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LETTER FROM THE EDITOR

We are extremely pleased to present this issue of the *Journal of Economics and Economic Education Research*, an official publication of the Allied Academies' Academy of Economics and Economic Education Research, dedicated to the study, research and dissemination of information pertinent to the improvement of methodologies and effective teaching in the discipline of economics with a special emphasis on the process of economic education. The editorial board is composed primarily of directors of councils and centers for economic education affiliated with the National Council on Economic Education. This journal attempts to bridge the gap between the theoretical discipline of economics and the applied excellence relative to the teaching arts.

The Editorial Board considers two types of manuscripts for publication. First is empirical research related to the discipline of economics. The other is research oriented toward effective teaching methods and technologies in economics designed for grades kindergarten through twelve. These manuscripts are blind reviewed by the Editorial Board members with only the top programs in each category selected for publication, with an acceptance rate of less than 25%.

We are inviting papers for future editions of the *Journal for Economics and Economic Education Research* and encourage you to submit your manuscripts according to the guidelines found on the Allied Academies webpage at www.alliedacademies.org.

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ECONOMICS EDUCATION ARTICLES

ON-LINE MATHEMATICS REVIEWS AND PERFORMANCE IN INTRODUCTORY MICROECONOMICS

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ABSTRACT

We examine whether on-line remedial mathematics reviews can improve student performance in introductory microeconomics. In treatment sections, graded pre- and post- math tests were used to assess student understanding of graphing, systems of linear equations, area, slope, ratios and percentages. Students had on-line reviews and tutorials available between completing the tests. Pre- and post-test scores are positively and significantly related to course grade, more so than variables designating which mathematics courses have been taken by students. Students exposed to the math reviews in the treatment sections scored on average 0.20 of a grade point higher than comparable students in the control sections.

INTRODUCTION

Even at the introductory level, the abilities to think mathematically and reason abstractly have been shown to be important contributors to student success in economics, and many studies in economics education have attempted to control for students' mathematical backgrounds in their analysis. Durden and Ellis (1995) and Williams, Waldauer, and Duggal (1992) use Math SAT score as a measure of student mathematics ability and find that Math SAT score is positively and significantly correlated with student performance in economics courses. Anderson, Benjamin, and Fuss (1994), Brasfield, Harrison, and McCoy (1993), Brown and Leidholm (2002), Ely and Hittle (1990) and Lumsden and Scott (1987) include in their regressions of student performance the types of mathematics courses taken by students. These studies argue that the mathematics classes a student has taken are a reasonable proxy for student mathematics ability. Ballard and Johnson (2004) find that the mastery of very basic mathematics concepts is one of the most significant

contributors to student success in introductory microeconomics; they argue that studies that emphasize whether a student has taken calculus does not measure the influence of calculus *per se*, but rather measures the fact that students taking calculus are more likely to have mastered the basic mathematics concepts important for introductory economics.

The results of these studies suggest potential gains in student mastery of economics concepts if greater emphasis is placed on students' mathematics skills. In this study, we verify the link between basic mathematics skills and performance in introductory microeconomics and examine the use of on-line mathematics reviews as a method to improve student performance. As economics courses are increasingly being offered wholly or partly via internet, the effectiveness of this alternative format for student learning is important to assess. Brown and Leidholm (2002) and Katz and Becker (1999) examine whether internet courses can effectively substitute for classroom learning in economics. In this study, we examine whether an internet mathematics component to a standard lecture-based classroom course can improve student performance. We identify the advantages of conducting the mathematics reviews on-line as: (a) it does not require students to take additional mathematics classes or satisfy more prerequisites, (b) it can be done simultaneously with the economics course, and (c) it does not use valuable class time.

While introductory microeconomics is not, in general, a heavily mathematical course, the recognition of economics as a mathematics-based discipline at the introductory level is important. Instructors who de-emphasize the quantitative aspects of economics still must present concepts such as elasticity and consumer surplus, which can prove difficult if students cannot mathematically conceptualize the ideas. Additionally, students who enter intermediate-level economics classes with little idea that economics is a mathematics based discipline are functionally unprepared to be economics majors.

We collected information on the background, motivation, and mathematics preparation of 445 students enrolled in nine sections of introductory microeconomics at a regional Midwestern university. To ascertain the degree to which mathematics skills are correlated with performance and whether mathematics reviews can improve student performance, six sections of introductory microeconomics were assigned or given the opportunity to complete on-line tutorials with quizzes on basic mathematics, and earn class points on graded mathematics pre-and posttests. The three remaining sections served as controls. Students' scores on the mathematics pre- and posttests are significantly and positively correlated with

final grades in the course, holding other factors constant. In addition, we find that students in the six treatment sections performed significantly better than their counterparts in the control sections, earning on average one-fifth of a letter grade higher in introductory economics. Further, each additional point earned on the mathematics posttest over the initial pretest score is positively and significantly related to course grade. The results suggest that one way to improve student performance in introductory microeconomics is to place more emphasis on improving students' basic mathematics skills.

DESCRIPTION OF THE DATA

Using a survey, data was gathered on students enrolled in nine sections of introductory microeconomics during the Fall 2002, Spring 2003, and Fall 2003 semesters at a regional-Midwestern university. The nine sections all had enrollments of roughly 50 students each. Professor 1 taught six sections (two sections each during the three semesters) and Professor 2 taught three sections (all during the Fall Semester 2002). Students were asked to provide background and demographic information including their gender, race, age, university class status, study habits, attendance patterns, mathematics background, grade point average (GPA), and ACT score. See Table 1 for a summary. While we rely primarily on student reported data, we find little evidence that our students overstated their GPA or ACT scores, comparing our means and standard deviations to those of the university as a whole.[1] Our sample consists of 445 students, a sub-sample of the 457 students that were enrolled. The students were primarily sophomores (64.8%) and juniors (18.0%) with a mean GPA of 2.90 and a mean ACT score of 22.6. The sections were 46.8% female, and 95.6% of students classified their race as "white." Nearly 88% of students were taking the class because it was required for their major.

To enroll in introductory microeconomics, students must score sufficiently well on a mathematics placement exam or have taken pre-calculus. However, this prerequisite is not enforced. Of the sample, at the time of taking introductory microeconomics, 7.7% of students had been required to take remedial mathematics; 72.8% had taken a pre-calculus course; 53.6% had taken calculus or business calculus; and 7.3% had taken a mathematics course more advanced than calculus. In addition, 83% of the students were currently taking a mathematics course or had taken one during the previous semester. Only 7.5% of students had not taken a mathematics class in two or more years. Women were more likely to have been

required to take remedial mathematics than men ($p < 0.05$), and were less likely to have taken calculus ($p < 0.001$).

On some survey questions, students occasionally chose an invalid option or left the question blank. For these students, we replace the missing values with sample mean values in an effort to preserve the sample size.[2] In addition, some of the students were absent on the first day of class— the day the survey was given—and four students who completed the survey did not complete the course and do not have a final grade. In total, we are missing information on 2.6% of the students enrolled in the nine sections. There is the possibility of selectivity bias in our survey sample if the missing students are systematically different from the students in the sample (Chan, Shum, and Wright, 1997). While we lack information on the non-survey students, we do know that they performed relatively worse in the course than students who took the survey. If we compare the distribution of grades between the survey sample and the entire class sample, it is evident that grades are relatively consistent over the mid-range (from a 1.5 to a 3.5), but that there are statistically significant differences in the tails of the distribution. Students who completed the survey and were in the sample were more likely to earn 4.0's in the course, and students who missed filling out the survey were more likely to have failed the class (both with $p < 0.01$).[3]

We argue the inclusion of the missing students in the study would actually strengthen our results. Consider an equation determining attendance:

$$\text{attendance}_{\,i} = \alpha + \sum_{j} \beta_j x_{ij} + u_i ,$$

where, for every individual i, α is a constant, β_j is a vector of coefficients on the exogenous variables x_i, and u_i is the error term. We argue that the error, u, in this equation is positively correlated with the error in an equation determining student final grade:

$$\text{grade}_{\,i} = \delta + \sum_{j} \gamma_j x_{ij} + e_i$$

In the grade equation, δ represents the constant, and γ_j represents the vector of j coefficients on the same explanatory variables, x_i, where e_{ii} is the error term. Such a relationship would indicate that the students who are more likely to attend class (and thus were more likely to complete the survey) are also more likely to get higher grades and have better mathematics skills.[4] The negative correlation between mathematics skills and the error term, e, would cause the coefficient on the

"treatment section" dummy variable to be underestimated. In other words, the error from the attendance equation effectively operates as an omitted explanatory variable in the grade equation, causing downward bias in the estimated coefficient for the treatment-section dummy variable. Therefore, although the sample of students who took the survey was not drawn randomly from the class as a whole, we argue that this does not significantly affect our conclusions.

We have two additional concerns regarding the data. First, some students in the sample do not have an ACT score. For students who took the SAT instead, the university's admissions scale was used to convert the SAT scores to ACT scores. However, there also were a number of transfer students and special scholarship students enrolled in the sections who were never required to take the ACT exam before being admitted to the university. Since we do not want to drop these students from the analysis, we replace their missing ACT scores with predicted ACT scores.[5] A second concern is that the division of students between the control and treatment sections was not random; students selectively enrolled in sections of microeconomics and students with fewer credits had fewer choices of sections, though students did not know of the experiment in advance of the first day of class. In an effort to control for this non-random assignment, we collected information as to whether the student was enrolled in his or her first-choice section and the student's preferred sleeping habits. Overall, 87.1% of students enrolled in their preferred section, and fewer than 7.4% of the students were enrolled in sections they considered "too early." However, both variables have insignificant coefficients and *t*-statistics in the performance regressions and are thus not included in the final reported results.

Table 1: Summary of the Data

	Percent	**Mean**	**Std Dev**
Female	46.77		
Male	53.23		
Age		20.47	3.43
Freshmen	10.24		
Sophomores	64.81		
Juniors	18.01		
Seniors	4.90		
Other	2.04		

Table 1: Summary of the Data			
	Percent	**Mean**	**Std Dev**
White Non-white	95.55 4.45		
Hours Work per Week		12.57	11.69
Hours in Extra Curricular Activities		4.90	5.41
Weekly Hours Study for all Classes		11.10	6.37
Course is Required for Major Not Required for Major	87.63 12.37		
Took Economics in High School Did Not Take in High School	46.55 53.45		
Took Economics at Another College Did Not Take at Another College	9.58 90.42		
Never Skip Class Hardly Ever Skip Class Don't Usually Class Often Skip Class Almost Always Skip Class	58.13 38.08 3.57 0.22 0.00		
GPA		2.90	0.53
ACT Score		22.64	3.08
First Choice of Sections Not First Choice of Sections	87.08 12.92		
Naturally Awake Before 8am Awake between 8 and 9am Awake between 10 and 11am Awake in the After noon	14.92 53.67 24.05 7.35		
Required to take Remedial Math Not Required to take Remedial	7.73 92.27		
Have Taken Pre-calculus Have Not Taken Pre-calculus	72.83 27.17		
Have Taken Calculus[a] Have Not Taken Calculus	53.63 46.37		
Have Taken Advanced Math[b] Have Not Taken Advanced Math	7.26 92.74		

Table 1: Summary of the Data			
	Percent	**Mean**	**Std Dev**
Currently Taking a Math Class	40.05		
Took Math Last Semester	42.39		
Took Math Last Year	10.07		
Took Math 2 Years Ago	3.04		
Took Math More than 2 Yrs. Ago	4.45		
Took the On-Line Math Pre-test	60.33	26.71	4.50
Did not Take the Math Pre-test	39.67		
Took the On-line Math Post=test	41.67	27.73	5.80
Did not Take the Math Post=test	58.33		

PRE-TESTS, POST-TESTS, AND TUTORIALS

To test the effectiveness of the mathematics reviews in improving student performance, three of the nine sections of introductory microeconomics were assigned to be controls.[6] These sections had the same lectures, homework, and exams as the other sections, but did not have access to the mathematics review materials.[7] The remaining six sections were either required to, or could voluntarily, use the review materials. We began by assessing student mathematics skills in the six treatment sections with a mathematics pretest. Students could supplement the basic review of the pretest with tutorials and homework assignments during the first three weeks of the semester. Professor 1 assigned the mathematics pre- and post-tests as homework, allowing students to keep the highest number of points earned on the tests in her four treatment sections. Professor 2 gave students the option of completing the pre- and post-test, keeping the greatest number of points earned as extra credit in his two treatment sections.[8]

All review materials were made available to students on-line, through the economics course management and content web company, Aplia©. None of the review material was discussed in class, other than providing general instruction for logging- on, etc. Each pre- and post-test contained 35 questions divided among five key topics: (1) reading graphs, (2) solving systems of linear equations, (3) manipulating ratios and fractions, (4) calculating areas, and (5) finding slopes. (Note: this differs from Ballard and Johnson (2004) who used a pretest of only 10 questions covering topics 2 through 5, above.) The tests contained some standard multiple-choice questions and some questions that relied on interactive graphing

technology. For example, students were asked to place a point at a particular *x*-*y* coordinate pair, to plot a line, or to change the slope of a line to a particular value. Students were given one week to complete the pretest. Students who chose to review the mathematics concepts in more detail could complete up to five tutorials, covering the five major basic mathematics concepts. Each tutorial contained a 10 to 15 minute explanation of the mathematics concepts, with sample problems. Students also had the option of doing practice homework problems relating to each of the five concepts, and students could review their answers to the pretest, comparing them against the correct answers and detailed explanations. Students were given two weeks to work with this review material. Following that two-week period, the students had the option of completing a posttest on the same mathematics concepts. Students were awarded the highest number of points earned on either the pre- or the posttest.

Professor 1 had 162 students who took the pretest out of an eligible 200 students (81%); Professor 2 had 49 students of an eligible 103 students (47.6%) take the pretest. Of those, 142 students in Professor 1's sections opted to take the posttest, and 33 students in Professor 2's sections opted to take the posttest. Additionally, 38 students opted to only take the posttest.[9] The average score on the pretest was 26.7 out of 35 and the average score on posttest was 27.7 out of 35; the difference is statistically significant ($p < 0.001$). There was no statistically significant difference in test scores across professors on either the pre-test or the post-test. Of those students who took the pre- and posttests, 22.6% of students did worse on the posttest than the pretest (the average being 5.43 fewer questions answered correctly).[10] In addition, 9.5% of students did exactly the same on the pre- and posttests, and 67.9% of students did better. The average improvement across all students who took both the posttest and the pretest was 1.9 more questions answered correctly.[11]

An examination of simple correlation coefficients indicates that students who performed better on the pre- and posttests also received higher grades in the class. See Table 2. Further, while students with higher GPAs did better on the pre- and posttests overall, students with lower ACT scores saw more improvement between the pre- and the posttest. In addition, the correlation coefficient between GPA and the posttest is smaller than the correlation coefficient between GPA and the pretest. The same relationship is observed for correlation coefficients between ACT score and the pre- and posttests. This may indicate that students who are less prepared than their counterparts are not necessarily permanently disadvantaged; they can gain the skills they lack through review work.

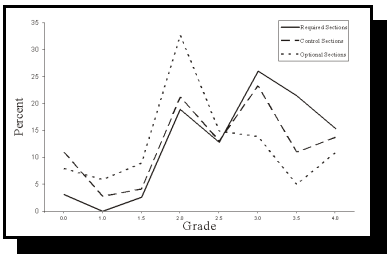
Table 2: Correlation Coefficients

	Grade	GPA	ACT	Pretest Score	Posttest Score	Improvement (Pretest – Posttest)
Grade	1.0000					
GPA	0.5827	1.0000				
ACT	0.4095	0.4634	1.0000			
Pretest Score	0.3570	0.2727	0.2905	1.0000		
Posttest Score	0.4128	0.2490	0.2058	0.2859	1.0000	
Improvement (Pretest – Posttest)	0.0895	0.0095	-0.0429	-0.5232	0.6670	1.0000

To test the reliability of student performance on the pre- and posttests we use Cronbach's alpha with test items of GPA, ACT score, grade in the course, pretest and posttest scores. We find the item-test correlations are roughly the same for all items, the lowest belonging to ACT score and the highest belonging to GPA. An alpha of 0.6680 is calculated for the pretest; the post-test alpha is 0.6860. This suggests that student performance on the mathematics tests is reasonably well correlated with their general academic performance.

ANALYSIS OF THE DATA

In Figure 1, the grade distributions for all nine sections are examined. Students are grouped into three categories: those who were in the control sections and did not have an option to do the mathematics reviews and tutorials (Control Series), those who were in Professor 2's treatment sections with the option to do the mathematics reviews and tutorials (Optional Series), and those in Professor 1's sections for whom the mathematics reviews were required (Required Series). It is apparent that the students in the required treatment sections were more likely to earn a B or better in the class. Students in the control sections earned consistently lower grades than those in the required treatment sections; this result is particularly evident at the tails of the grading distribution. For the optional sections, the results are less clear. Overall, *t*-tests of means suggest that students in the treatment sections earned on average 0.45 of a letter grade higher than students in the control sections ($p < 0.01$), not controlling for other factors.



While completing the mathematics tests and reviews is correlated with higher grades in introductory microeconomics, we are concerned about whether we are measuring student motivation or the actual effects of the review. We run a series of regressions to determine if the treatment sections actually perform better than the control sections, taking into account exogenous influences. The dependent variable in this study is "grade," which indicates the grade a student received overall in the course, on a 4.0 scale.[12]

The model we use is the education production function, as developed by Allison (1979) and Hanushek (1979). This model suggests knowledge is produced out of a variety of student motivational and background variables as well as university and professor specific variables.[13] Our dependent variable, "grade", is an ordered categorical variable, and therefore we primarily use ordered-probit estimation techniques. We suggest the grade for each student, *i*, depends on a student's background (gender, race, age), the effort put into the class, innate intelligence, and mathematics ability.

$$\text{Grade}_i = f(\text{background}_i, \text{effort}_i, \text{intelligence}_i, \text{mathability}_i)$$

We proxy student effort with variables including how often they report skipping class, hours spent studying per week, and hours spent working for pay per week. Intelligence is proxied with student GPA and ACT score. We also include a vector of control variables for the semester and the professor. Student mathematics ability is measured variously by the mathematics courses a student has taken as well as their performance on the mathematics pre- and posttests. Although we have a wide variety of data on students, such as previous economics experiences, whether economics is required for their major, etc., we found that those variables are not significantly related to student grades, and they did not pass an *F*-test of inclusion in the regressions. Additional results and tests are available upon request.

