

## **RELATIONSHIP OF ECONOMICS AND BUSINESS CORE COURSE GRADES AND RATINGS**

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### **ABSTRACT**

The focus of this study was to ascertain the relationship of college algebra grades to economics and business core course grades and student evaluations to measure outcomes assessment criterion.. Grades in macroeconomics, microeconomics, finance, quantitative and statistics were positively correlated to GPA for both grades A and C in college algebra. There was a significant positive linear relationship between college algebra grades and GPA, macroeconomics, microeconomics, finance, and quantitative grades. There was a statistically significant negative linear relationship between college algebra grades and economics ratings. Significant variables for macroeconomic grades were microeconomics grades, finance grades and GPA. Significant variables for microeconomics grades were macroeconomics grades, ETS standard scores and GPA.

### **INTRODUCTION AND REVIEW OF LITERATURE**

The measurement of continuously improving performance outcomes intended for the graduating senior business major seems to imply an investigation into the mathematics proficiency necessary to successfully improve outcomes in economics. The primary focus of this paper was to determine the relationships of college algebra grades to economics evaluations and economics principles course grades and business core course grades. Does information elicited from the data suggest curricular, content or structural changes in design of economics and related courses and/or the level of mathematics requirements?

Krohn and O'Conner (2005) suggest that high midterm scores in economics tended to be a variable that reduced the marginal utility of study versus leisure. Jensen and Owen (2003) found that students classified as problem solving with high GPAs preferred economics classes with less participation and greater lecture time for determination of their grade in the course. Santos and Lavin (2004) implied that men achieve deep learning better than women. Williams, Waldauer and Duggal (1992) suggest that gender grade differences in economics courses are related to the higher quantitative scores by males as measured by the math SAT. This study also cited numerous findings that suggest that males do better than females on standardized economics tests. Durden and Ellis (1995) found that student attendance had a positive effect on student learning in economics. The study also suggested that math SAT scores and calculus were significantly related to student success in economics. Ballard and Johnson (2004) indicated that math ACT scores, calculus, and basic math skills

including basic algebra, were significant variables in microeconomics course performance. Sewell (2004) also found that male achievement in economics classes was significantly higher than females. Further this study found that SAT scores and a major in business were positive significant variables. Park and Kerr (1990) found that percentile rank on college ACT tests and adjusted cumulative GPA were key determinants of student grades in an economics course. Anderson, Benjamin and Fuss (1994) found that determinates of success in beginning economics courses were high school grades, calculus and gender (males scored higher). Lumsden and Scott (1987) found that in beginning economics courses males performed better on multiple choice tests and had higher learning rates, while females performed better on economics essay examinations. Hansen (2001) examined the challenge of developing assessment of economics that is comprehensive for measuring both content knowledge and proficiencies. Walstad (2001) suggested that economics assessment should have many dimensions, take different forms, be of high quality and provide researchable data. Chizmar and Ostrosky (1998) suggest that a short written exercise can improve economics learning and active class participation in economics classes. Bishop (1998) recommends a curriculum based external exit examination in economics as part of an assessment program in economics. Grimes (2002) suggested that unmet expectations by economics students had important assessment implications for student satisfaction and faculty evaluations.

Maki (2002) suggested that if assessment originates from an external source, such as accreditation, then faculty often resist the process and the “burden” becomes a short term commitment. Payne and Whitfield (1999) indicated that quality improvements involve the use of benchmarking. Henninger (1994) reported on the role of the two accrediting agencies that evaluate schools (colleges) of business. One standard of these accrediting agencies includes requiring institutions to have an outcome assessment program that documents results and improvements made based upon analysis of the data. Hatfield and Gorman (2000) suggested that various institutional informational data that does not help understand students or student characteristics or is not useful for statistical analysis is a waste of time. Course or teacher effectiveness has become an important function that is evaluated by student rating of instruction. Hoyt and Perera (2002) found that objectives that emphasized substantive knowledge, principles and theories were selected more in classes directed toward specialization. This study found the professional oriented classes selected professional skills and viewpoints more than general education classes. Interest in the subject area prior to the course tended to give more favorable ratings (Prave & Baril, 1993). Student ratings tended to be more objective than other approaches (Arreola, 1995; Peterson, 1995). Yunker and Yunker (2003) in a validity study, found a negative relationship between student evaluations and student achievement. Nuhfer (2003) suggested that statistics were often misrepresented when student evaluations were used as a measure of student learning. Mandatory student ratings led faculty to reduce coursework requirements and make examinations easier (Greenwald & Gilmore, 1998), while Franklin, Thell, and Ludlow (1991) found a positive effect of course difficulty on student ratings. More strict grading standards led students to rate the instructor lower (Chacko, 1983).

