\right].$$

Fitting the empirical models described above to the data sample using both OLS and MLE provides the results discussed in the next section.

RESULTS

To address the sample bias problem related to the truncated nature of the data sample, the MLE method described above generates the results shown in Tables 2 and 3. The results for Model 1 indicates that overall GPA is increasing over the study period, providing support for the contention that grade inflation has occurred over the study period.

Additionally, the results indicate that students in the weekend BBA program have higher GPA than graduates enrolled in the traditional program; older graduates have higher GPA than younger graduates; female graduates have higher GPA than male graduates; economics majors, health administration majors, finance majors, accounting majors, management science majors, and international business majors have higher GPA than management graduates (the omitted category); and that graduates who identify their ethnicity as "Other" have higher GPA than White graduates. The results also indicate that Black and Hispanic graduates have lower GPA than White graduates and that students taking more credit hours on the path to graduation have lower GPA. No significant grade inflation effects were identified for graduates who received a minor in their plans of study, for marketing and real estate majors, or for graduates who identify their ethnicity as Native American.

The results for Model 1 indicate a years' difference in graduation in itself results in an increase in average graduating GPA of about 0.01. This is about half the grade inflation found by the McSpirit, et al. (2000) study for Eastern Kentucky University over the years 1983 to 1991.

For Model 2, the results again indicate the overall GPA is increasing over the study period, but the effect is insignificant until 2003 where time is accounted for by dummy variables rather than a continuous variable, providing support for the notion that grade inflation has occurred over the latter years of the study period. The results for the control variables included in Model 2 are similar to those summarized above for Model 1.

The Wald χ^2 statistics for both models provide strong evidence that the models provide a good fit for the data, with both statistics being significant at greater than the 0.001 level. While the truncated regression does not provide an R^2, an approximation of the degree of association between the dependent variable and the independent variables can be calculated as the square of the correlation between the predicted values and the dependent variable (Long (1997)). This "rough R^2" indicates that the model accounts for (or "explain") 8.98 and 8.91 percent of the variation in overall GPA.

CONCLUSIONS

Grade inflation as shown in our study continues to exist to some extent. In an ideal study of this nature it would have been interesting to have controlled for faculty bias as well. An aptitude surrogate such as ACT or SAT scores is also missing. Nonetheless, the number of statistically significantly independent variables in our model makes it doubtful that much was not controlled for. Class subject was found to be very significant in the literature and no previous study that we know of has obtained an estimate of grade inflation over time controlling for major. Additional independent variables were controlled for. The addition of majors to our study most probably controlled for aptitude to some extent as a result of self-selection into the majors. The study also controlled for truncation bias caused by omission of information about students leaving the business school before graduation.

Previous research points out that the crux of the grade inflation problem is discerning between grades and student achievement. Certain factors must be controlled for in order to understand grade inflation, which is the increase of GPA merely due to the passage of time. This study adds to that literature and demonstrates the importance of students' majors, genders, ethnicities, ages, and total credit hours completed, with correction for bias brought about by sample truncation.

Table 1: Summary Statistics for Variables in the Data Sample
N = 6,229

Variable	Mean	Standard Deviation
GPA	2.95	0.46
Year	2002.67	1.68
Weekend	0.04	n/a
Age	28.25	7.02
Female	0.54	n/a
White	0.59	n/a
Black	0.16	n/a
Hispanic	0.16	n/a
Asian	0.07	n/a
Native American	0.00	n/a
Other	0.00	n/a
Management	0.25	n/a
Economics	0.01	n/a
Health Administration	0.03	n/a
Finance	0.17	n/a
Accounting	0.17	n/a
Marketing	0.14	n/a
Management Information Systems	0.10	n/a
International Business	0.09	n/a
Computer Science	0.03	n/a
Real Estate	0.01	n/a
Minor	0.78	n/a
Hours	136.43	23.21

Table 2: Results of regressing *GPA* on Explanatory Variables Using Truncated Regression (Model 1)

N = 6,229

Variable	Coefficient	Standard Error	t-statistic
Year	0.008	0.003	2.280
Weekend	0.076	0.033	2.330
Age	0.008	0.001	9.600
Female	0.134	0.012	11.590
Black	-0.246	0.016	-15.400
Hispanic	-0.105	0.016	-6.620
Asian	-0.087	0.022	-3.920
Native American	-0.074	0.084	-0.880
Other	0.172	0.089	1.930
Economics	0.160	0.051	3.110
Health Administration	0.198	0.035	5.730
Finance	0.094	0.018	5.070
Accounting	0.140	0.019	7.580
Marketing	-0.011	0.020	-0.550
Management Information Systems	0.062	0.022	2.830
International Business	0.117	0.023	5.170
Computer Information Systems	0.060	0.036	1.670
Real Estate	-0.043	0.053	-0.800
Minor	0.014	0.014	0.990
Hours	-0.001	0.000	-4.230
Constant	-13.032	6.930	-1.880
Wald χ^2	608.94		
Rough R^2	0.0891		

Table 3: Results of regressing *GPA* on Explanatory Variables Using Truncated Regression (Model 2)

N = 6,229

Variable	Coefficient	Standard Error	*z*-statistic
D2001	0.032	0.021	1.530
D2002	0.016	0.021	0.780
D2003	0.056	0.021	2.710
D2004	0.043	0.020	2.110
D2005	0.043	0.021	2.110
Weekend	0.076	0.033	2.330
Age	0.008	0.001	9.600
Female	0.134	0.012	11.610
Black	-0.245	0.016	-15.390
Hispanic	-0.104	0.016	-6.570
Asian	-0.087	0.022	-3.940
Native American	-0.074	0.084	-0.880
Other	0.173	0.089	1.940
Economics	0.159	0.051	3.090
Health Administration	0.197	0.035	5.700
Finance	0.094	0.018	5.070
Accounting	0.140	0.018	7.570
Marketing	-0.012	0.020	-0.600
Management Information Systems	0.059	0.022	2.680
International Business	0.116	0.023	5.160
Computer Information Systems	0.064	0.036	1.790
Real Estate	-0.042	0.053	-0.780
Minor	0.013	0.014	0.960
Hours	-0.001	0.000	-4.240
Constant	2.744	0.044	62.990
Wald χ^2	614.21		
Rough R^2	0.0898		

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