Initially, we seek to verify a relationship between basic mathematics skills and performance in introductory microeconomics. In Table 3, the results from two initial ordered probit regressions of course grade on the explanatory variables and student scores on the pre- and posttests are reported. The most important determinants of student grade are college GPA and ACT score. We find no significant differences between the grades of men and women, nor do we find significant differences by university class-levels. These results are consistent across a variety of regression specifications. Variables controlling for student motivation, such as self-reported skipping and hours spent working per week are also not statistically significant. We do find significant differences in grading across professors: Professor 2 gave lower grades on average than Professor 1 ($p < 0.001$). However, there is no significant difference in grades given by the same professor across semesters ($p = 0.56$).

Both a student's pretest score and posttest score are positively and significantly related to course grade. All else equal, for every additional question a student answered correctly on the pretest, students increased the probability of earning a higher letter grade. For example, a student scoring a 30 on the pretest is predicted to earn 0.6 of a letter grade higher than a student who scored a 20 on the pretest. These results are consistent with Ballard and Johnson (2004), who also find basic mathematics skills to be significantly related to performance in introductory microeconomics. Unlike previous studies, we find that neither having taken calculus nor having taken remedial mathematics are as significantly related to course grade as the pre- and posttest scores. This suggests that there may be a specific group of mathematics skills which are particularly important for microeconomics students, rather than general mathematics knowledge.

Table 3: Raw Math Pre- and Post-test Scores and Grades in Microeconomics

	Regression 1 —Pre-test and Grade in Microeconomics	**Regression 2 —Post-test and Grade in Microeconomics**
Female	0.147 (-0.88)	0.104 (-0.57)
Minority	-0.558 (-1.63)*	-0.608 (-1.55)

Table 3: Raw Math Pre- and Post-test Scores and Grades in Microeconomics		
	Regression 1 —Pre-test and Grade in Microeconomics	**Regression 2 —Post-test and Grade in Microeconomics**
University Class Status		
Freshmen	-0.046	0.148
	(-0.19)	(0.55)
Junior	0.373	.0364
	(1.77)*	(1.57)
Senior	-0.762	-0.777
	(-1.82)*	(-1.54)
Other	0.476	0.360
	(0.53)	(0.39)
Skip Class	-0.988	-0.396
	(-0.60)	(-1.90)*
Hours Study Per Week	-0.001	-0.003
	(-0.07)	(-0.21)
Hours Work Per Week	0.004	0.009
	(0.56)	(1.18)
GPA	1.283	1.224
	(6.63)***	(5.85)***
ACT Score	0.083	0.057
	(2.73)***	(1.64)*
Took Remedial Math	-0.411	-0.329
	(-1.42)	(-0.95)
Took Calculus	0.282	0.305
	(1.70)	(1.63)*
Semester		
Spring 2003	0.054	0.035
	(0.25)	(0.13)
Fall 2003	-0.384	-0.103
	(-1.43)	(-0.41)
Professor 2	-0.915	-0.953
	(-3.93)***	(-3.41)***

Table 3: Raw Math Pre- and Post-test Scores and Grades in Microeconomics		
	Regression 1 —Pre-test and Grade in Microeconomics	**Regression 2 —Post-test and Grade in Microeconomics**
Pretest Score	0.067 (3.52)***	--
Posttest Score	--	0.057 (3.59)***
Number of Observation R-squared	209 0.2036	174 0.2006

Dependent Variable is Course Grade. Significance is indicated as * = 10%, ** = 5%, and *** = 1%. The comparison category for "University Class" is sophomores and the comparison category for "Semester" is Fall 2002.

We find that students who were required to take remedial mathematics had slightly lower grades in introductory microeconomics. This is consistent with the findings of Ballard and Johnson (2004), though the remedial mathematics dummy variable is not significant in our regressions. Also as expected, we find that taking calculus is positively related to performance in introductory microeconomics. This result is consistent with previous studies (e.g., Brown and Leidholm, 2002).

In the next series of regressions, we examine whether students can improve their performance in economics by improving their mathematics skills through on-line reviews. The results are reported in Table 4. As before, grade earned in microeconomics is our dependent variable. In columns 1 and 2, we simply include a binary dummy variable indicating whether a student was assigned to a mathematics treatment or control section. In columns 3 and 4, we look more closely at student performance on the mathematics pre- and posttests and their performance in introductory microeconomics. We include a student's pretest score as a control for initial mathematics ability and examine whether an improvement on the posttest score, compared to the pretest, is associated with a higher grade in introductory microeconomics.

We consider two regression specifications, both with "grade" as the dependent variable. In regressions 1 and 2, reported in Table 4, we include a binary dummy variable to indicate whether a student was enrolled in a treatment or control section, and find that Ordinary Least Squares (OLS) and Ordered Probit techniques

produce similar results. In all cases, we check a variety of interaction terms and nonlinearity specifications, but find that these have no significant impact on our regression. In addition, we also enter dummy variables for each individual treatment section, but find that these are also not statistically significant. GPA, ACT score, and Professor 2 remain the most significant explanatory variables, as we saw in Table 3. In the OLS analysis we find that on average, students in the treatment sections earned 0.20 of a grade point higher than students in the control sections (whereas the ordered probit approach finds them to have a higher probability of earning a better grade in the course). This result was significant in the OLS estimation, but not in the ordered probit regression, due to the higher specification requirements for probit estimation.

Table 4: Regression Results

	OLS for the Entire Sample	**Ordered Probit for the Entire Sample**	**Ordered Probit for the Entire Sample**	**Ordered Probit for Only the Required Sections**
Female	0.109 (1.25)	0.121 (1.10)	-0.322 (-1.50)	-0.431 (-1.78)*
Minority	-0.203 (-1.03)	-0.293 (-1.19)	-0.824 (-2.04)**	-0.722 (-1.60)*
Class				
Freshmen	0.034 (0.23)	0.129 (0.68)	0.122 (0.41)	0.053 (0.16)
Junior	0.115 (1.03)	0.182 (1.29)	0.465 (1.73)*	0.430 (1.43)
Senior	-0.003 (-0.01)	-0.015 (-0.06)	-0.836 (-1.60)*	-0.971 (-1.72)
Other	0.398 (1.20)	0.576 (1.31)	0.137 (0.15)	0.524 (0.55)
Skip Class	-0.193 (-2.39)**	-0.231 (-2.28)**	-0.210 (-1.00)	-0.250 (-1.08)*
Study	0.003 (0.54)	0.006 (0.69)	-0.015 (-1.06)	0.003 (0.06)
Work	0.000 (0.02)	0.001 (0.20)	0.011 (1.23)	0.006 (0.67)

Table 4: Regression Results				
	OLS for the Entire Sample	**Ordered Probit for the Entire Sample**	**Ordered Probit for the Entire Sample**	**Ordered Probit for Only the Required Sections**
GPA	0.857 (9.18)***	1.239 (9.89)***	1.323 (5.56)***	1.425 (5.15)***
ACT Score	0.030 (2.04)**	0.054 (2.87)***	0.071 (1.85)*	0.003 (0.06)
Took Remedial Math	-0.088 (-0.59)	-0.122 (-0.65)	-0.823 (-1.96)**	-0.769 (-1.80)*
Took Calculus	0.210 (2.43)**	0.290 (2.66)***	0.411 (1.88)*	0.453 (1.79)*
Semester Spring 2003 Fall 2003	 -0.061 (-0.44) -0.107 (-0.88)	 -0.064 (-0.37) -0.222 (-1.46)	 0.059 (0.21) -0.355 (-1.14)	 0.121 (0.42) -0.195 (-0.61)
Professor 2	-0.621 (-5.59)***	-0.881 (-6.15)***	-0.982 (-3.14)***	--
Assigned to the Treatment Group	0.206 (2.24)**	0.161 (1.39)	--	--
Pretest Score	--	--	0.119 (4.21)***	0.144 (4.14)***
Difference = Posttest - Pretest	--	--	0.062 (3.08)***	0.092 (3.29)***
Constant	0.367 (0.67)	--	--	--
Number of Obs. R-squared	445 0.3829	445 0.1473	136 0.2439	111 0.2519

Dependent Variable is Course Grade. Significance is indicated as * = 10%, ** = 5%, and *** = 1%. The comparison category for "University Class" is sophomores and the comparison category for "Semester" is Fall 2002.

Perhaps more informative are the regressions that control for initial mathematics ability with the pretest score. The regression reported in Regression 3 of Table 4 examines whether student improvement from the mathematics pretest to the posttest is associated with better performance in introductory microeconomics, including the full sample of treatment sections. In the regression reported in the last column of Table 4, we examine the same question, but only looking at Professor 1's students, for whom the pre- and posttests were required. We define "difference" as the posttest score minus the pretest score. As in previous studies, GPA and ACT score remain highly significant indicators of student performance in introductory economics. Students who had taken calculus did significantly better in economics and students who were required to take remedial mathematics did significantly worse, indicating again the importance of mathematics skills to introductory economics students.

Despite including the two variables for mathematics course background, we find both the pretest score and the difference in test scores are positively and highly significantly related to student performance in the class for the entire sample and the Professor 1 sub-sample. Controlling for initial mathematics skills, students of all levels find that improved mathematics skills are associated with the probability of earning higher grades. An examination of the tails of the distribution—those with poor and those with excellent initial mathematics skills—indicates that the benefits of the mathematics review accrue relatively evenly across all students. In other words, all students can benefit from being reminded of the mathematical concepts important to microeconomics study.

In the economics education literature, there is some concern that women generally do worse in economics than men. It has been suggested that this is due in part to course content and grading policies and also because of the lack of female role models (Dynan and Rouse, 1997). Other studies identify that women have or perceive themselves to have weaker mathematics skills then men, and this negatively influences their course grade (Ballard and Johnson, 2005). We find women scored an average of 1.85 questions fewer correct on the mathematics pretest than men ($p < 0.001$), but that there was no statistically significant difference between the performance of men and women on the posttest. Women and men were equally likely to complete the pre- and posttests. Pair-wise comparisons indicate that women and men benefit equally from the mathematics reviews. Ultimately, we find little evidence that women performed worse in economics than men (see Regressions 1-3 in Table 4).

Thus, in general, we find that a student's gender is not statistically significantly related to course grade. However, if we include a measure of basic mathematics skills as a control by looking only at the improvement between pretest and posttest scores, women are predicted to earn higher grades. This is consistent with our earlier finding that women score more poorly than men on the pretest, but as well as men on the posttest. Thus, while the benefits to on-line remedial work seem to accrue generally to all students, there is perhaps some small additional benefit to women.

We also compare minority and non-minority students, but find that our sample of minority students is too small to draw any valid conclusions.

CONCLUSIONS AND RECOMMENDATIONS

In this paper, we document the connection between basic mathematics skills and performance in introductory microeconomics and examine whether on-line mathematics reviews can be used to improve student performance in the course. The mathematics reviews encompassed pre- and posttests, designed to measure student knowledge of five basic mathematical concepts frequently used in introductory microeconomics: solving linear equations, reading and understanding graphs, manipulating fractions and ratios, calculating area, and finding the slopes of lines. In addition, students had the option of completing tutorials and homework on each topic between the pre- and posttest. All review material was available on-line, though Aplia ©.

We find that basic mathematics skills, as identified by our mathematics pre- and posttests, are positively and significantly related to higher course grades. A more careful examination of these skills shows that review of basic mathematics concepts can improve student grades. Students enrolled in the treatment sections with access to the on-line review material earned statistically significantly higher grades in the course than students enrolled in the control sections. Further, we find that for each additional question answered correctly on the mathematics posttest, compared to the pretest, students have a higher probability of earning a better grade in the course, regardless of the initial pretest score. These results suggest that one way to improve student mastery of introductory economics concepts is to address their basic mathematics deficiencies.

Basic mathematics skills can make a difference Our analysis suggests that quantitative skills are important even at the introductory level in economics, and that remedial mathematics work, done concurrently with taking the economics, can

improve student mastery of basic economics concepts. The results also suggest that there are alternative ways to make effective use of informational technology, including out-of-class assignments and reviews. With the use of on-line reviews, the burden of completing remedial mathematics work can be placed on the students, instead of using valuable class time.

NOTE

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ENDNOTES

1 The university's Office of the Registrar reports a mean GPA of 2.91 for the university and a mean ACT score of 21.9, highly consistent with the student reported mean values. For discussion of self-reported versus official university data for students, see Maxwell and Lopus (1994). Ballard and Johnson (2004) argue that while students may overstate such variables, if they do so consistently, it does not bias regression results.

2 The alternative is leaving students out of the analysis, which would increase the number of missing observations and introduces bias.

3 All letter grades are converted to their grade point equivalent. An A is a 4.0, a B+ is a 3.5, etc.

4 In the sample we also find evidence that academically poorer students have poorer math skills. Students with lower reported GPAs scored significantly lower on the math quiz, on average. Further, an examination of the grades show that the students who received 1.0's or 0's for the course (a D or a F) also generally did not complete the other assigned homework for the class, though we would expect those students to benefit the most.

5 The predicted values were found by a simple regression of ACT on explanatory variables, including student academic performance, student individual characteristics, and family background. For all other students, the actual value of their ACT exam score is used in the analysis.

6 Professor 1 randomly selected two of her six sections to be controls; one control section was during Fall 2002 and one was during Fall 2003. Professor 2 only participated during Fall 2002 and he randomly selected one of his three sections to be a control.

7 Exams were carefully collected in the earlier sections, so as to not influence student performance in later sections. Students were only allowed to review their exams in class and were not allowed to keep their exams, so as not to influence student performance across semesters.

8 The math test given by Ballard and Johnson (2004) was not graded and no extra credit was offered to students for completing the quiz.

9 Of the 38 students, 30 were in Professor 1's sections. This brings the number of students who completed the assignment in one way or another to 198 students out of 200.

10 This may be attributed to a handful of students who began the posttest, completed 4 or 5 questions, and then decided that the opportunity cost of finishing the entire posttest was too high.

11 We attempt to calibrate the pre- and post-tests by switching the order in which they were given during the Fall 2003 semester. That semester, the post-test was given as the pre-test and the pre-test served as the post-test. There are no noticeable differences in means, comparing across sections, excluding the 21 individuals who scored a zero on the pre-test. We suspect that the zero more likely indicates that the individual mistakenly began the pre-test or logged out early than actually got zero questions correct.

12 The results reported here are based on OLS estimations, chosen mainly for interpretative ease. Given that grades are ordered and numerically meaningful, OLS is a valid estimation procedure. While we could have used some form of standardized test, such as the TUCE, to measure student knowledge about economics, this approach proved too costly, both in terms of class time and institutional resources.

13 We check for multicollinearity between variables by calculating the variance inflation factors (VIF's). The VIF for coefficient j is found as $\frac{1}{1-R^2_j}$, where R^2_j is the R^2 from regression the independent variable x_j on all the other independent variables. Generally, VIF values greater than 10 indicate multicollinearity. In the

model specified in Table 4, column 1, we have only one VIF greater than 2.42, with an overall calculated VIF for the regressions of 1.49. The outlier is "difference" which is a linear combination of the pre- and posttest score. This analysis suggests we do not have a multicollinearity problem.

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EXTENDING THE PROFIT ELASTICITY MEASURE OF OPERATING LEVERAGE IN MANAGERIAL ECONOMICS TEXTS

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ABSTRACT

The authors suggest recasting operating leverage (DOL) treatments in managerial textbooks. They extend the profit elasticity form of DOL used by firms to other than competitive markets by introducing nonlinear cost and revenue functions. From their results, the authors urge text writers to highlight four key issues: the role and limitations of 1) management--long run versus short run operating leverage decisions, 2) engineering--variable cost changes associated with fixed cost changes, 3) economic forces—competitive versus non-competitive markets and 4) mathematical results--DOL equals zero at the maximum profit output level, regardless of the level of fixed cost.

INTRODUCTION

Operating leverage is important to firm management for one reason, additions to operating fixed costs affect a firm's value by increasing risk as measured by the variability of returns (Lev, 1974, and Berner, 2002). Operating leverage discussions often follow as a natural extension to linear breakeven analysis in managerial economics textbooks. Application of the generally received profit sensitivity formula, the degree of operating leverage (DOL), is limited both theoretically and practically.

Most textual treatments ignore the role DOL variables other than fixed costs play. Most authors assume overly restrictive linear cost and revenue functions, while subsequent chapters develop standard non-linear economic cost and revenue functions.

The roles of management, engineering and economic markets along with the measure's inherent mathematical limitations are left unstated. This article reviews unstated aspects of the DOL measure and offers a more theoretically complete framework for operating leverage textual discussions aimed at the practicing corporate managerial specialist.

Aspects of DOL we consider important include a) consistency with orthodox economic theory, b) recognizing the larger business risk context within which the DOL measure is applied, c) a clearer view of management's role in influencing certain DOL parameters as business risk components and d) some important analytical limitations inherent to the measure's form.

Business risk is a central determinant of a firm's value, the risk-adjusted present value of future profit. Several important parameters affect a firm's business risk position. Among them are price, variable costs, operating fixed costs, the output rate and the stability of demand. The DOL measure contains variables that capture four of these parameters. The fifth, demand stability, is a through-time assessment while DOL is a point in time measure. The level of operating fixed cost, the parameter of greatest attention in textual DOL discussions, is only one business risk parameter. A change in a single business risk parameter in the DOL expression also affects the remaining parameters. For example, increases in operating fixed cost without a compensating reduction in unit variable cost may require increases in output to sustain a desired profit level. A meaningful discussion of DOL should at least mention the distinction between management-led choices addressing the firm's business risk posture versus market forces and engineering-based limits. Finally, other than for expository simplicity, we question the use of restrictive linear cost functions in the DOL formula application, when textual narrative in the same text stresses non-linear relationships.

Discussion in Section 2 confirms the mathematical equivalence between various DOL measures and presents works by Dran (1991), Long (1992) and shows that DOL is sensitive not only to changes in the firm's operating fixed cost but also to short run output. That section suggests that narrative treatments indicating which DOL parameters management can directly influence would help place the measure into a useful operational context. Section 3 extends the DOL expression to include a cubic variable (and total) cost function and parabolic total revenue function to demonstrate that DOL equals zero at the theoretically optimized output, regardless of the level of fixed cost. Section 4 narrative reviews each of nine managerial text treatments on the DOL concept and measure. Section 5 provides the authors' suggestions on how to coalesce DOL treatments, given the arguments made.