## **PURPOSE**

The purpose of this study was to ascertain the relationship of college algebra grades to economics and business core course grades. A secondary purpose was to determine the correlations of college algebra grades to economics and business core course student evaluations and student evaluations of outcomes assessment criterion. A third purpose was to examine regression analysis for selected economics and business core course variables with college algebra utilized as the dependent variable. Does information elicited from the data suggest changes in economics courses? The analysis of data may suggest changes needed to meet continuous improvement in outcome assessment.

## **METHODOLOGY**

The population consisted of graduating senior business majors pursuing a School of Business BBA. All students enrolled in the senior level Strategic Management and Policy course are required to take the ETS Major Field Test in Business (ETS MFTB) during the 14th week of each semester. This examination was administered to 106 students during the 2003-2004 academic year. The results of this study included several components such as students' major, gender, grade point average, and ETS Major Field Test scores. Correlation of college algebra grades to ratings and grades of all economics and business core courses was a major objective of this analysis. Assessment criterion was predetermined by the School of Business Outcomes Assessment Program for some variables. Analysis of variance and correlation statistical tests were performed on all parametric data, while Pearson chi-square statistical tests were utilized for all non-parametric data. Regression analysis were utilized for selected economics and business core course variables with college algebra as the dependent variable.

### **Correlation of Selected Criteria**

Students with higher grade point averages tended to have higher ETS scores with a computed correlation of .518. When respondent ratings were examined in previous years, it was found that students with higher grade points and ETS scores tended to rate the major programs preparation for a career, intellectual challenge, teacher effectiveness, relevance of material to the "real world" and professionalism in the classroom lower than expected. Overall, the correlation of these assessment variables to GPA and ETS scores was low and in some cases negative. Table 4 indicates that for graduating senior business majors the course rating variable of economics ratings had a negative correlation to GPA, macroeconomics, microeconomics and college algebra grades. A very low positive correlation occurred for the course rating variable of economics ratings to the statistics grade and the ETS standard score. The data in Table 1 indicates that for graduating senior business majors that all of the grades (macroeconomics, microeconomics, statistics, college algebra grades and GPA, ETS scores) were significantly positively correlated.

**TABLE 1**  
**PEARSON CORRELATION OF SELECTED CRITERIA FOR GRADUATING SENIOR**  
**BUSINESS MAJORS**  
**2003-2004**

<b>Correlation Variable</b>	<b>Econ R</b>	<b>GPA</b>	<b>Macro G</b>	<b>Micro G</b>	<b>Stat G</b>	<b>ETS</b>	<b>Cl Alg G</b>
Economics Rating	1.000						
Grade Point Average	-.105	1.000					
Macroecon. Grade	-.079	.598***	1.000				
Microecon. Grade	-.026	.594***	.576***	1.000			
Statistics Grade	.027	.438***	.323***	.309***	1.000		
ETS Standard Score	.118	.416***	.303**	.407***	.252***	1.000	
College Alg. Grade	-.195	.450***	.353***	.261**	.226*	.218*	1.000

\*Correlation is significant at the 0.05 level (2-tailed)

\*\*Correlation is significant at the 0.01 level (2-tailed)

\*\*\* Correlation is significant at the 0.001 level (2-tailed)