THEORETICAL REVIEW

As derived from short run linear revenue and cost functions for a profit maximizing firm producing a single product, in a purely competitive industry, the DOL measure is essentially a profit cum output sensitivity ratio. Managerial text DOL expressions take one of several algebraic forms such as those listed below.

$$\begin{aligned} DOL &= (\%\ \text{Change in Profit}) / (\%\ \text{Change in Q}) \\ &= Q(p\text{-}v) / [Q(p\text{-}v) - FC] \\ &= (TR - TVC) / (TR - TVC - FC) = (\Pi + FC) / \text{Profit} \end{aligned} \tag{1}$$

From the development in the Appendix, these mathematically equivalent *linear* DOL expressions above reduce to:

$$DOL = 1 + FC/(p \cdot Q - v \cdot Q - FC), \text{ where} \tag{2}$$

FC = operating fixed cost
p = unit price
v = unit variable cost
Q = quantity of output
Profit = earnings before interest and taxes = EBIT = $p \cdot Q - v \cdot Q - FC$

Notice that the profit sensitivity version for DOL (1) used by many managerial text authors is a stylized but very general form suitable for theoretical and practical applications. Yet, this generality goes unused by the very authors who, in subsequent chapters take the reader through nonlinear cost theory and nonlinear revenue generation in imperfect markets. We think it is important for the student and the professional manager that authors provide a more, rather than less, complete DOL discussion.

Dran (1991) and Long (1992) provided the economics literature a theoretical treatment that demonstrated how proximity to breakeven output influences DOL, independent of the level of operating fixed cost. Dran did so by defining the firm's output as a percentage of breakeven quantity. Separating the traditional DOL measure from the firm's cost structure revealed that DOL was also sensitive to the firm's output level, rising or falling asymptotically toward positive or negative infinity as breakeven output was approached either from above or below.

In a reply to Dran's original contribution, Long (1992) showed that there was no a priori fixed-in-proportion economic relationship between increases in fixed

operating expenses and commensurate reductions in unit variable cost sufficient to maintain the prior breakeven output. There logically exists a lower unit variable cost value that could compensate for increased operating fixed costs sufficient to leave both breakeven output and DOL unchanged, but engineering and economic relationships determine that value more than does management. Empirical investigators (Li, 1991) offer evidence that management recognizes and considers such a tradeoff, though text writers uniformly avoid discussing such limits.

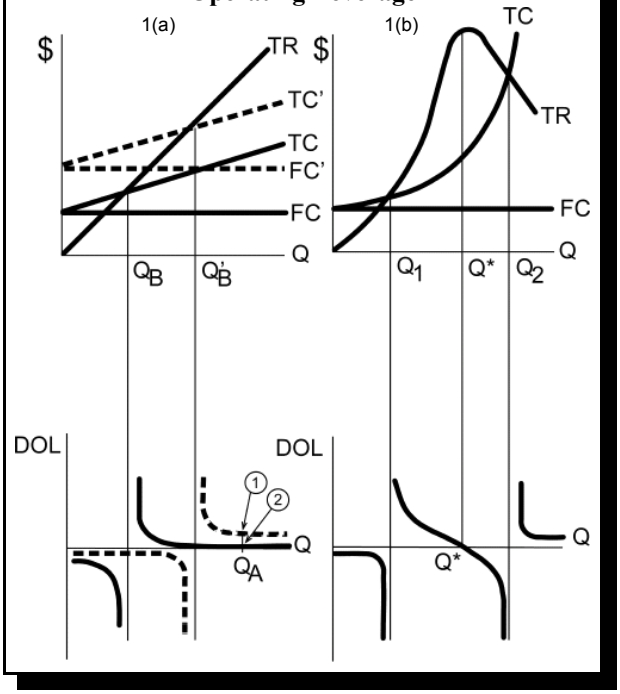
Given the assumed linear revenue and cost functions and regardless of the operating fixed cost level, as operating profit gets close to zero, DOL approaches negative or positive infinity in the vicinity of breakeven quantity, depending on whether breakeven output is approached from below or above. At the breakeven quantity, DOL provides no useful value. For output levels above the breakeven quantity, DOL falls asymptotically toward zero as output increases because profit in the denominator continues to increase while operating fixed cost is constant in the numerator. So, DOL varies for two reasons, the level of operating fixed cost and output, both of which management determines.

From equation (2), if FC = 0, then DOL = 1, indicating that there is no operating leverage. As FC assumes any positive value and, for simplicity, if profit remains positive and there is no change in unit variable cost, then DOL must rise above 1 for two analytical reasons. With an increased operating FC level, if price and unit variable cost remain the same, the denominator in the second part of the expression is smaller and the numerator is larger. This is precisely the point where textual treatments begin to get murky by confusing what is mathematically possible with what is economically plausible. Logically, a firm's management seeking to maximize profits will not voluntarily permit operating FC to rise without a commensurate fall in unit variable costs or a possible increase in price, if price-setting is within their power and strategically desired.

Readings of the DOL result after a fixed cost change are most meaningful when compared to the same output level. Looking at Figure 1(a) and output level Q_A shows the result of a higher FC on the DOL at that output level. The measured DOL, (1), after the increase in FC is clearly greater than the originally measured DOL, (2). Depending on the prior output level, even a small increase in FC, depending on the slope of the TR function, with no change in unit variable costs for simplicity, would require a management decision to increase output, demand permitting, to avoid losses or to maintain desired profits. Failure to do so could lead to short run operating losses and disappointing profit reports as shown in Figure 1(a) and comparing breakeven quantities Q_B and $Q_{B'}$ that differ only due to a greater FC.

Even in a perfectly competitive market, price plays a role in determining the DOL magnitude. Assume the firm is currently operating with a positive profit. When market equilibrium price rises, the denominator in (1) rises reducing the DOL with no change in output, operating fixed cost or unit variable cost. Consequently, breakeven output falls since the contribution margin is larger. DOL can vary due to changes in any of the variables appearing in equation (1). These variables include management-determined choices—operating fixed cost and output levels; market determined parameters—price in a competitive market as time passes; and economic and engineering relationships—unit variable costs, given operating fixed cost increases due to new capital integration.

Figure 1: Linear and Non-linear Break-even and Operating Leverage



A THEORETICAL EXTENSION

A theoretical extension provides additional insight into DOL measurement. Relax the assumption of linear total variable cost and revenue functions in favor of

a twice-differentiable cubic cost function and a parabolic revenue function derived from a downward sloping demand (applicable to less than competitive markets). The resulting profit elasticity expression from the development in the appendix appears below.

$$E_{\pi} = [(e - 2f \cdot Q) - (3a \cdot Q^2 + 2b \cdot Q + c)]\, Q / [(-a \cdot Q^3 - (f + b) \cdot Q^2 + (e - c) \cdot Q - d)] \quad (2)$$

Standard economic theory is useful here to help explain a counterintuitive result. From (2), DOL must be zero when profit is maximized or when losses are minimized, because at that point positive marginal revenue, $(e - 2f \cdot Q)$, must equal the negative marginal cost, $(3a \cdot Q^2 + 2b \cdot Q + c)$, in the numerator. It is also true that as TR approaches TC, DOL will approach positive or negative infinity depending on the direction from which quantity approaches breakeven. These analytical results are obtained regardless of the level of fixed cost. Hence, there exists two points where the DOL measure provides no useful information: breakeven quantity and profit maximizing/loss minimizing quantity. The irony is that if management were able to guide the firm to the profit maximizing output level as fixed costs rose through time, DOL would remain equal to zero!

Figure 1 shows the ranges of DOL values, given linear 1(a) and curvilinear 1(b) cost functions. Notice in Figure 1(a) when fixed costs rise from FC to FC', with no compensatory reduction in unit variable costs, two things occur. First, the breakeven quantity of output rises. Second, the DOL magnitude for any quantity above the new breakeven point is greater than before the addition of fixed cost. This is precisely what the DOL expression should show as a firm's business risk indicator.

Figure 1(b) reveals the influence on DOL from the more general curvilinear cost and revenue functions, other assumptions the same. Just as in the linear case, DOL approaches infinity at the breakeven quantity levels of output. At the profit maximizing output level, DOL also equals zero. Such a result poses a conflict, especially for empirical studies, between an important concept in economic theory and an important risk measure in finance theory. DOL for the firm operating at the theoretically optimal output in economics becomes impossible to directly measure.

BASIC MANAGERIAL TEXT TREATMENTS

Managerial textbook treatments uniformly incorporate linear cost and revenue functions to motivate discussions on breakeven analysis. Applied linear

breakeven analysis can serve as a first approximation to real-life business settings. Given that the hurdle to be exceeded by the margin of unit price over unit variable cost times unit volume in breakeven analysis is operating fixed cost, textual narrative regarding the degree of operating leverage follows in many instances.

Of the nine textbooks reviewed, six equate operating leverage with the level of operating fixed cost in a firm's operation. The degree of operating leverage, DOL, is most widely defined as the sensitivity of profit to changes in sales revenue or quantity. This interpretation of DOL is based on the notion that, in the presence of operating fixed costs, a small percentage change in sales may result in a larger percentage change in earnings—greater business risk, something about which managerial corporate stewards should be aware.

As with all indicators, DOL manifests useful characteristics and limitations. Its usefulness centers on its simplicity. As operating fixed costs rise, the DOL magnitude typically will rise. Its limitations relate to its sensitivity from changes in other of its parameters and with measurement discontinuities. A change in the magnitude of any variable in the DOL expression, including quantity, results in an altered DOL magnitude. Only two of nine text writers in our search directly mention this fact. (Salvatore, 2004; Keat and Young, 2003)

Table 1 : Managerial Economics Text Treatments of Operating Leverage and Definitions*

Authors	Operating Leverage	DOL	How to measure DOL	C-V-P Analysis
Salvatore 2004	The ratio of the firm's total fixed costs to total variable costs.	The responsive-ness or sensitiv-ity of the firm's total profits to a change in its output or sales.	$DOL = \frac{Q(P-AVC)}{Q(P-AVC)-FC}$	Linear
Hirshey 2003, 7th Ed.	The extent to fixed production facilities versus variable production facilities are employed.	The percentage change in profit from a 1 percent change in output.	$DOL = \frac{\partial\pi/\pi}{\partial Q/Q}$	Linear, notes limitations

Table 1 : Managerial Economics Text Treatments of Operating Leverage and Definitions*

Authors	Operating Leverage	DOL	How to measure DOL	C-V-P Analysis
Hirshey 2003, 10th Ed.	The extent to which production facilities versus variable production facilities are employed.	The percentage change in profit from a 1 percent change in output.	DOL= $\frac{\partial\pi/\pi}{\partial Q/Q}$	Linear, notes limitations
Keat & Young 2003		A coefficient that measures the effects of a percentage change in quantity on the percentage change in profit.	DOL= $\frac{Q(P-AVC)}{Q(P-AVC)-FC}$	Linear, notes limitations
McGuigan, Moyer, and Harris, 2002	The use of assets having fixed cost in an effort to increase expected return.	The percentage change in a firm's EBIT resulting from a 1 percent change in sales or output.	DOL= $\frac{Q\ (P-V)}{Q\ (P-V)\ -FC}$	Linear and non-linear, notes limitations
Mansfield, Allen, Doherty, and Weigelt, 2002	The use of fixed cost in operation.	The percentage change in profit resulting from a 1 percent change in the number of units of product sold.	DOL= $\frac{\partial\pi/\pi}{\partial Q/Q}$	Linear

*DOL discussion excluded in: Brickley, Smith, and Zimmerman 2004; Baye, 2002; Maurice and Thomas, 2002

Six of the nine managerial texts written for the college and university market examined introduce the degree of operating leverage measure in algebraic, graphical or elasticity form or some combination of these forms after discussing

breakeven analysis. Text authors, apparently for simplicity and instructive purposes, assume linear revenue and cost relationships to motivate the DOL discussion.

Other textual discussions imply that positive net present value options to acquire new capital, while increasing fixed operating costs may also reduce unit variable cost as a trade-off benefit, but pay little attention to the fact that the resulting breakeven output may rise, fall or remain the same. It is not necessarily true that a given increase in operating fixed costs, due perhaps to new technology introduction, will automatically reduce variable unit costs sufficiently to maintain the original breakeven output.

Managerial students draw the lesson that increasing operating fixed costs in the firm's operating cost structure adds to business risk. The lesson seems obvious and, perhaps, that is sufficient introduction at the elementary level. The higher the operating fixed cost hurdle for a firm in the short run, the smaller the chance that the margin of unit price above unit variable cost times the count of units sold will be sufficient to generate a profit. Our view is that a bit more framing, theoretical generality and acknowledgement of measurement limits would better serve the learner and the professional manager with a relatively a small commitment of valuable page space.

A SUGGESTED REVISION

We suggest a more complete framing and discussion on DOL limitations to form a more cohesive picture in the student's mind. We emphasize that the most useful DOL changes are those showing the expected consequences of management-led decisions on the DOL magnitude *at a given level of output*. It is the change in DOL, output constant, brought about by management's decisions, where DOL is most compelling as a business risk measure.

We separate the DOL expression variables into three related categories: management decision variables, economic market-determined variables and engineering variables. Management must assess the effect of any change in operating fixed cost on unit variable costs prior to committing to the decision. Unit variable cost is partly determined by the market, i.e. factor inputs at their market rate per time and partly by the engineering relationships that exist between old versus new capital equipment and related labor support requirements. Whether the newly adopted technology is labor saving or capital saving directly affects the relationship between fixed cost changes and unit variable cost changes to determine the new required minimum output for the firm to breakeven in the short run.

Table 2: DOL Parameters and Business Risk Factors		
Time Frame	Influencing Factor	DOL Parameter
Long-run per plant capacity	Economic Market Forces:	
	All markets	Selling price
	Management Decision:	
	All markets	Fixed cost
	Engineering and Economic Relationships:	
	All markets	Variable cost structure
Short-run per plant utilization	Engineering and Economic Relationships:	
	All markets	Unit variable cost
	Management Decision:	
	All markets	Output

As firm management evaluates production cost reduction strategies, they have three options: increase production efficiency, outsource an operating fixed cost component to make it a variable cost, or acquire new technology that reduces unit variable cost. Once management acts on the commitment to increase operating fixed cost, reversing the decision is neither easy nor quick, giving it long run implications.

The information presented in Table 2 summarizes the DOL expression variables into short-run and long run time periods and the three influencing factors: management, economic markets and engineering. Management determines the optimal output rate given price and cost in the short run. Management assesses the effect of any change in operating fixed cost on unit variable costs and operating risk prior to committing to the decision in the long run. Unit variable cost is determined partly by economic market forces, i.e. factor inputs at their market rate per time and partly by the engineering relationships that exist between old versus new capital equipment and related labor support requirements. The relationship between fixed cost changes and unit variable cost changes determines the new required output for the firm. From the arguments presented above, the essential points worth emphasizing in textual discussions on DOL reduce to the following:

- Short-run output rate is a management decision that does not reflect a change in the firm's risk posture.
- In the long run, the effect of changes in operating fixed cost and per unit variable cost structure should be evaluated at the same output level.
- In the long run, engineering and economic market relationships largely dictate the trade-off between changes in operating fixed cost and unit variable cost, and management must assess each case on its own merit.
- If unit variable costs are non-linear, no useful leverage value is produced when the firm is operating at or very near operating breakeven output level or profit maximizing (or loss minimizing) output level.

SUMMARY AND CONCLUSION

A review of operating leverage discussions from a selection of nine current managerial economics textbooks reveals that relevant aspects of DOL are absent from many textual discussions. The authors suggest that useful aspects include a) standard economic cost theory consistency, b) a clearer view of management's role in influencing DOL parameters as business risk components and c) mention of some important limitations inherent in nonlinear versions of the measure.

Articles by Dran and Long in the economics literature, using the profit sensitivity version of DOL, demonstrate the dual influence on profit sensitivity from operating fixed cost changes as well as from output changes. Variables in the DOL expression are economically interdependent. The authors suggest the usefulness of separating DOL parameters into those that management can influence, those that the market influences and those determined by engineering relationships.

By changing two assumptions used in elementary models of the firm, from linear to cubic variable cost and parabolic revenue functions, keeping other assumptions intact—single product, short run, and certainty, it was shown that DOL equals zero when the firm's output is optimized, regardless of the level of operating fixed cost. Hence, two measurement discontinuities for DOL exist, the quantity breakeven output and the profit maximizing or loss minimizing output.

The authors suggest that including these points in DOL narrative discussions will enhance both managerial student's and professional manager's understanding of the larger business risk context, sources of all formulaic DOL variability and more about its measurement limitations.

A more complete DOL discussion would include the following points -- a) the DOL profit sensitivity expression contains several business risk parameters, b) DOL changes due to operating fixed cost changes should be measured at the same

output level, c) the DOL measure varies with changes in output in the short run but not its risk posture, a management decision, d) DOL provides no useful information at the firm's operating breakeven output level or profit maximizing (loss minimizing) output level, and e) engineering relationships affect the relation between changes in operating fixed cost and unit variable cost and must be weighed a priori by management.

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APPENDIX

Assume a single product firm in the short run under certainty operating in competitive input and output markets. Total revenue and total cost functions are linear. The degree of operating leverage (DOL) function in standard managerial text treatments in profit elasticity form:

$$DOL = \%\Delta Profit / \%\Delta Q \quad (1)$$
$$= [(\Delta p \cdot Q - \Delta v \cdot Q - \Delta FC) / (p \cdot Q - v \cdot Q - FC)] [Q/ \Delta Q]$$
where $\Delta FC = 0$
$$= [(p \cdot Q - v \cdot Q) / (p \cdot Q - v \cdot Q - FC)]$$
$$DOL = Q(p-v) / [Q(p-v) - FC] \quad (2)$$
$$DOL = (TR - TVC) / (TR - TVC - FC), \text{ where} \quad (3)$$

Q = quantity output per time
p = selling price per unit of output
v = variable cost per unit of output
FC = total operating fixed cost
TR = total revenue
TVC = total variable cost

Economic analysis defines Profit as,

$$Profit = TR - TVC - FC \quad (4)$$
$$Profit = p \cdot Q - v \cdot Q - FC.$$

If profit = 0, then

$$Q = FC/(p - v), \text{ to solve for breakeven quantity of output.} \quad (5)$$

For any Profit value other than zero,

$$Profit - TR + TVC = - FC$$
$$TR - TVC = FC + Profit \quad (6)$$

Substituting (4) and (6) into (3) gives

$$DOL = (Profit + FC) / Profit, \text{ or} \quad (7)$$
$$DOL = 1 + (FC / Profit) = 1 + FC/(p \cdot Q - v \cdot Q - FC) \quad (8)$$

and the DOL becomes discontinuous at Profit = 0.

Now assume non-linear total cost and total revenue functions that are twice differentiable. Standard economic optimization theory confirms the parent profit maximization as:

$$Profit = TR(Q) - TC(Q) \quad (9)$$

Take the first derivative as the necessary condition, to determine candidate values for Q,

$$Profit' = R'(Q) - C'(Q) = 0, \quad (10)$$

and the second derivative sufficient condition to test the candidate values from (10)

$$Profit''(Q) = R''(Q) - C''(Q) < 0. \quad (11)$$

Now allow the single product firm in the short run under certainty operating in less than competitive output markets to make total revenue quadratic, i.e. demand is negatively sloping, and total costs are cubic, the general approach taken in microeconomic theory.

$P = e - f \cdot Q$

$TR = e \cdot Q - f \cdot Q^2$ (12)

$MR = e - 2f \cdot Q$ (13)

$TC = a \cdot Q^3 + b \cdot Q^2 + c \cdot Q + d$ (14)

To achieve the idealized total cost shape that economists prefer for all ranges of short run variable proportions, the coefficients in (14) must be restricted as follows:

$a,c,d > 0,\ b < 0,\ b^2 < 3ac$

$MC = 3a \cdot Q^2 + 2b \cdot Q + c$ (15)

$d = FC$,

$a \cdot Q^3 + b \cdot Q^2 + c \cdot Q = TVC$, and

$a \cdot Q^2 + b \cdot Q + c = AVC$

Substituting (13) and (15) into the profit function,

$Profit = TR - TC = (e \cdot Q - f \cdot Q^2) - (a \cdot Q^3 + b \cdot Q^2 + c \cdot Q + d)$ (16)

$= -a \cdot Q^3 - (f + b) \cdot Q^2 + (e - c) \cdot Q - d$

where,

$dProfit/dQ = -3a \cdot Q^2 - 2f \cdot Q - 2b \cdot Q + e - c$, and rearranging terms,

$dProfit/dQ = (e - 2f \cdot Q) - (3a \cdot Q^2 + 2b \cdot Q + c) = 0$ (17)

In words, marginal revenue less marginal cost equals zero as a necessary condition for an optimum.

Recall the quantity elasticity of profit, DOL, is written as:

Profit Elasticity = (dProfit/dQ) (Q/Profit)

Substituting (16) and (17) into the E_π expression above

$$\text{Profit Elasticity} = [(e - 2f \cdot Q) - (3a \cdot Q^2 + 2b \cdot Q + c)]\ Q / [(-a \cdot Q^3 - (f + b) \cdot Q^2 + (e - c) \cdot Q - d)] \quad (18)$$

Notice, from the bracketed term in the numerator for (18), that DOL must equal zero when the firm maximizes profit or minimizes losses. This is true because MR = MC at that output level, which means the numerator must be zero. If profit is positive, then at any output level above profit maximization DOL must be negative (MC > MR) and at any output level below profit maximization DOL must be positive (MR > MC). If profit is negative, and still minimized, DOL is negative below the loss minimizing output and positive above it.

ECONOMICS ARTICLES

THE MONETARY APPROACH TO BALANCE OF PAYMENTS: A TAXONOMY WITH A COMPREHENSIVE REFERENCE TO THE LITERATURE

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ABSTRACT

This paper provides a taxonomy of the monetary approach to the balance of payments with a comprehensive reference guide to the literature. The paper very briefly reviews the three major alternative theories of balance of payments adjustments. These theories are the elasticities and absorption approaches (associated with Keynesian theory), and the monetary approach. The paper focuses on the monetary approach to balance of payments and points to the long-run and short-run lines of research within the monetary approach to balance of payments. Throughout, the paper provides a comprehensive set of references corresponding to each point discussed. Together, these references exhaust the existing literature on the monetary approach to balance of payments.

INTRODUCTION

This paper provides a taxonomy of the monetary approach to the balance of payments with a comprehensive reference guide to the literature. The paper very briefly reviews the three major alternative theories of balance of payments adjustments. These theories are the elasticities and absorption approaches (associated with Keynesian theory), and the monetary approach. The paper focuses on the monetary approach to balance of payments and points to the long-run and short-run lines of research within the monetary approach to balance of payments, as reviewed by Author (2003a and 2003b). Throughout, the paper provides a comprehensive set of references corresponding to each point discussed. Together

with references in Author (2003a and 2003b), these references exhaust the existing literature on the monetary approach to balance of payments.

This study is organized in the following way: Section II very briefly reviews three alternative theories of balance of payments adjustments. Then, with its focus on the monetary approach to balance of payments, the section divides the research into long run and short run. Section III concludes the paper.

DIFFERENT APPROACHES TO THE BALANCE OF PAYMENT ANALYSIS

Three alternative theories of balance of payments adjustment are reviewed in this section.[1] They are commonly known as the elasticities, absorption, and monetary approaches.[2]

The Elasticities Approach

The elasticities approach applies the Marshallian analysis of elasticities of supply and demand for individual commodities to the analysis of exports and imports as a whole. It is mainly concerned with the balance of trade:

X	=	value of exports	
IM	=	value of imports	
BT	=	balance of trade	
BT	=	X – IM	(1)

It is generally assumed that exports depend on the price of exports, and imports depend on the price of imports. These relations are then translated into elasticities, by differentiating the above equation with respect to the exchange rate. A criterion for a change of the balance of trade in the desired direction can be established, assuming that export and import prices adjust to equate the demand for and supply of exports and imports.

The Absorption Approach

The absorption approach seeks to look at the balance of trade from the point of view of national income accounting:

Y	=	domestic production of goods and services	
E	=	domestic absorption of goods and services, or domestic total expenditure	
BT	=	balance of trade	
BT	=	Y – E	(2)

The above identity is useful in pointing out that an improvement in the balance of trade calls for an increase in production relative to absorption.

The Monetary Approach

The monetary approach[3] looks at the balance of payments as the change in the monetary base[4] less the change in the domestic component:

H	=	change in the quantity of money demanded	
D	=	domestic credit creation	
BP	=	DH - DD	(3)

where the "italic D," i.e., D, appearing in front of a variable designates the "change" in that variable. That is, D is the first difference operator: $DX = X_{(t)} - X_{(t-1)}$.

The monetary approach assumes[5] that the domestic assets component of the monetary base is unaffected[6] by balance of payments flows[7]. The monetary approach assumes full-employment and an integrated world markets[8].

The concentration on the absolute, rather than relative, price level is a notable point of departure from the Humean monetary approach that long preceded Keynes. In Hume, the domestic price level can vary from purchasing power parity due to stock disequilibrium in the domestic money market[9]. Such a variation in relative price levels gives rise to changes in trade flows which affect the balance of payments, and hence the domestic money stock in the long run. The monetary approach, on the other hand, often relies on the excess demand for money to directly affect the overall balance rather than via a change in relative price levels. It should be pointed out that both the Humean adjustment process and the monetary approach have the same implications with respect to the price level in the long run.

A Foundational Comparison of the Three Approaches

The preceding pages present a brief review of the three major approaches to the balance of payments – elasticities, absorption, and monetary. Ignoring capital flows the three views can be summarized with the following equations:

Y	=	real income		
*D*H	=	change in the quantity of money demanded		
*D*D	=	domestic credit creation		
BT	=	X – IM	(Elasticities)	(4)
BT	=	Y – E	(Absorption)	(5)
BT	=	*D*H – *D*D	(Monetary)	(6)

where, as before, the "italic D," i.e., *D*, appearing in front of a variable designates the "change" in that variable. That is, *D* is the first difference operator: $DX = X_{(t)} - X_{(t-1)}$.

Mundell (1986c) cautions that the three approaches are all correct and assert identical propositions, even if capital movements are included when all variables are defined as ex-post, realized entities. This can be shown by the following three equations:

*D*R	=	increase in international reserves	
*D*K	=	net capital outflow	
Y	=	E + BT	(7)
*D*H	=	*D*D + *D*R	(8)
*D*R	=	BT – *D*K	(9)

From national income accounting, we have equation (7); from banking accounts equation (8) follows; balance of payments accounts give us equation (9). The ex-post identity of the three approaches is seen when we note that:

$$DR = BT - DK = Y - E - DK = DH - DD \qquad (10)$$

Though it is true that an improvement in the balance of payments must imply an increase in Y–E–*D*K, an increase in *D*R, an increase in *D*H–*D*D provides additional checks on the logic of balance of payment policies, it should be remembered that the assumptions behind the three approaches differ widely. So do

their views[10] of the process of adjustment in the balance of payments[11]. Differences in the approaches become apparent when we conceive of the categories as ex-ante – that is, as representative of intentions[12].

Research on the Monetary Approach to Balance of Payments

Research on the monetary approach to the balance of payments can be divided into two different approaches; one focuses on the long-run equilibrium, the other considers the adjustment mechanism and the channels through which equilibrium is reached. The first approach is based on the reserve flow equation developed by H. G. Johnson (1972). Testing was undertaken by J.R. Zecher (1974) and others[13]. The second approach is based on theoretical work of S.J. Prais (1961), with corresponding empirical work undertaken by R. R. Rhomberg (1977) and others[14].

CONCLUSION

This paper very briefly reviewed three alternative theories of balance of payments adjustments. These theories were the elasticities and absorption approaches (associated with Keynesian theory), and the monetary approach. The paper focused on the monetary approach to balance of payments, pointed to the long-run and short-run lines of research within the monetary approach to balance of payments, and listed a comprehensive set of references corresponding to each line of research. Accordingly, the reference section together with referenced cited in Author (2003a and 2003b) exhausted the literature on the monetary approach to balance of payments.

APPENDIX 1

This is a comprehensive list of references in the context of the monetary approach to balance of payments which have discussed the other approaches to balance of payments.

Blejer, Khan, and Masson (1995), Dombrecht (1978), Frenkel and Johnson (1976b), Harberger (1950), Helliwell (1978), Hossain (1988), Jager (1978), Johnson (1958, 1972, 1973b, 1976a, 1977a, 1977b, 1977c), Jonson and Kierzkowski (1975), Kenneally and Finn

(1985), Meller (1987), Pearce (1961), Rhomberg and Heller (1977), Shone (1980), Tsanacas, Kasibhatla, and Malindretos (2000), Tullio (1981a), and Whitman (1975).

APPENDIX 2

This is a comprehensive list of references regarding the modern revival, theoretical foundation, further development, and review articles related to the theory, assumptions, features, and empirical work on the monetary approach to balance of payments.

Modern Revival by:
Collery (1971a), Hahn (1959), Harberger (1950), Kemp, M.C. (1962, 1970), Komiya (1966, 1969), McKinnon (1968), McKinnon and Oates (1966), Meade (1951), Mundell (1968a, 1971a), Negishi (1972), Pearce (1961), Polak (1957), Polak and Argy (1971), and Prais (1961).

Theoretical Foundation:
Dornbusch (1973a), Johnson (1958, 1972, 1973a), and Mundell (1968a, 1971a).

Further Developed by:
Frenkel (1975), Frenkel and Johnson (1976a, 1976b), Frenkel and Rodriguez (1975), Humphrey and Keleher (1982a), International Monetary Fund (1977), Johnson (1976a, 1977b), Johnson and Nobay (1974), Kemp, D.S. (1975), Mussa (1974, 1976), Putnam and Wilford (1978), and Swoboda (1973, 1976).

Review Articles:
Kreinin and Officer (1978), Magee (1976), and Whitman (1975).

Further Review Article:
Arize, Grivoyannis, Kallianiotis, and Malindretos (2000), Blejer, Khan, and Masson (1995), Connolly (1986), Dombrecht (1978), Finn (1982), Grubel (1976), Hahn (1977), Helliwell (1978), Horne (1983), Hossain (1988), Johnson (1973b, 1975, 1977b), Mussa (1974, 1976), Rabin and Yeager (1982), Rhomberg and Heller (1977), and Tsiang (1977).

Review Assumptions and Features:
Akhtar (1986), Blejer (1983), Branson (1975a, 1975b), Connolly (1986), Frenkel and Johnson (1976b), Frenkel and Rodriguez (1975), Grubel (1976), Haberler (1976), Hahn (1977), Humphrey (1986a, 1986b), Humphrey and Keleher (1982b), Johnson (1958, 1962b, 1972, 1973b, 1975, 1976a, 1976b, 1977a, 1977b, 1977c), Kasibhatla and Malindretos (1993), Kemp, D.S. (1975), Kenneally and Finn (1985), Manouchehi (1988), Metzler (1976), Mussa (1974, 1976), Putnam (1976), Rohmberg and Heller (1977), Swoboda (1976), Tsanacas,

Kasibhatla, and Malindretos (2000), Tullio (1981b), Wilford, D.S. (1977a), and Wilford, W.T. (1986).

Review of Empirical Work:
Arize, Grivoyannis, Kallianiotis, and Malindretos (2000), Kreinin and Officer (1978), Magee (1976), Malindretos (1988), and Whitman (1975).

APPENDIX 3

This is a comprehensive list of references in the context of the monetary approach to balance of payments which discuss or incorporate the real-balance effect.

Agenor (1990), Aghevli (1975), Aghevli and Khan (1980), Aghevli and Sassanpour (1982), Archibald and Lipsey (1958), Argy (1970), Baker and Falero (1971), Bergstrom and Wymer (1976), Bilquees (1989), Black (1975), Blejer (1977, 1983), Blejer and Fernandez (1978, 1980), Blejer and Leiderman (1981), Bonitsis and Malindretos (2000), Bourne (1989), Brissimis and Leventakis (1984), Coghlan (1981), Collery (1971a, 1971b), Connolly and Taylor (1976), Courchene (1973), Currie (1976), De Silva (1977), Dornbusch (1971, 1973a, 1973b), Dornbusch and Mussa (1975), Frenkel (1976a, 1976b), Frenkel and Johnson (1976b), Frenkel and Rodriguez (1975), Friedman (1970), Girton and Roper (1977), Guitian (1973, 1976), Gupta (1984), Helliwell (1978), Henderson (1977), Horne (1979), Humphrey (1986a, 1986b), Humphrey and Keleher (1982b), Jimoh (1990), Johnson (1958, 1972, 1975, 1976a), Jonson (1975, 1976), Jonson and Kierzkowski (1975), Jonson, Moses, and Wymer (1977), Kasibhatla and Malindretos (1993), Kasibhatla, Malindretos, and Kutasovic (2000), Keleher (1986), Kemp, D.S. (1975), Khan (1974, 1976, 1977), Khan and Knight (1981), Kieran (1970), Kim (1983), Knight and Mathieson (1983), Knight and Wymer (1976, 1978), Knoester and Van Sinderen (1985), Kouri (1976), Kreinin and Officer (1978), Laidler and O'Shea (1980), Leon and Molana (1987), Leventakis (1984), Levy (1981), Miller (1980), Mundell (1968b, 1971b), Parkin (1974a), Patinkin (1965), Polak (1957), Porter (1974), Prais (1961), Purviz (1972), Reid (1973), Rhomberg (1977), Rodriguez (1976), Sassanpour and Sheen (1984), Schotta (1966), Spencer (1974), Spinelli (1979, 1983), Swoboda (1976), Taylor (1987b), Tsanacas, Kasibhatla, and Malindretos (2000), Tsiang (1977), Tullio (1981a, 1981b), Vaez-Zadeh (1989), Wein (1974), Whitman (1975), Wilford (1977a), and Yusoff (1988).

APPENDIX 4

This is a comprehensive list of references related to discussions of criticisms of the monetary approach to balance of payments.

Akhtar (1986), Arize, Grivoyannis, Kallianiotis, and Malindretos (2000), Bilquees (1989), Borts and Hanson (1977), Branson (1975a), Currie (1976, 1977), Darby (1980a), De Grauwe (1975, 1976), Fontana (1998), Fratiani (1977), Frenkel, Gylfason, and Helliwell (1980), Hacche and Townend (1981), Hahn (1977), Hodjera (1976), Horne (1983), Hossain (1988), Johnson (1972, 1977a, 1977c), Jonson (1976), Kamas (1985), Karacaoglu (1980), Kenneally and Finn (1985), Kouri and Porter (1974), Kreinin and Officer (1978), Laskar (1982), Lee and Wohar (1991), Leon (1988), Looney (1991), Magee (1976), McNown and Wallace (1977), Miller (1980), Nobay and Johnson (1977), Obstfeld (1982), Petoussis (1985), Putnam and Wilford (1977), Rabin and Yeager (1982), Rasulo and Wilford (1980), Salop (1976), Scheetz (1986a, 1986b), Sheehey (1980), Sohrab-Uddin (1985), Spanos and Taylor (1984), Swoboda (1976), Taylor (1987a, 1987b), Tsiang (1977), Tullio (1981c), Watson (1988, 1990), Whitman (1975), and Wohar and Burkett (1989).

APPENDIX 5

This is a comprehensive list of references in the general context of the monetary approach to balance of payments which discuss sterilization.

Addison, Demery, and Page (1993), Bloomfield (1959), Boyer (1979), Cooper (1969), Courchene (1973), Darby (1980b), Feige and Johannes (1981), Frenkel, Gylfason, and Helliwell (1980), Frenkel and Johnson (1976b), Frenkel and Rodriguez (1975), Galliott (1973), Helliwell (1978), Horne (1979), Humphrey (1986a), Johnson (1972), Kim (1983), Knight and Wymer (1976, 1978), Lee (1985), Magee (1976), Michaely (1970), Miller (1980), Mundell (1968a), Mussa (1974, 1976), Roper (1971), Schotta (1966), Swoboda (1973, 1976), Whitman (1975), Wilford, W.T. (1986), and Willms (1971).

APPENDIX 6

This is a comprehensive list of references which discuss the weak and strong forms of the monetary approach to balance of payments.

Hodgson and Schneck (1981), Kenneally and Nhan (1986), Lee and Wohar (1991), and Rabin and Yeager (1982).

APPENDIX 7

This is a comprehensive list of references to the Humean origin of the monetary approach to balance of payments.

Berdell (1995), Cesarano (1998), Connolly (1986), Courchene (1973), Dombrecht (1978), Fausten (1979), Hume (1752), Johnson (1973b, 1976a, 1977b, 1977c), Kasibhatla and Malindretos (1993), Keleher (1986), Kenneally and Finn (1985), Kreinin and Officer (1978), McCloskey and Zecher (1976), Putnam and Wilford (1986a), Rhomberg and Heller (1977), and Wilford (1977a).

APPENDIX 8

This is a comprehensive list of references in the context of the monetary approach to balance of payments which discuss the compatibility of the monetary approach with other approaches to the balance of payments.