**Correlation of Selected Variables to College Algebra Grades**

Respondent ratings and economics and related business core course grades were examined for correlations of these assessment variables when individual college algebra grades of A and C were factored for each correlation variable. The data in Table 2 indicates that for all senior business majors that all of the grades (macroeconomics, microeconomics, finance, quantitative and statistics) were significantly positively correlated to GPA for both grades A and C in college algebra except for an algebra C to microeconomics and statistics at the .01 level. GPA and ETS scores were only significantly positively correlated at the .01 level for those with college algebra grades of C. GPA and ETS scores were often negatively correlated to course ratings for those with college algebra grades of A. Economics, finance ratings and ETS scores were only significantly positively correlated at the .01 level for those with college algebra grades of C. Quantitative ratings and statistics ratings were significantly positively correlated with economics ratings at the .01 level for those with college algebra grades of A. The data in Table 2 indicates that for all graduating senior business majors all of the grades (macroeconomics, microeconomics, finance, quantitative and statistics) were significantly positively correlated to grades in these courses for those with A's in college algebra. However a C in college algebra resulted in positive, but not significant, correlations for statistics with all other course grades and for finance and quantitative grades with microeconomics grades.

**TABLE 2**  
**CORRELATION OF VARIABLES FOR SELECTED COLLEGE ALGEBRA GRADES FOR**  
**GRADUATING BUSINESS SENIORS**  
**2003-2004**

Correlation Variable	GPA	ETS	EconR	FinR	QuaR	StatR	MacroG	MicroG	FinG	QuaG	StatG
Grade point Ave.											
A in College Alg.	1.000										
C in College Alg.	1.000										
ETS standard Score											
A in College Alg.	.214	1.000									
C in College Alg.	.447**	1.000									
Economics Ratings											
A in College Alg.	.113	.120	1.000								
C in College Alg.	-.016	.427**	1.000								
Finance Ratings											
A in College Alg.	-.249	-.059	.263	1.000							
C in College Alg.	.142	.376**	.482**	1.000							
Quant. Ratings											
A in College Alg.	-.047	-.236	.397**	.286	1.000						
C in College Alg.	.028	.209	.499**	.346*	1.000						
Statistics Ratings											
A in College Alg.	.017	-.079	.512**	.062	.725**	1.000					
C in College Alg.	-.086	-.129	.325*	.159	.247	1.000					
Macroecon Grades											
A in College Alg.	.600**	.121	.046	.387**	.225	.334*	1.000				
C in College Alg.	.423**	.348**	.135	.080	-.016	-.130	1.000				
Microecon. Grades											
A in College Alg.	.629**	.230	.023	-.152	.284	.259	.579**	1.000			
C in College Alg.	.287	.281	.337*	.199	.294	.102	.534**	1.000			
Finance Grades											
A in College Alg.	.594**	.219	.105	.193	.124	.075	.489**	.625**	1.000		
C in College Alg.	.571**	.508**	.177	.320*	.215	-.121	.394*	.298	1.000		
Quant. Grades											
A in College Alg.	.547**	.160	-.045	-.317*	.235	.252	.680**	.682**	.478**	1.000	
C in College Alg.	.513**	.691**	.182	.294	.216	-.142	.448**	.150	.689**	1.000	
Statistics Grades											
A in College Alg.	.556**	.212	.180	-.056	.286	.315*	.529**	.527**	.570**	.641*	1.000
C in College Alg.	.149	.206	.142	-.178	-.207	-.014	.206	.205	.288	.202	1.000

\*Correlation is significant at the 0.05 level (2-tailed)

\*\*Correlation is significant at the 0.01 level (2-tailed)

### Regression Analysis with College Algebra Grades as the Dependent Variable

GPA, ETS standard scores, economics and related business core course grades and ratings were subjected to regression analysis with college algebra as the dependent variable. These variables were selected to represent a portion of the quantifiable assessment objectives that will permit measurement as part of the continuous improvement program as the School of Business redesigns data collection for further accreditation. The data in Table 3 suggests that for all graduating senior business majors there was a statistically significant positive linear relationship at the .01 level between college algebra grades and GPA, macroeconomics, microeconomics, finance, and quantitative grades. The positive relationship between college algebra grades and ETS standard scores and statistics were statistically significant at the .05 level. For all graduating senior business majors there was a statistically significant negative linear relationship at the .05 level between college algebra grades and economics ratings.