Akhtar (1986), Blejer (1983), Dornbusch (1973a, 1973b), Frenkel, Gylfason, and Helliwell (1980), Hossain (1988), Jager (1978), Johnson (1972, 1976a), Jonson and Kierzkowski (1975), Kenneally and Finn (1985), Khan (1976), Kreinin and Officer (1978), Laidler (1981), Montiel (1984, 1985), Mussa (1974, 1976), Petoussis (1985), Rhomberg (1964), Rodriguez (1976), Sassanpour and Sheen (1984), Swoboda (1976), and Wilford (1986).

APPENDIX 9

This is a comprehensive list of references in the context of the monetary approach to balance of payments which discuss the historical background of the monetary approach.

Fausten and Victoria (1980), Frenkel (1976b), Frenkel and Johnson (1976b), Humphrey (1986b), Keleher (1986), Myhrman (1976), and Spinelli (1988).

APPENDIX 10

This is a comprehensive list of references which discuss the Keynesian-monetarist controversy in the context of the monetary approach to balance of payments.

Arize, Grivoyannis, Kallianiotis, and Malindretos (2000), Beladi, Biswas, and Tribedy (1986), Bonitsis, Kasibhatla, and Malindretos (1995), Bonitsis and Malindretos (2000), Dornbusch (1971), Fontana (1998), Frenkel, Gylfason, and Helliwell (1980), Grubel (1976), Horne (1983), Johnson, Kasibhatla, and Malindretos (2000), Kamas (1986), Kasibhatla, Malindretos, and Kutasovic (2000), Malindretos (1984, 1988, 1991), Miller (1978), Rivera-Solis, Kasibhatla, and Malindretos (2000), Spencer (1974), and Whitman (1975).

ENDNOTES

1 For a comprehensive list of references in the context of the monetary approach to balance of payments which have discussed the other approaches to balance of payments see Appendix 1.

2 In order to save space in this paper, the author decided not to report here the references which have already appeared in Author (2003a, 2003b).

3 For a comprehensive list of references regarding the modern revival, theoretical foundation, further development, and review articles related to the theory, assumptions, features, and empirical work on the monetary approach to balance of payments see Appendix 2.

4 For a comprehensive list of references in the context of the monetary approach to balance of payments which discuss or incorporate real-balance effect see Appendix 3.

5 For a comprehensive list of references related to discussions of criticisms of the monetary approach to balance of payments see Appendix 4.

6 This is the well-known "non-sterilization" assumption. The monetary approach considers the non-sterilization assumption to be realistic because of its view of the overall balance as a symptom of excess demand for money. Thus, a deficit indicates the presence of a negative excess demand. The deficit also removes the disequilibrium in the money market. Any attempt by the monetary authorities to make up for the decline in money supply is doomed to failure, since credit creation will only prolong the payments deficit.

7 For a comprehensive list of references in the general context of the monetary approach to balance of payments which discuss sterilization see Appendix 5.

8 For a comprehensive list of references which discuss the weak and strong forms of the monetary approach to balance of payments see Appendix 6.

9 For a comprehensive list of references to the Humean origin of the monetary approach to balance of payments see Appendix 7.

10 For a comprehensive list of references in the context of the monetary approach to balance of payments which discuss the compatibility of the monetary approach with other approaches to the balance of payments see Appendix 8.

11 For a comprehensive list of references in the context of the monetary approach to balance of payments which discuss the historical background of the monetary approach see Appendix 9.

12 For a comprehensive list of references which discuss the Keynesian-monetarist controversy in the context of the monetary approach to balance of payments see Appendix 10.

13 See Author (2003a) for a review of the long-run monetary approach to balance of payments.

14 See Author (2003b) for a review of the short-run monetary approach to balance of payments.

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THE MARKET ATTITUDES INVENTORY: THE DEVELOPMENT AND TESTING OF RELIABILITY AND VALIDITY

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ABSTRACT

In this article we report the development of a 22-statement survey that measures attitudes towards the market system. We report on the testing of the Market Attitude Inventory (MAI) for reliability and validity. Mean scores on the instrument are reported for a random sample of Midwest high school social studies teachers. We conclude that the MAI is a valid and reliable instrument. The MAI has applications in research, educational outcome assessment, and teaching pedagogy for the measurement and evaluation of attitudes and values towards the workings of the market system in the US.

INTRODUCTION

In this article we report the development of a survey that evaluates an individual's attitudes towards the market system in the United States. Our motivation for developing the Market Attitude Inventory (MAI) was twofold. First, our overall and long-term research interests involve the evaluation of the relationship between an individual's attitudes toward the market system and achievement of economic success within that system (Breeden and Lephardt, 2002b pp. 67-68). For our longitudinal research project we needed a valid and reliable instrument to measure attitudes towards the market. Since we began the initial project we have continued to trace the careers and earnings of the original 180 undergraduates that we surveyed in 1993. Second, in the process of reviewing the literature it became apparent that there was a paucity of instruments and research that measured the values and attitudes people hold toward the market system. It was our contention that refining the original instrument we had designed in 1992 and making it available to other researchers and educators could make a contribution to this important area of understanding the affective component of economics.

REVIEW OF LITERATURE: MEASURES OF ECONOMIC ATTITUDES

The importance of measuring economic values and attitudes using a valid and reliable measure was clearly articulated in several articles in economic education (Becker, 1983; Soper and Walstad, 1983). In the last twenty years there is still a dearth of research on attitudes concerning the market system.

In the process of developing the MAI we searched the literature for published surveys that measure attitudes toward the market system. We briefly describe four of the surveys we reviewed although none of them met our research needs. Soper and Walstad (1983) developed the Survey on Economic Attitudes (SEA). Their instrument is a two-part measure that was nationally normed, and externally validated. It consists of two parts with 14 questions for each section; The Attitudes towards Economics (ATE) section, and the Economic Attitude Sophistication (EAS) section. For a through review of the SEA see Phipps and Clark (1993). The first part asks for students' personal opinions of economics as a discipline and the second part judged the sophistication of economic knowledge. While the responses to these 28 questions were interesting, we sought a more basic reflection of attitudes toward general market outcomes not the discipline of economics. O'Brien and Ingels (1987) designed a 44 question economic values inventory that would enable the detection of changes in attitudes attendant to economic education which was designed for a younger population (seven to nine year olds). Shiller, Boycko, and Korobov (1991) developed a thirty-six-question instrument that targeted perceptions of fairness of market outcomes based on mini scenarios. This survey was far longer and more complex than we desired and it also required a fairly robust knowledge of formal economic relationships. Finally, Peterson, Kozmetsky and Albaum ((1991) surveyed a national sample of households in 1980 and 1989 regarding their attitudes towards capitalism. They constructed a set of 16 items based on input from 'the writings of well-know capitalist authors"; others from a previous survey they conducted. Although some of the items measured the elements of the market system that we were interested in, we concluded that our research project would be best served by designing our own survey.

INSTRUMENT DEVELOPMENT

We began the development of the survey with four simple objectives. The survey would need to 1) be a valid and reliable instrument based on standard statistical criteria, 2) have minimal cost for usage, that is, employ an acceptable level of language

comprehension for a diverse population, require simple directions, take less that 15 minutes to answer, and be easy to score, 3) assess attitudes towards the core functions, processes and outcomes of the market system and, 4) be acceptable and accessible for use in a wide range of potential research and educational applications.

The development of the items on the instrument began in 1992 as the result of our interest in measuring a person's attitudes towards the market. The overarching theoretical construct of the relationship between attitudes and economic success was presented in Harrison (1992), who argued that differing cultural attitudes between countries contribute to the explanation of differentials in economic prosperity. In order to explore these relationships we needed an instrument that would measure an individual's attitudes toward the outcomes of a market system.

The original content for each statement on the MAI was developed based on the an evaluation of student responses concerning the strengths and weaknesses of the market system, and our sense of the commonly accepted core concepts of markets outcomes that are notable in most introductory level economics textbooks (see Mc Connell and Brue, 1996 pp. 6-7). Initially we obtained student input by administering a questionnaire to 180 introductory microeconomics principles students in the fall 1992. The students were asked to provide input on two statements: 1) List what you believe are the major strengths of the market economy, and 2) List the major weaknesses of the market economy. They were also asked to rank their responses indicating whether they believed the item was very important, moderately important, or slightly important.

We independently assigned all student responses into content categories corresponding to market outcomes discussed earlier and with a 99% interrater reliability. We excluded any analysis of ranking the importance of the content areas because there was little variation in rankings and a preponderance of incomplete responses. It was our contention that a combination of core functions and processes defined in the discipline of economics as well as the perceptions of the students regarding the strengths and weaknesses was a solid basis for subsequent development of the statements on the inventory. In addition, we sought feedback from other economists and economic educators. We then constructed 19 statements based on a blending of the student input and our professional knowledge and experience. Nine statements on the inventory were constructed as affirmative statements about the basic workings of the market system and ten were constructed to reflect a negative statement about the basic workings of the market. The two scales made up the inventory statements. The response to each statement is measured by continuous scale of agreement from zero to 100%, where zero % agreement meant absolutely no agreement with the statement, and 100% meant absolute total agreement with the statement.

Initially we had designed a five-point Likert scale for responses however a colleague with expertise in attitudinal measurement recommended a continuous scale that could measure more subtle differences and would offer a richer basis for statistical testing. She suggested the scale could be easily collapsed into more discrete response units if needed.

We presented the pilot survey and mean score of students (Breeden and Lephardt, 1993) at the October 1993 National Council on Economic Education and the National Association of Economics Educators Annual Meeting (NCEE/NAEE). Based on the feedback from the session we added two more questions regarding the outcomes of the market, and a final summary question. We also began collecting data from a more diverse population.

Validity

We have continuously refined the instrument and have sought feedback and input from a wide range of professionals and educators. At the NCEE Meeting in 1999 we distributed the final version of the instrument to a group of thirty-five educators, economist, and high school teachers/administrators. Each individual evaluating the instrument was given the 20 item version of the MAI, and instructed that we were developing an assessment of an individual's attitudes towards the free market. They were asked to give feedback on the following questions: 1) Are there any questions (topic areas) that might measure important foundation ideas for a market system that we have missed? 2) Are there any questions on the current survey that can be revised? 3) Are there any questions in the current survey that are inappropriate and should be excluded? We received responses from 24 of the NCEE participants. Based on the responses from the NCEE participants', changes were made to clarify language, reduce vagueness and complexity, and redundancy. We also added two new questions. One statement was added that clearly addressed prices, one on entrepreneurship and the summary statement were rewritten to evaluate the overall fairness of the market system. We also distributed the inventory to our colleagues (10) in our economics department who were also asked to provide feedback on the MAI. All of the economists indicated that the major market processes and outcomes were either directly or indirectly measured in the instrument. We also changed the instrument's stem statement to evaluate attitudes towards the "market system in the United States", rather than the theoretical construct of the "free market". We believe that the critical evaluation and input of educators, administrators and economists provided the level of expert

knowledge to be assured of the content validity of the items in the inventory (Litwin, 1995).

The final version of the Market Attitude Survey (MAI) consists of 22 statements and a lead question. There are 11 market-positive statements and 11 market-negative statements. The expert opinion and feedback that we formally solicited and the more informal feedback we received over the past ten years constitutes strong evidence that the MAI is a valid measurement of attitudes towards market outcomes and processes. Table 1 presents the complete MAI with mean percent agreement responses a random sample of Social Studies teachers from the state of Wisconsin. The bolded statements (items 2,4,6,8,10,12,18,19,20,21,22) are the market-positive statements, and the remaining items are defined as market negative statements (items 1,3,5,7,9,11,14,14,15,16,17). It should be noted that there is no bold type used when the MAI is administered.

Reliability

The internal consistency of the final version of the MAI was evaluated using Cronbach's coefficient alpha. Cronbach's coefficient alpha is a commonly used test that measures the internal reliability among a group of items combined to form a single scale. The test is "…a reflection of how well the different items complement each other in their measurement of different aspects of the same variable or quality." (Litwin, 1995, p.24).

Potentially the alpha coefficient can range from zero to 1.00. The higher the coefficient alpha, the more confident we can be of the internal consistency of the items measuring positive and negative market attitudes. Nunnaly (1978) has indicated 0.7 to be an acceptable reliability coefficient but lower thresholds are sometimes used in the literature. Litwin (1995) also noted "levels of .70 or more are generally accepted as representing good reliability."

We calculated the alpha coefficient for the two scales. We used the SPSS software to generate Cronbach's coefficient for the two scales. Items 2,4,6,8,10,12,18,19,20,21 and 22 were used to generate the alpha for the market-positive scale and items 1,3,5,7,9,11,13,14,15,16,and 17 were used for the market negative scale. The alpha coefficient was generated from our large random sample of 900 teachers from the data bank of the Wisconsin Department of Public Instruction grade 7-12 social studies teachers (n = 443: 49.2% response rate). Chronbach's Alpha for the market positive scale was .812 and for the market negative scale was .799. The

alphas indicate that there is a strong internal consistency on the items that make up the market positive and market negative statements.

Table 1. MARKET ATTITUDES INVENTORY

Attitude survey questions:

Indicate your level of agreement with the following statements. Write in a number between 0% and 100 % to reflect your percentage [%] of agreement according to the following scale:

Strongly disagree Moderately disagree Neutral Moderately agree Strongly agree
0 %……..……...25%…….....50%……75%..……..…..…100%

Please use the numbers between the two extremes to indicate partial agreement, e.g. 15% or 85%.

In my opinion, the market system in the US.....		Means
1...leads to an unfair distribution of income.....……..	_____	54
2... rewards people fairly for their productivity and hard work	_____	61
3…encourages unethical business behavior ……..	_____	59
4...leads to quality and technological advancement in products and services.....…	_____	81
5...leads to inadequate amounts of important public services (police, roads, preventative health care)……....	_____	45
6. ..provides opportunities and incentives for success	_____	78
7....encourages greed and excessive materialism..... .....…….	_____	73
8....allows equal access to work opportunities.....……	_____	50
9....leads to erratic cycles of growth and decline in economic activity…… ……	_____	54
10. ..raises the living standard for most people..... ……...	_____	64
11. ..leads to monopoly power among businesses.....…….	_____	62
12. ..leads to an efficient use of resources..... ……	_____	47
13. ..encourages the abuse of the environment.....	_____	68
14. ..leads to unemployment and worker insecurity……..	_____	48
15. ..leads to excessive risk of business failure.....…..	_____	46
16. ..requires a lot of government control to work well.....	_____	45
17. ..allows too much foreign competition.....…	_____	39
18. ..provides consumers the goods and services they want.....	_____	80
19. ..provides employment opportunities for all who desire. ..	_____	66
20….encourages innovation and entrepreneurship……	_____	82
21….provide goods and services at an affordable price.……	_____	69
22... "Overall and in summary, I believe that the market system in the US is a fair and ethical system."……	_____	65

Norming

We report the MAI means in Table 1 for the high school teachers (n=443). We acknowledge the inherent limitations of a midwestern sample, however, we believe that reporting means for our existing sample is useful for those who are interested in using the instrument and would perhaps add to the database for future norming. In other research we have explored the implications of the means differences between different levels of education and differences in other demographic characteristics (Breeden and Lephardt, 2002a).

Usefulness of the Instrument

The MAI can be utilized in several types of applications. First, in conjunction with objective measures of economic knowledge the MAI would be an excellent tool for evaluation. The survey could be used to evaluate attitudinal changes as the result of economic instruction if that is an intended outcome of the course or training. As a pre-post assessment, the MAI would be a relatively easy tool to utilize. The MAI can be used as a quantitative measure of accountability for funding agencies and research projects that are looking for attitudinal changes as a dimension of the program

Although current pedagogy regarding the teaching of economics does not systematically address attitudes and values it is becoming an increasingly important issue in academe. We would encourage the use of the MAI in delving into the relationship between attitudes and learning. For the instructional purposes the results of the MAI allow for dialogue concerning the values and attitudes students possess regarding the market system, its processes and outcomes. It provides the framework for the discussion of the evolution of a student's attitudes and values towards the market system. An instructor could use the MAI (an affective measure) for discussion in conjunction with a content objective evaluation. In this application it is possible to address the linkage between credible evidence and affective reactions based on false premises.

We also believe that the MAI can be used in outcome assessment in economics to augment other measures used for the evaluation of continuous improvement. In most colleges and universities the assessment process is being driven down to the department level and often there is an assessment category that reflects values and dispositions relevant to the discipline. The MAI is appropriate for PRE-POST measurement of change in expressed attitudes.

We have also been utilizing the instrument as a potential predictor of economic success measured by earnings (Breeden and Lephardt, 2002). It is our contention that individuals with a positive disposition towards the workings of the market are more likely to se successful in that system. Our tentative longitudinal findings support this perspective.

Lastly, any research involving a desire to measure attitudes towards the market could utilize this instrument. The simplicity of use and the clarity of the content make the instrument potentially usable in a wide variety of applications.

SUMMARY AND CONCLUSION

We conclude that the MAI is a valid and reliable instrument that has applications in research, teaching and assessment. Content validity of the item on the instrument was established through the formal and systematic review of the items by experts in the field of economics, the input of educators and administrators in economic education, and our own professional knowledge and experience. We are confident that the instrument measures attitudes towards market process and outcomes. The Cronbach's coefficient alphas for the scales were beyond the typical threshold level established in psychometrics (Litwin, 1995, Nunnaly, 1978) indicating that the MAI is an internally reliable instrument.

One aspect of the MAI that we would like to explore in the future is the impact of current events on self-reported attitudes. For example, it is likely that a plethora of public information on a current event like the failure of Enron or the issues of unethical behavior is the Mutual Fund industry could have a potential impact on the attitudes people hold concerning items on the survey and the summary question about the overall fairness and equity of the market system. We would expect that a persons' attitudes and beliefs are influenced and heightened by her perceptions of current market events. There are many interesting and unanswered questions about the nature of attitudes towards the market system and intervening events. We believe some of these questions can be addressed using the MAI as a benchmark of market attitudes.

We recognize that a national norming would have strengthened the evaluation of the MAI, but it was beyond the scope of this project. Our future research goal is to provide norms for more diverse populations. We are confident that the random sample of the Midwest high school social studies teachers can provide an important insight into the norming for teachers, which is an important area in the field of economic education.

The MAI is a user-friendly instrument. It is easy to administer and interpret. Most high school and college students can complete the MAI in less than 15 minutes.

The Flesch-Kincaid Reading Scale measures the reading level at 9.3. This means that the average high school freshman should have no significant problem with reading and comprehending the inventory.

In summary, we feel that the MAI is a valid and reliable inventory that can be used to measure a person's attitudes towards the workings of the market system. We welcome other researchers interested in attitudinal measurement of market outcomes to utilize this instrument.

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DAGWOOD DOESN'T WORK HERE ANYMORE?: THE DENOMINATOR, UNEMPLOYMENT, AND WAR

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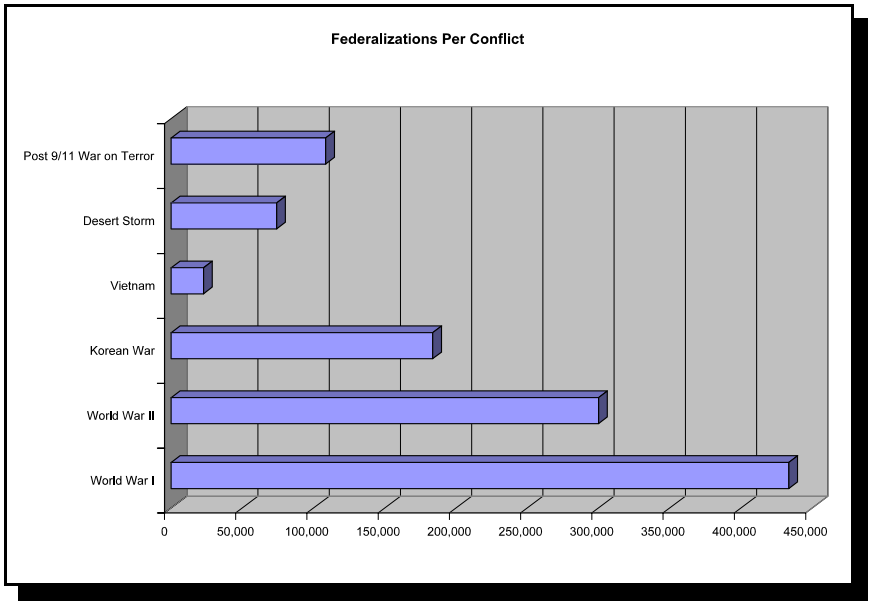
ABSTRACT

In the years leading up to 2001, the United States economy saw an unprecedented level of growth. From all accounts, economists and the general public alike agreed that we had never been here before. During this period, the Dow Jones Industrial Average reached 11,000 and unemployment was at an all time low of 4.0%. So where are we today? In the last year, the DOW reached 10,000 before dropping again, and America's unemployment rate ended the year of 2003 at 5.9%. The United States economy is in its third year of recession. With employment at an unsettling level, could it be worse if it were not for the effects of war? Everyone, including our President, wants to be able to say that we have hit the bottom and that we have begun recovery. Has the time come that we can begin to relax and ride the American dream?

INTRODUCTION

It's Sunday morning. You've gotten out of bed, and with your steaming cup of Java in hand, you've settled in your favorite chair to read the Sunday comics. You notice that the comics just aren't the same as they used to be. Beetle Bailey isn't there; the author has noted that Beetle has been shipped out to Iraq and will not be back for 24 months. You turn to look for Dagwood because you know he will be there. There is a stamp saying, "RESERVE FORCES ACTIVATED FOR NEXT TWELVE MONTHS. DAGWOOD SHIPPED OUT!" Instead of Dagwood going to work, there is a replacement in the comic strip. Twelve months later, when Dagwood returns, his boss and all the readers have really learned to love the new character. What is Dagwood (and Dagwood's boss) to do?

Sure, we are just talking comics here, but this is what is going in today's workforce. In an unprecedented amount, our country has activated the guard and reserve in an effort to fight the war on terror because of the reduction in forces of our permanent military staff (Mazzetti, 2004). In President Bush's remarks on November 8, 2002, he said "Our National Guard and Reserve units comprise 38% of America's military forces" and he continued to say, "Our volunteer National Guardsmen and Reservists rely on their employers for essential support and encouragement that often come at the employer's expense" (National Employer Support of the Guard and Reserve Week, 2002). What does that do to our economy?



How do we measure the effect this has on the employers of all of those members of the National Guard and Reserve who have been full-time employees and now are full-time soldiers? Is it an unfair indicator of our economy to say that unemployment is going down because of new job creation or is it because we need replacement workers for the jobs that are being vacated due to the activation Reservists? In the year since President Bush's comments, the business world has responded. Returning "citizen soldiers" are coming home to find their job is no longer there, and 1,300 have filed complaints with the Department of Labor (Jobs and economic growth, 2003). Economists are asked to think in both costs and benefits and it appears that the

government is thinking of the benefits that they receive from the "citizen soldier" and the employers of these "citizen soldiers" are incurring the costs (Arnold, 2004).

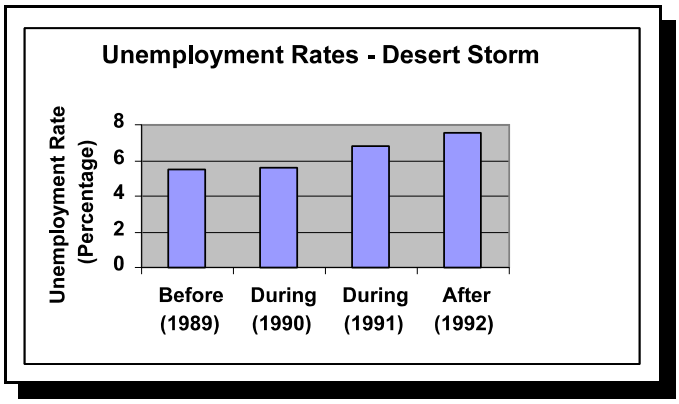
Milton Friedman wrote, "Economics is the science of how a particular society solves its economic problems," and continued his thought with "an economic problem exists whenever scarce means are used to satisfy alternative uses" (Arnold, 2004). How will the United States 2004-2005 be remembered? Did we use our resources to the fullest or did we squander them? How is our government using the "scarce means?" Are they satisfying the correct needs? Friedman also goes on to say "When an executive decides to take action for reasons of social responsibility, he is taking money from someone else" (Twomey, Jennings, & Fox, 2002). How much social responsibility should our employers have? And what will that do to the bottom line of our economy?

Alan Greenspan, our Federal Reserve Chairman, said the following about our involvement in the war front of Iraq, "I would be very doubtful if the impact on the economy is more than modest, largely because this is not Vietnam or Korea. Korea – it had a really monumental effect, basically because the economy was so much smaller than it is today"(Dettmer, 2002). Since the years of the Korean War, our economic indicators have changed, our laws have changed, and where the United States stands in the world is the measure that we will need to judge where we should be as a country. This paper will review the law that has changed employers' rights and our country's use of volunteer soldiers. Concurrently this paper will also look at the United States' balance of trade, inflation, Real GDP, full employment, and unemployment.

THE LAW

"Thousands of reservists and members of the National Guard answered our country's call and now they're starting to come back from their mission" said Secretary of Labor Elain Chao. A law called USERRA guarantees that the jobs they left behind will be waiting for them. Most employers know more about this law, those that don't can call 1-866-4USADOL. As Secretary Chao says, "They did their job – now let's do ours." This was a public service announcement used a social marketing technique to remind employers of their ethical duty to those members of the National Guard and Reserve. This marketing effort was to remind employers that there was now a law that could be enforced against employers if they did not treat the "returning from active duty" employee as if they had never left (Agency Group 08, 2003). Many left their employment to become full-time soldiers and have returned to get back into full-time employment.

According to Scoot Woodham of the National Guard Bureau, the National Guard is made of two divisions: Army and Air. The National Guard's first and primary responsibility has been to state militia, and then the President of the United States has the right to federalize these state militias for active duty in a time of a national crisis. Ms. Renee Hylton, historian for the National Guard Bureau, notes that after Vietnam, the Air National Guard can only be voluntarily activated but that the Army National Guard can be involuntarily activated for a period of 18-24 months. Each military division within the United States has its own reserve units. The reserve units of our armed forces are made up of men and women who have been previous members of the military (now, civilian), and they can be federalized in the event of the national crisis. (Woodham, 20004) (Hylton, 2004) Many laws of the land were implemented because the citizens of the United States had previously been mistreated after coming home from the previous wars or conflicts. When the violators did not voluntarily change their course of action, our legislators felt it was their duty to deal with it and change behavior through laws (Anderson, 2002). This is what occurred after the Persian Gulf War. As the National Guard and Reserve came back after the war, many were left without a job or a demotion with no legal recourse to get what they felt was rightfully theirs. That unethical treatment of our returning veterans prompted the passing of the Uniformed Services Employment and Re-employment Rights Act (USERRA) in 1994 (Leonard, 2003). This law "gives employees who take a leave of absence for active military service certain statutory rights – not only to re-employment but to specific coverage for retirement and wellness benefits" (Lewison, 2004).



"All government has powers that they never possessed before" is certainly one way to express the way that our government has begun to control the United States economic state in the world (Twomey, Jennings, & Fox, 2002). During previous

wartime needs for serviceman, it has been the individual citizen that was involuntarily drafted into the service. Today the National Guard and Reserve made up of men and women that if needed, will defend their country; yet, in the mean time, each is expected to be just part-time soldiers and full-time employees. Not only is this a commitment for the employee to become a full-time soldier if needed but it also has become a commitment for the employer.

There are various support systems for the employers and employees which includes the Employer Support of the Guard and Reserve (ESGR). ESGR was formed in 1972 at the anticipation of the end to the draft. The ESGR calls the members of the National Guard and the Reserve, "Ready Reserve." ESGR reports that the "Ready Reserve" makes up 46% of total military power for the United States and the success of the "total force" is dependent on the success of the support from the employer and community for the "Ready Reserve" (Information about ESGR, 2004). Even with this law, it does not remove the obstacle of unemployment or demotion for many of the guard and reservists as they return home. Employer support offices arranged through our defense department are reporting as many as 100 calls per week of potential violations of the law USERRA (Jobs for returning troops, 2003).

Is anyone concerned about the rights of the employee that was hired to replace the activated member of the National Guard and Reserve? The rights of the returning employee supersede the rights of anyone hired to replace him or her, even if the replacement ends up with no position at all (Lewison, 2004). A replacement employee has no rights to keep the job and the employer has no rights if they want to keep them. According to USERRA, the returning civilian soldier must be returned to their civilian job with "a position of like seniority, status and pay" (Lewison, 2004).

NUMBERS OF EMPLOYERS AND EMPLOYEES AFFECTED

Of 400 U.S. employers that were recently surveyed by Buck Consultants, 85% reported having "military reservists on staff" and 83% had been affected by one or more being called to full-time duty. Twelve percent are doing more that the law requires by continuing full pay for 3-6 months or making up the difference between military pay and civilian pay (54% of the businesses surveyed). Some businesses that cannot do that are at least continuing medical benefits for twelve months (43%) (Leonard, 2003). Nevertheless, the question remains; are the executives making these social responsibility decisions, "taking money from someone else – from the stockholders, in the form of lower dividends; from the employees, in the form of lower wages; or from the consumer, in the form of higher prices?" as economist Milton Friedman questioned

(Twomey, Jennings, & Fox, 2002). President Bush commented on this when he said of the activated members of the National Guard and Reserve, "They rely on their civilian employers to put their national interest above corporate or self-interest" (President thanks employers for support of Guard and Reserve forces, 2003).

How many reservists have been called out of the civilian world to that of active military? "American citizen soldiers have served in every conflict since the Revolutionary War," stated President Bush (President thanks employers for support of Guard and Reserve forces, 2003). There have been 243,000 reservists called to active duty and around 183,000 actively serving (Leonard, 2003). Col. John O'Shea, a representative of the Reserve Officers Association (ROA) states our concerns before this war is over are valid, "The actual pool of reservists is somewhere around 900,000 and most of them do hold full-time jobs. So there are plenty of employers who have reservist on their staffs and could still be affected by another call-up by the military" (Leonard, 2003). President Bush stated "…more than 1.2 million men and women serve in the Guard and the Reserve. That's almost half of America's total strength. These men and women face the difficult challenge of balancing military duty with civilian employment." (President thanks employers for support of Guard and Reserve forces, 2003). Out of 200 American citizens, only one wears a uniform for the armed forces which is comparatively low in recent years and the brunt of this duty is falling on the shoulders of the National Guard and Reserve. "Many of the part-time soldiers mobilized the first days after September 11 have yet to be deactivated. Within months, reservists will make up 40 percent of the total U.S. force in Iraq," says Lt. Gen. Steven Blum, chief of the Army National Guard (Mazzetti, 2004).

President Bush also seems to understand the sacrifice that the businesses across America pay for having member of the guard and reserve work for them. He states, "our Guardsmen and Reservist depend on the understanding of their employers. Across America, where units have been activated, employers at offices and factories and schools, hospitals and other workplaces have been understanding and really supportive" (President thanks employers for support of Guard and Reserve forces, 2003). There are numerous support agencies for both the employers and employees that are affected by the activation of members of the National Guard and Reserve. Egsr.com provides a complete listing of support agencies (Related Sites, 2004).

BALANCE OF TRADE & INFLATION

Would our employers be more willing to be patient with the loss of their workforce if they saw they were reaping the benefits somehow? Is our dollar worth as

much, what does our balance of trade look like and what do they have to do with one another? As the American economy moved from the local community state to the nation wide state, the individual states were unable to provide effective regulation of business. It was inevitable that regulation would migrate to the central government." (Twomey, Jennings, & Fox, 2002). The United States government has regulated trade well. Trade benefits have increased due to trade agreements like NAFTA (North American Free Trade Agreement) and the Uruguay Round global trade agreement which have provided American consumers with more choice and lower prices on the goods that they consume which total "$1,300-$2,000 annually for the typical U.S. family in savings" (Fact sheet: making life better for America's consumers, 2004).

The dollar is finally shrinking in worth. "Since 1982, the United States has run an every growing current account deficit – the gap between what we buy and reap from investment abroad and what foreigners sell to us and garner in returns on their U.S. investments," says Allen and Lim (2004). That should have driven down the US dollars much before now, but only in the last year have we seen a major decrease in the value of the US dollar in terms of other currencies. If we had seen the dollar's value shrink before now, we would not have the $3 trillion in net debts owed to other countries. The dollar has lost one-forth of its value since February 2003. Perhaps now, we will see the number of exports increase due to the fact that others currencies can buy more American goods and the American domestic population will buy less imports due to the price increases.

Inflation is a measure by the consumer price index (CPI), which is garnered by the Bureau of Labor Statistics. According to the CIA World Factbook, the inflation rate of the United States in 2002 was a mere 1.6% (2004). According to one of Council of Economic Advisers to the president, the public should not be concerned about inflation. "Inflation is primarily a monetary problem and as long as we have a central bank as competent as ours, I don't think inflation will be a problem," said Gregory Mankiw, who is the chair (Allen & Lim, 2004).

REAL GDP AND ECONOMIC STABILITY

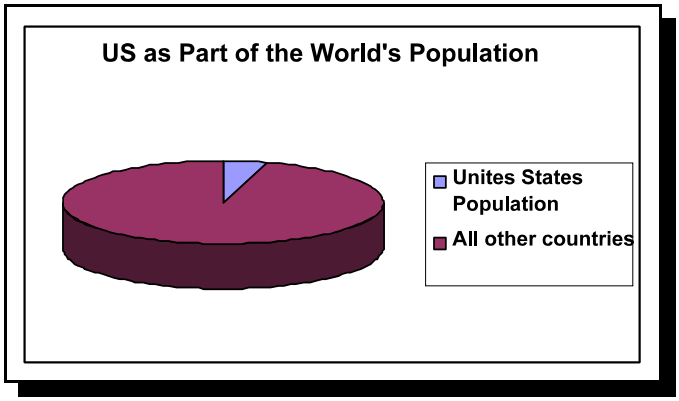
In the past twenty years, the United States has not seen growth in Real GDP like that which was recorded in the second half of 2003. Real GDP grew at an incredible 6.1% (Jobs & Economic Growth, 2004). A growth rate increase of that proportion indicates a significant increase in value of what we are producing within our country's borders. Certainly unemployment would have to have been reduced to have the additional workforce to create such an increase. If the Real GDP growth is any

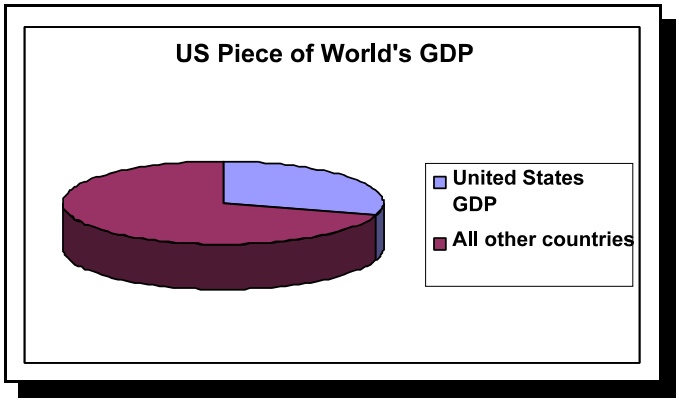
indicator, "an old-fashioned upswing in the business cycle is finally under way," and increasing our inventories and exports are what is making the difference (Copper & Madigan, 2004).

The state of our economy is measured by whether or not our Real GDP is increasing or decreasing from the previous quarter. Our US economy has entered into five periods of recession since 1970: 1973-1975, 1980, 1981-1982, 1990-1991 and the recession which began in 2001 (McConnell & Brue, 2005). Do the current figures that are out for second two quarters of 2003 truly indicate that the last recession is over?

How strong is America's economy? The United States of America accounts for only 4.5% of the world's population. The United States does forty percent of the world's use of the World Wide Web. The spending on military by our military leaders makes up 36% of the world's spending on the military (which is equal to the total of the next nine largest spenders). Our GDP reflects approximately 30% of the world product (Kennedy, 2001). Our economy appears strong on the world front.

The challengers of today's American economy, are tomorrow's China, India, Russia, and Brazil. Zhu Min, general manager and economic advisor to the president of the Bank of China, predicts, "China will be number two by 2020. China's GDP will roughly become $4-5 trillion. The United States will go to US $14-16 trillion." Bill Gates commented on China's growth as well, "It's breathtaking. It's capitalism at full speed. The whole world's going to get richer." (India, Brazil Predict Economic Strength, 2004) It has been noted that in the last decade, "China has become the world's workshop…India is becoming the world's back office," (Zuckerman, 2004). These jobs have always traditionally been thought as American, but we are no longer in the world of "tradition." We also do not see the other leading economic competitors are not committing a major portion of their country's resources to stabilize another part of the world.