**TABLE 3**  
**REGRESSION ANALYSIS WITH COLLEGE ALGEBRA GRADES AS A DEPENDENT**  
**VARIABLE**  
**2003-2004**  
**GRADUATING BUSINESS SENIORS**

Dependent Variable	r	R Squared	Adjusted R squared	Standard Error Of the Estimate	Standardized Coefficients (Beta)	t	Significance
Grade point average	.450	.202	.195	.475	.450	5.138	.000
ETS standard score	.218	.048	.039	9.840	.218	2.283	.024
Macroecon. grades	.353	.125	.116	.777	.353	3.848	.000
Microecon. grades	.261	.068	.059	.851	.261	2.760	.007
Finance grades	.427	.183	.175	.930	.427	4.819	.000
Statistics grades	.226	.051	.042	.884	.226	2.359	.020
Quantitative grades	.437	.191	.183	1.005	.437	4.957	.000
Economics ratings	.195	.038	.028	.931	-.195	-	.050
Finance ratings	.011	.000	-.010	.991	-.011	1.983	.915
Quantitative ratings	.133	.018	.008	.895	.133	1.354	.179
Statistics ratings	.136	.018	.009	.936	.136	1.379	.171

**Multiple Regression Analysis with Economics Courses as the Dependent Variable**

Multiple regression analysis was utilized with macroeconomics grades as the dependent variable and the following set of independent variables: microeconomics grades, finance grades, quantitative grades, statistics grades, college algebra grades, GPA, and ETS standard scores. Significant regression coefficients were found for the independent variable of microeconomics grades with a *t* of 3.240, significant at the .01 level. In addition a significant regression coefficient was determined for the independent variable GPA with a *t* of 2.395 and finance grades with a *t* of 2.257 both significant at the .05 level. When GPA was removed as an independent variable and the data was recomputed, only microeconomics grades and finance grades emerged as significant variables.

Multiple regression analysis then was utilized with microeconomic grades as the dependent variable with the following set of independent variables: macroeconomic grades, finance grades, quantitative grades, statistics grades, college algebra grades, GPA, and ETS standard scores. Significant regression coefficients were found for the independent variable of macroeconomic grades with a *t* of 3.520 and GPA with a *t* of 3.380 both significant at the .01 level. Also a significant regression coefficient was determined for the independent variable ETS standard scores with a *t* of 2.104, significant at the .05 level. When GPA was removed as an

independent variable and the data was recomputed, macroeconomic grades and ETS standard scores remained as significant variables along with the addition of quantitative grades with a  $t$  of 2.209 significant at the .05 level.

### CONCLUSIONS AND RECOMMENDATIONS

For graduating senior business majors all of the grades in macroeconomics, microeconomics, finance, statistics college algebra including ETS scores and GPA were significantly positively correlated. For graduating senior business majors all of the grades in macroeconomics, microeconomics, finance, quantitative and statistics were significantly positively correlated to GPA for both grades A and C in algebra except for a C in college algebra to statistics and microeconomics. For graduating senior business majors there was a highly statistically significant positive linear relationship between college algebra grades and GPA, macroeconomics, microeconomics, finance, and quantitative grades. Additionally, there was a statistically significant negative linear relationship between college algebra grades and economics ratings. Significant variables for macroeconomic grades were microeconomics grades, finance grades and GPA. Significant variables for microeconomics grades were macroeconomics grades, ETS standard scores and GPA.

Highly correlated business core courses tend to have a common thread of knowledge, or have the expectation of proficiency in quantitative analytical skills. Students with higher grade point averages tended to have higher ETS scores with a correlation of .518.

Further study of graduating senior business majors for additional years is suggested to acquire a larger data base for benchmarking. The implications of data for the low student ratings of the two economics business core courses will require further study. Also further study is suggested to redesign data collection to measure continuously improving performance outcomes intended for all graduating senior business majors.

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