FULL EMPLOYMENT

How full employment is determined is still a question of deliberation. However, our current president vows that he "will not be satisfied until every American looking for work has found a job" (Jobs & Economic Growth, 2004). Is President Bush saying that America should have an unemployment rate of 0%? For some that is what "full employment means (Walker, 2003). Still others proclaim that in order to have "a dynamic, changing economy," your unemployment rate will never be zero due to frictional or structural unemployment (Arnold, 2004). "Economists accept the idea that some unemployment - perhaps 5 to 6 percent – is natural" (Walker, 2003). Using the idea of full employment, our most current unemployment rate is 5.6% (Labor Force Statistics from the Current Population Survey, 2004) that would lead to the conclusion that our economy is currently at full-employment.

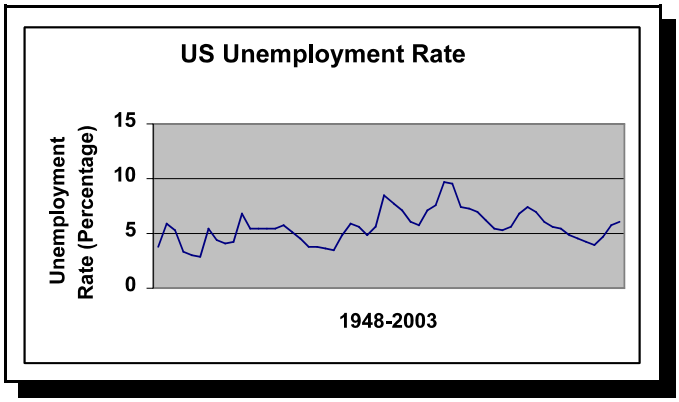
Instead comments like "unemployment remains high by recent standards," leads to reduced citizen confidence in our economy and to the reluctance in the employment of those citizens (The Bush Victory in Iraq, 2002). It appears that even our most basic issue (happiness) is that we place our constraints on how we would feel and respond now if placed in the conditions of the past, not how we as citizens actually were in the past (Easterlin, 2002). Could that not also be true as how we measure how well we were doing as a country?

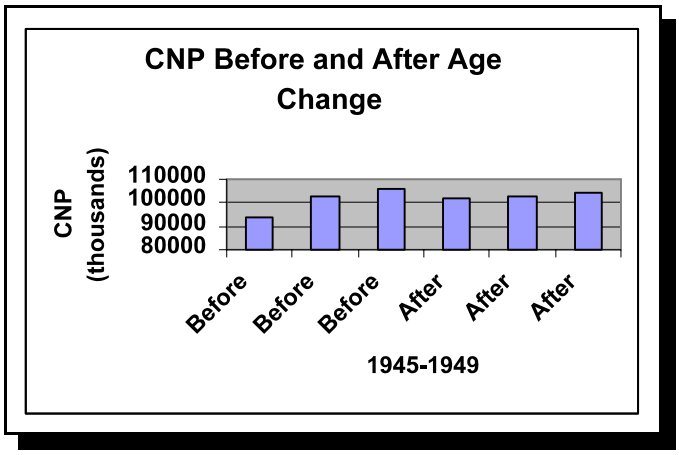
Is everyone in the United States surveyed to calculate the employment rate? In fact only 60,000 households are surveyed by the Bureau of Labor Statistics (Miller, 2004). Are the 60,000 households surveyed a true representation of the 290 million individuals that live in the United States. A second way to look employment of our

population is to survey business payroll, but the data lag is about 3-4 months for that information to be available that it would be untimely (Miller, 2004). The discrepancy between the two is recorded to be growing to 6-7 million individuals in recent years (Miller, 2004). Do we have a true measurement of employment?

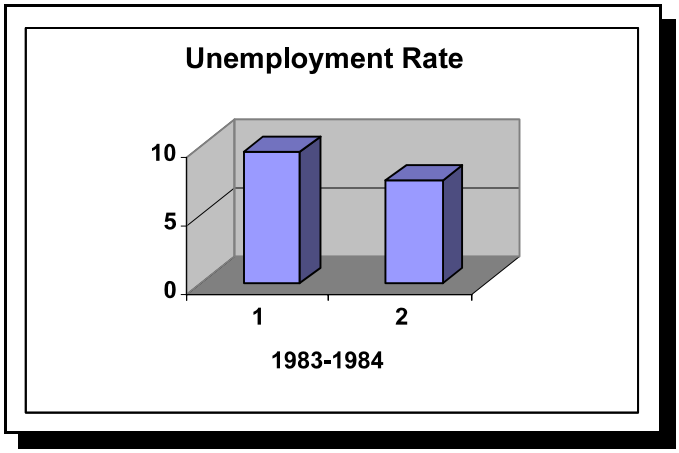
UNEMPLOYMENT

According to the Bureau of Labor Statistics, from 1940 to 1948, all persons that were 14 years of age and older, not institutionalized, and not in the military, were considered to be part of the civilian noninstitutional population. That age changed to 16 in 1947 which resulted in a reduction of the "workforce" according to our government's definition.





The only other governmental change (other than the change in the legal working age in 1947) occurred to the numerator for the unemployment rate. Who can be counted as unemployed changed with Ronald Reagan in 1983. At this time, Reagan wanted to reexamine structural unemployment. According to Durst 2000, the policy changed occurred to make unemployment rates decrease but with a false sense of security. But was it really? Reagan's idea was that someone that was structurally unemployed, was truly unemployable until they retrained. Maybe this change was for the better. Perhaps, it derived a truer number for the unemployed. If someone is structurally unemployed, there is not a job in the current economy for them. They must drop out of the market, retrain, and become a reentrant with new skills. Maybe Reagan making this policy change was the best for those that continually looking for a job to fit their skills that does not exist to is to force them to retrain and off of unemployment through the label of "unemployable." (Durst, 2000) (Feldstein, 1997) This change did make the unemployment rate decrease. The following illustration depicts the unemployment rates in 1983 and 1984. The data comes from the Bureau of Labor Statistics. There was a significant drop in the unemployment rate after the change was made.



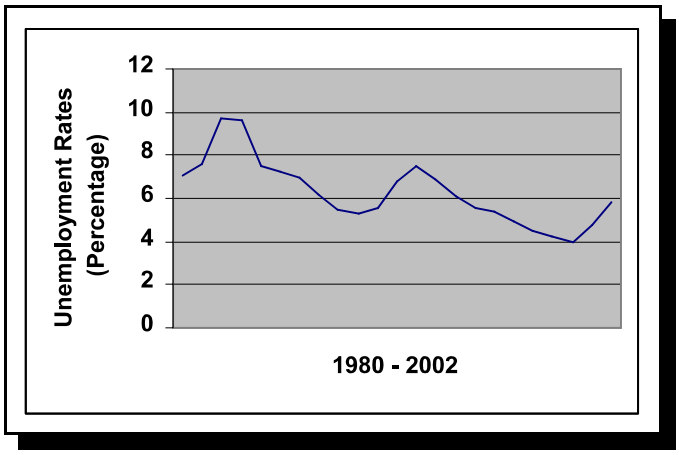
When reflecting on the history of our country, most would say that our economic policies are decided with the reflection of the great depression in our eyes. High unemployment rates could only lead to poverty and a destruction of order – political or social. The conclusion was that unemployment should be avoided at all costs. The decision makers listed economic growth and full employment at the top of the agenda and concerns on inflation were important but took a back seat to

employment issues. This type of economic planning occurred up until the late seventies when our economy proved that rather than low unemployment being the cause of high inflation, that the opposite was true. Could it be true that higher unemployment and higher inflation went hand in hand? Beginning in 1992, it has been noted that unemployment and inflation move in the same direction (lowering unemployment is meaning lowering inflation or at least stable inflation) (Notwotny, 2003).

In April 2000, the unemployment rate of the United States was at a thirty-year low of 3.8 percent. It drifted higher for a few months and went back down to 3.9 for October and December of 2000, and then the unemployment rate began to climb. According to the Bureau of Labor Statistics, the U.S. unemployment rates have hovered between 4.3-6.1 percent since our economic recession began in March 2001 through January 2004 (Labor Force Statistics from the Current Population Survey, 2004). There are approximately nine million people counted as unemployed today with 2.3 million more not working but cannot be counted as unemployed because they have become discourage and have quite the search for employment (Bush's War Economy, 2003).

When defining how much of our 290 million citizens are unemployed, the civilian non-institutional population is considered which removes those that cannot work (those under the age of 16 and those that are institutionalized) along with all of those who are in the armed forces from the total population (Arnold, 2004). When one starts to consider activating the National Guard and Reserve, one must remember the civilian non-institutional population is declining because according to the model, members of the armed forces are not part of the civilian non-institutional population. The individuals were removed but the jobs that those civilian soldiers once did remained. These jobs must be done. So the employer hires someone that is currently unemployed to do the job which make the number of unemployed persons decrease, but not as much as the number of people that have been taken out of our civilian noninstitutional population. Is it only because we removed a person who was previously doing a job? What will the unemployment rate be as the Reserve and Guard return to their civilian posts? Let's look at unemployment rates before and after each conflict that the National Guard and Reserve have been a part in the last two wars.

According to the CIA World Factbook, the unemployment rate of the United States in 2002 was a mere 5.8% with a civilian labor force of 141.8 million of a population of approximately 290 million (2004). Below, one can see what our unemployment rate has done form 1980-2002. Source: Unemployment Rates, by selected countries, 1970-2003 (2004). *World Almanac & Book of Facts*, 2004



Reflecting upon the numbers above, one can see that unemployment increased during the years our economy was affected by the Persian Gulf War in the early nineties in addition to the end of the Cold War, which some say is the reason that our economy slid into a deeper recession (Mollins, 2003). Compounding this were the events of September 11th and the United States entry into its war on terror. Since September 11th, we have seen a steady increase in unemployment than from the pre-war years. Could this be further evidence that we are missing our mark on the calculations of unemployment numbers? More people might not be unemployed, but actually more are employed through the military and the civilian non-institutional population is smaller than in nonmilitary times. We just reduced the denominator by a greater amount than the numerator. The unemployment rate is calculated by taking the number of unemployed and dividing it by the civilian noninstitutional population (Arnold, 2004). If during the activation of the National Guard and Reservists (wartime), the employer chooses to assign those tasks that are vacated to another employee and not hire someone, the numerator would remain the same and the denominator would decrease. Again, this would make the unemployment rate increase without there being any additional people' unemployed and looking for a job.

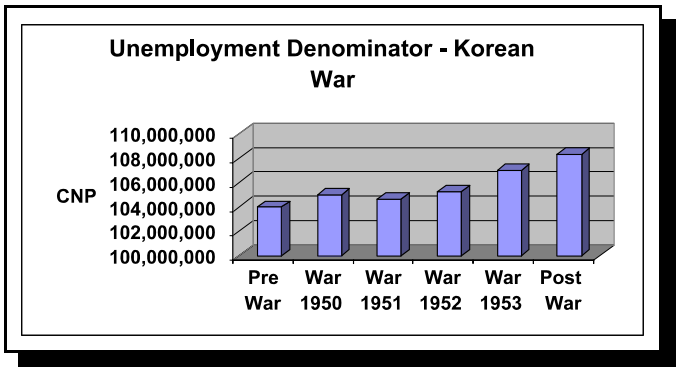
One potential solution to this problem is to increase the number of full-time members of the armed forces and reduce the number of National Guard and Reserve men and women that are being activated. Both parties that represent both sides of Capital Hill are for increasing the size of our military for the first time in over 16 years since the ending of the Cold War, but the Pentagon is not. Everyone but the Pentagon seems to see that the call-ups of the Guard and Reserve have only patched the problem and have been a temporary solution. In 1987, our full-time military was at a peak of 2.2

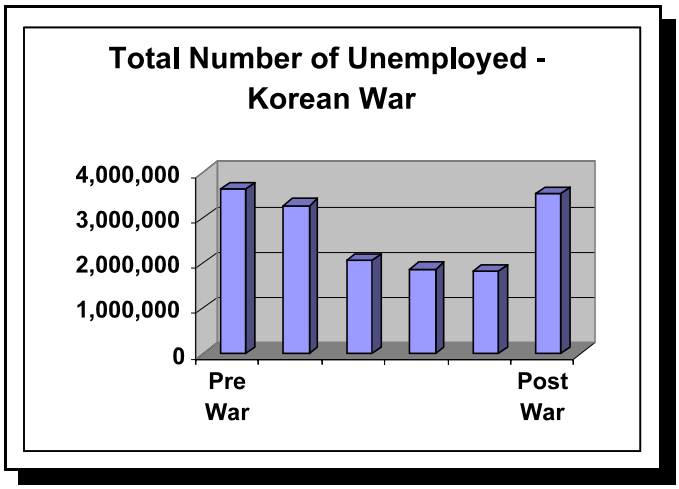
million persons and dropped to 1.5 million in 1988 and has remained at that level (Squiteieri, 2003).

Perhaps the Pentagon is not in favor of this because they currently operate under a budget of $401 billion which in the largest since the Reagan era. Considering the amount of money the Pentagon is spending, its military force is one-third smaller than in the Reagan era (Mazzetti, 2004). What should our military forces be as Iraq rebuilds? In post-war Germany, the United States "deployed one soldier for every ten citizens," which is what President Bush used as a model. Although in post-war Iraq, there is "one soldier for every 154 citizens." Donald Rumsfeld says the "our goal is not to create a dependency in Iraq by flooding it with Americans." Our current Administration wants to "Iraqify" it. Let the Iraqis handle their rebuilding but with minimal support from the United States. What is the minimal support going to cost our country in the process (Crunch Time, 2003)?

If you are merely measuring how many people are employed or unemployed by looking at the rates, we have shown that the percentages can be misleading. The unemployment rate has been continually dropping since its high of 6.3 in June of 2003 (Labor Force Statistics from the Current Population Survey, 2004). How can this be when we continually hear that the Bush administration is losing jobs? "More than 2 million jobs have been lost since Bush took office," (Kadlec, Carney, Zagorin, Kiviat, & Thottam, 2003). The current administration got a substantial tax cut that they promised would bring an average of 306,000 jobs a month, and give 510,000 American citizens employment before the end of 2003, but it has not. Only one-third of the anticipated job growth has occurred (Zuckerman, 2004). If jobs are not being created, how is unemployment affected? How could the unemployment rate continue to drop one-tenth of one percent every month for the previous seven months? Maybe, just maybe, it has something to do with the denominator for the unemployment rate.

During the Korean War, we saw the denominator actually decrease during the first year of the way. Looking at the following graph, one can see that the denominator (civilian noninstitutional population) decrease. The numerator (number of unemployed) continually decreased in size except in the postwar numbers perhaps due to the fact that the number of soldiers activated came back and found no job waiting. The data was retrieved from the Bureau of Labor Statistics.





CONCLUSION

It is true that there is no country in the world that is an economy of pure capitalism or pure socialism, but is what we require of our business is America pushing our economy more and more toward socialism (Arnold, 2004)? How long can our businesses be supportive of the guard and reserve by continuing their social responsibility to our country? How long will we be required to endure the effects on our economy while trying to provide stability in others?

The United States of America won its independence on July 4, 1776 and it took until September 17, 1787 for our countrymen to put together a document that would outline the relationship of our government and its people (CIA – The World Factbook –United States, 2003). Are our businesses and our economy prepared to endure the

strains for the next eight years until Iraq defines theirs? We still have our economic problems to deal with: raging medical and retirement costs for a rapidly growing senior population, an increasing imbalance of trade, and a potential for a rise in inflation with "stagnation of family income in the lower economic groups" (CIA – The World Factbook –United States, 2003).

The president has growing power and influence in our country more than ever before. With Republican control over both sides of Congress, he is "leader of the lawmaking process" (Twomey, Jennings, & Gox, 2002). In the President's release dated February 2, 2004, he did say that his budget would focus on "winning the war on terror by defeating terrorists and their supporters," and "strengthening our economy" (President Bush's FY 2005 Budget, 2004). President Bush and his policy sent $100 billion last summer to the citizens and have had enormous increase in military spending which could be the reason for the unprecedented 7.2 percent growth in the third quarter of 2003. Increasing the governmental spending does make our economy grow but it should be noted that it could have a greater multiplying effect if used for improving the infrastructure of the county (schools and roads) than used on defense spending. (Bush's War Economy, 2003)

Have we stretched our military resources too far? Does our military need to be increased to have additional full-time members? "Fifty-four of the 61 members of the House Armed Services Committee…have sent President Bush a letter urging him to expand the U.S. combat force…{asking Bush to} reassess the ratio between active and reserve forces used in long deployments because of concerns that the military is overly reliant on the Guard and Reserve in the war on terrorism." (Squitieri, 2003)

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THE CORRELATION BETWEEN TEACHING ATTRIBUTES AND THE INSTRUCTOR'S RATING

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ABSTRACT

This paper examines the relationship between teaching effectiveness and the awarding of economic and finance grades at one large regional institution. Using several statistical tests, the paper compared the average course grade that the economics and finance faculty members gave their students and the average score that the students awarded their instructor on the university's teaching effective instrument. The findings suggest that for the sample groups, there was no correlation between the class grade and the teacher's "grade."

INTRODUCTION

At the conclusion of most academic semester, it has become a common practice at many colleges and universities to ask for student feedback concerning the instructor's effectiveness. Ostensibly, the purpose is to provide the teacher with information on their strengths and weaknesses in order that areas needed for improvement can be identified and acted upon. The number of instruments used to measure teaching effectiveness and various attributes of the instructor or the course, however, are as varied as there are colleges and universities. Most instruments of measurement are grouped by pedagogy and other categories designed to capture specific attributes relative to the instructor. Regardless of the format of the assessment instrument used, and the several questions found on that instrument, many evaluative instruments contain but one question that is designed to encapsulate the instructor's *overall* effectiveness for that particular course. What is often overlooked is the relevance of the other questions as predictors of the instructor's teaching effectiveness.

While teaching evaluations can provide valuable information for the instructor of record, many faculty members, however, feel that some department chairs might rely on poor evaluations as a means for not granting promotion, tenure, or merit raise. If there is merit to the latter argument then some faculty members may "buy" good

teaching evaluations by awarding high and unearned grades. In casual conversations, some professors who have received poor evaluations will counter by claiming that the reason lies in their tough grading policy and rigorous standards. These same faculty members will claim that the way to insure high teaching marks is to award inflated grades. While this paper lays no claim to provide definitive answers to the on-going controversy, for there are multiple reasons, which might explain high grades, this inquiry could shed some preliminary light. In this regard, the purpose of the paper is to examine the correlation between measures of teaching effectiveness and class grades. The null hypothesis is that there is a positive relationship between teaching effectiveness and class grades, due to one "buying" grades.

DATA SET AND STATISTICAL TESTS

The data sets are from the economics and finance department of a mid-size southeastern university. The university requires that all faculty members allow their students to evaluate the course, instructor, etc., at the end of each semester. The instrument used to "measure teaching effectiveness", Student Perception of Teaching (SPOT), is composed of 16 questions, according to Pedagogy, Personal Characteristics, Ethical and Personal Characteristics and Overall Rating. Each question is designed to capture some aspect of the course or the instructor of record, and allows the student to respond with one of five responses: poor, below average, average, above average, or excellent. The weight assigned to each response ranges from 1 (poor) to 5 (above average). One question in particular, 'Instructor Rating Compared to All Others' (Q16), has become *the* question that university administrators hold to be the "best" indicator of teaching effectiveness. The numerical response to this question shall serve as one critical variable of teaching effectiveness, in this paper and his coded as EFFECTIVE. The other critical variable will be coded as GRADE. Other quantitative variables found on the SPOT are coded as Q1-Q16 and are described as:

Further, at the culmination of each semester the chair is furnished with the number of A's, B's, C's, etc. that the faculty awarded for each class that he or she taught. Given that an A=4 pts., and a B=3 pts., etc., the average grade for the class can be determined. Hence, GRADE, became the other critical variable in the analysis.

The data set consisted of all tenured or tenured track faculty members in the department of economics and finance (25 professors) and covered a period of five academic years including the spring semester 2001 (1996-2001). It did not include summer sessions for this period. Further, where either GRADE or EFFECTIVE was not available, that particular class was eliminated from the data set. In all there were

325 observations. Lastly, other variables were identified and will be used in several different models. In particular: Classize, Core, semester, and tenured vs. non-tenured. All will be described below.

STUDENT PERCEPTION OF TEACHING (SPOT)		
Pedagogy -		
	Presentation of Material	= student's score on Q1
	Learning Experience	= student's score on Q2
	Organization of Course	= student's score on Q4
	Work required of Course	= student's score on Q5
	Explanation of Assignments	= student's score on Q7
	Relevance of Assignments	= student's score on Q8
	Feedback on Assignments	= student's score on Q9
	Instructor's Expectations	= student's score on Q6
Personal Characteristics –		
	Stimulation of Interest	= student's score on Q3
	Concern for Students	= student's score on Q10
	Accessibility of Instructor	= student's score on Q11
	Instructor's Enthusiasm	= student's score on Q14
Ethical and Intellectual Characteristics –		
	Fairness in Grading	= student's score on Q12
	Knowledge of Subject	= student's score on Q13
Overall –		
	Instructor Rating Compared	=student's score on Q16 (EFFECTIVE)
	Course Rating Compared	=student's score on Q15
[Question 16 serves as one of two key dependent variables and is reported as EFFECTIVE. The other key dependent variable is reported as GRADE. Both will be defined below.]		

STATISTICAL TESTS AND MODELING

Two null hypotheses will be tested: there is no statistical and positive relationship between the high GRADE and high student evaluations (EFFECTIVE) and there is no statistical relationship between GRADE and SPOT scores. To accept or reject the hypothesis several statistical tests were performed.

First, an average of EFFECTIVE scores (Q16) was ranked from high to low for all members of the department. The purpose was to determine statistically significance from the department's average, by all professors in the department of economics and finance. Table 1 records the scores from high to low. Professors A-E was found to be statistically significant from professors F-T. Professors U-Y was likewise found to be statistically significant from professors F-T. Second, a Pearson Correlation Coefficient Matrix (not shown) was constructed for all questions found on the teaching evaluation instrument (SPOT) numbered 1-16. The purpose was to ascertain any correlation among any questions on this instrument. The Pearson Correlation matrix revealed that questions numbered 5 (Work required), 6 (Instructor" Expectation), 9 (Feedback on Assignments) and 15 (Course Comparison) were highly correlated, each were omitted from the models. Third, a series of OLS models were constructed where the dependent variable EFFECTIVE or GRADE was regressed on variables GRADE, CBK, SEMESTER, TENURE and questions 1-14.

The variables are specified as in the OLS models are as follow. Tables 2-5 records the results found for these models.

GRADE	= the average grade given by the instructor
SEMESTER	= dummy variable: 1= fall semester, 0= spring semester
PROF	= Professors in the data set
CBK	= dummy variable: 1= core elective course, 0= required core course CBK (Common Body of Knowledge, are those courses that all students in the business school must take, regardless of major)
TENURED	= dummy variable: 1 = nontenured status, 0 = tenured status
CLASSIZE	= the enrollment of the class, where: *small* classes are less than 13 & *large* classes are greater than 12

STATISTICAL RESULTS

In order to identify those professors that statistically receive EFFECTIVE scores above and below the mean, a Least Squares Mean test was conducted. Table 1

records the results. Basically, Table 1 is a one-way ANOVA model, which explains EFFECTIVE by professor, controlling for no other variables. As seen in columns 1 and 3, five departments member's EFFECTIVE scores were statistically significant *above* the department's average, and five were statistically significant *below* the departmental average. Based on the fact that twenty-five professors make up the data pool, it was decided to focus attention on the top five faculty members (A-E) and bottom five faculty members (U-Y) to determine if *these* instructors "buy" high teaching evaluations. Table 2 records the relationship between four predictor variables and the dependent variable, EFFECTIVE. What clearly emerges from the data is that for the top faculty, there is no relationship between EFFECTIVE and GRADE. Interestingly, no other variables for this group prove to be a factor in "predicting" the instructor's effectiveness. For the bottom faculty, the interpretation of the results depends on the reader. The correlation between GRADE and EFFECTIVE are statistically and positively related. Recognizing that this group is the ones that score the lowest EFFECTIVE score, then as their scores fall, so do the grades. Equally plausible, however, is that as their EFFECTIVE scores rise so do the grades.

Attention is then given to all department members, regardless of their EFFECTIVE score ranking, but based on class size. It was hypothesized that small classes (less than 13) would yield different results than classes greater than 13. Table 3 sought to determine if there was any "predictive" value between EFFECTIVE, GRADE, CBK, SEMESTER and TENURE, by large and small classes. The table is set in the aggregate and does not account for individual faculty members. With respect to EFFECTIVE and GRADE, the table does show a positive and statistically significant relationship, regardless of the class size. The data would appear to support the argument for "buying teaching evaluations." Table 3 reveals that no other variable are statistically significant. Clearly, more analysis is needed.

Tables 4 and 5 record the regression of SPOT against GRADE and are segmented by tenured and non-tenured faculty. To better interpret the data, the results the two tables should be juxtaposed. The results indicate that there are several teaching attributes that are statistically common for both large classes and small classes, regardless of tenure status. For both tenure sets, only Learning Experience (2) and Explanation of Assignments (Q 7) as a factor in determining grade. Interestingly, the variable CBK is non-significant (-1.39) for small classes and significant at –2.61 for tenured faculty. For large classes the results are mixed. In the area of *Pedagogy,* only Presentation of Material (Q1) emerges as important, regardless of tenure status. However, in the area of *Personal Characteristics*, both Stimulation of Interest (Q3) and Concern for Students (Q10) are consistently significant, regardless of tenure status.

Further, once again, the variable CBK emerges as a "predictive" factor, but of a curious sign.

Table 1: Mean Score Ranking of All Professors: Effective		
Professor	**Mean Effective Score**	**Statistical Significance (5%)**
A	4.74	*
B	4.56	*
C	4.5	*
D	4.48	*
E	4.43	*
F	4.3	
G	4.25	
H	4.16	
I	4.14	
J	4.12	
K	4.09	
L	4.09	
M	4.07	
N	4.04	
O	4	
P	3.98	
Q	3.88	
R	3.81	
S	3.71	
T	3.66	
U	3.61	*
V	3.58	*
W	3.54	*
X	3.43	*
Y	3.03	*

Table 2: Relationship Between Predictor Variables and Effective: Select Faculty			
(Top Faculty)			
Variables	**Parameter Estimate**	**t Value**	**PR >|T|**
INTERCEPT	4.6945	13.41	0.0001
GRADE	-0.1704	-0.17	0.8683
CBK	-0.1302	-1.42	0.1615
SEMESTER	0.0328	0.55	0.5817
TENURE	-0.0718	-1.13	0.2634
R^2: 070; n: 66; F: 1.11			
(Bottom Faculty)			
INTERCEPT	1.3502	3.69	0.0005
GRADE	0.7513	6.15	0.0001
CBK	0.0149	0.08	0.9335
SEMESTER	-0.1095	-1.79	0.0778
TENURE	0.4472	2.88	0.0057
R^2: 40: n: 69: F: 10.92			

Table 3: Relationship Between Predictor Variables and Effective All Faculty			
(For Class Size ≤ 12)			
Variables	**Parameter Estimate**	**t Value**	**PR >|T|**
INTERCEPT	2.834	5.63	<.0001
GRADE	0.634	4.79	<.0001
CBK	0.234	1.81	0.0742
SEMESTER	-0.039	-0.36	0.7208
TENURE	-0.0695	-0.64	0.5249
R^2: .2197; n: 86; F: 5.77			
(For Class Size > 12)			
INTERCEPT	2.8398	10.48	<.0001
GRADE	0.4621	5.31	<.0001
CBK	-0.0246	-0.36	0.7208
SEMESTER	-0.0638	-1.09	0.2767
TENURE	-0.0226	-0.37	0.7135
R^2: 1483: n: 253: F: 10.84			

Table 4: Relationship Between Predictor Variables and GRADE: Non-Tenured Faculty			
(Class Size ≤ 12)			
Variables	**Parameter Estimate**	**t Value**	**PR >|T|**
INTERCEPT	2.3762	3.49	0.0016
Pedagogy			
(Q2) Learning Experience	0.2283	0.83	0.4123
(Q7) Explanation of Assignment	-0.0489	-0.16	0.8716
Ethical & Intellectual			
(Q13) Knowledge of Subject	-0.0248	-0.12	0.9072
CBK	-0.2283	-1.39	0.1754
R^2: .10; n: 33; F: .81			
(For Class Size > 12)			
INTERCEPT	2.9327	8.61	0.0001
Pedagogy			
(Q1) Presentation of Material	-0.3439	-2.16	0.0326
(Q4) Organization of Course	-0.2921	-2.2	0.0298
Personal Characteristics			
(Q3) Stimulation of Interest	0.3191	2.6	0.0106
(Q10) Concern for Students	0.3388	3.17	0.002
(Q11) Accessibility of Instructor	0.0017	2.8	0.006
CBK	-0.2741	-6.04	0.0001
R^2: .42; n: 115; F: 11.26			

Table 5: Relationship Between Predictor Variables and GRADE: Tenured Faculty			
(Class Size ≤ 12)			
Variables	**Parameter Estimate**	**t Value**	**PR >|T|**
INTERCEPT	0.4066	0.91	0.3666
Pedagogy			
(Q2) Learning Experience	0.6021	3.6	0.0008
(Q7) Explanation of Assignment	-0.4905	-2.79	0.0085
Ethical & Intellectual			
(Q12) Fairness in Grading	0.5281	3	0.0048
CBK	-0.3079	-2.61	0.0131
R^2: .63; n: 40; F: 14.98			
(For Class Size > 12)			
INTERCEPT	4.05521	4.43	0.0001
Pedagogy			
(Q1) Presentation of Material	-0.4281	-2.67	0.0084
(Q8) Relevance of Assignments	0.3142	2.39	0.018
(Q6) Instructor's Expectations	-0.5305	-2.4	0.0175
Personal Characteristics			
(Q3) Stimulation of Interest	-0.4217	-3.11	0.0002
(Q10) Concern for Students	0.3739	3.74	0.0003
Ethical and Intellectual			
(Q13) Knowledge of Subject	-0.5446	-4.17	0.0001
CBK	-0.1134	-1.63	0.1054
R^2: .629; n: 149; F: 29.92			

CONCLUSION

As indicated at the beginning, this paper will not provide a definitive answer to the belief held by some that low teaching evaluations are the result of classroom rigor and that high evaluations are "bought" by giving high, unearned grades. It should be viewed as a paper to advance the discussion on this important subject. Said that, the authors will state, supported by some data, but rejected by other data, that the hypothesis that there is a relationship between high grades and teaching evaluation, due to one "buying" grades cannot be definitively rejected. The results are inconclusive and mixed. What drives high or low SPOT's is due to multiple factors. However, there appears more support in this study to reject the hypothesis that the awarding of high grades will result in high teaching evaluations than there is for accepting the hypothesis.

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ECONOMICS AND BUSINESS EDUCATION: A COMPARATIVE STUDY OF THE UKRAINE AND THE UNITED STATES

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ABSTRACT

Dr. Larry Dale was one of 14 educators chosen by the National Council on Economic Education (NCEE) and the U.S. Department of Education (USDE), to get a first-hand look at Ukraine's efforts to teach students how to build a democratic market economy. The group, returned from an eleven-day study tour on Ukrainian economic education in the late fall of 2002, in which they visited 22 schools in the cities of Kiev and Lviv. The purpose of this study was to examine the effectiveness of the Ukrainian approach to business and economic education as compared to the status of economic literacy in US High schools.

Our study examined seven different groups of students ranging from those with more than three hours of economics to those who had no formal training in both countries. These students were all given the Test of Economic Literacy, developed by the National Council on Economic Education and nationally normed in 1986, and translated into Ukraine in 1991. The mean scores were tested using a series of Chi Square tests of independence to determine if the difference between the overall performance score and the sub group scores were significant at the .01 level. The results tended to be significant for most of the factors. Then a regression analysis using the two-tailed test at the .01 level of significance, was run on the data.

Amazingly after only 12 years of independence from the Soviet Union the general Ukrainian student population was doing as well on a test of general economics as the American students who had never known any other system. This is because the null hypothesis could not be rejected indicating that there was no significant difference between the Ukraine and American groups overall. An examination of the subgroups was even more revealing. As would be expected, the group that performed the best on the test were American students taking the Advanced Placement tests in economics after completing a high school course in AP Economics that would count for college credit. There was no significant difference between this group and the Ukrainians who were

using the economics test as one of their Olympiad exams, a series of exams that are required for graduation from high school. There was no significant difference between the performances of these top groups on the test, since both of these students groups had strong incentive to be successful.

These top groups were followed closely by the college bound Lyceum students who also performed significantly better on the test than any of the other groups, except the top groups. There was however a significant difference between the top groups and the Lyceum group who had no formal training in economics, but not those with a minimal three hour course in economics and business. Since 73% of the College bound students had at least a three credit hour course in business and economics during their high school experience, they were almost even with those specializing in economics. The vocational oriented Gymnasium students were well behind the brighter groups, but performed significantly better than the Midsouth High Schools students, from Arkansas, Tennesse, Missouri and Mississippi, who had not taken any economics or business courses in High School. Also it should be noted that the data from the national norming test bank demonstrates that U.S. students did significantly better in 1986, when the tests were first administered, than the current student groups. This may however represent a regional difference, since the more recent data came from a specific region of the country, where as the 1986 data reflected the national experience. Overall it is sad to note that the Nation that perfected the market economy has students that perform only as well as a nation of students that have only had 13 years of experience with a market economy in transition. One explanation may be that the newness factor has a halo effect on the Ukrainian students enhancing their interest in market economics and thus their performance, similar to the effect that computer tutorials had on American students when they were exciting and new in the 1980's. An exit survey of 352 randomly selected students from the US and Ukraine indicates an abnormally high interest in the subject by Ukrainians as compared to American students.

This study clearly demonstrates two important findings. First the Ukraine educational system with all of its problems has done a miraculous job of improving both interest in economics and more informed students, particularly among the general population. This may relate to the greater discipline found in schools in the Ukraine as much as the perfected teaching methods, but it is till significant. A second important finding is that both countries have some need for improvement in business and infusing economic education into their Pre-college education curriculum if they are to reach the majority of students in either country, since most will not attend College or post-secondary education institutions.

INTRODUCTION

Dr. Larry Dale, Director of the Center for Economic Education is one of fourteen economic educators chosen by the National Council on Economic Education (NCEE) and the U.S. Department of Education (USDE), to get a first-hand look at Ukraine's efforts to teach students how to build a democratic market economy. The group, returned from an eleven-day study tour on Ukrainian economic education in 2002, sponsored by the US Department of Education and the National Council on Economic Education. The tour included 22 schools in the cities of Kiev and Lviv. Three of the schools were public schools, 15 were private Lyceums, 3 were private Gymnasiums and one was a special advanced business school.

The fourteen-member group studied education reforms currently in progress, economic education activities, curriculum standards and assessment, civic education programs, training and delivery systems. Participants also observed the ways in which Ukrainian teachers overcome limited resources and administrative constraints. They also met with representatives of the Ministry of Education, the Ukraine Council for Economic Education, as well as business leaders.

The *International Education Exchange Program* (IEEP) helps international partners, undergoing the transition to a democratic market economy, reform their educational systems through training, materials development and translation, conferences, organizational development, and study tours. The IEEP brings together U.S. economic and civic educators with their counterparts from central and Eastern Europe and the former Soviet states. Since 1995, the National Council on Economic Education *EconomicsInternational* program has been responsible for conducting the economic education component of the IEEP, which is funded by the U.S. Department of Education Office of Educational Research and Improvement, and conducted in cooperation with United States Department of State.

From the outset of transition in the early 1990s, the task of educational reform in Ukraine has been immense. Relative to the needs of a market economy, the Ukrainian educational system required substantial change. Courses never before offered during Soviet days had to be created and added to the curriculum. Further, all of this required developing a core of economics and social studies teachers who understood and could effectively teach market economic content, in a nation where no educators had any positive background in that field. Finally, the economic freedom and entrepreneurial spirit fundamental to a capitalist market economy required progress toward developing in school students an independence of thought and a greater skill in applying knowledge in new and creative ways. Strengthening this aspect of education

required an entirely new style of teaching that would accommodate active learning methods and greater student freedom of expression. These changes began in 1991.

. In classrooms of Lviv and Kiev, teachers trained through the cooperative efforts of NCEE and the Ukrainian Council on Economic Education (UCEE) delivered activity-based lessons with skill and great enthusiasm. From the Ministry of Education to the committees developing economics standards for Ukraine, the influence of NCEE is clear – lessons are being designed with an underlying active-learning paradigm and standards are being developed with significant reliance on NCEE guidance and assistance.

It is evident from both discussions with educational administrators and observations of classroom economics lessons that the active learning paradigm has been accredited by a core group of educators in Ukraine. With the leadership of Vladimir Melnyk, President of the Ukrainian Council on Economic Education, and the assistance of his dedicated Center Directors, epitomized by Ihor Shimkiv, it is clear that in time the economic education within the Ukrainian school system will fully adapt to the needs of a market-based economy. The Ukraine has a distinct advantage over the less organized fifty state efforts in the US. In the Ukraine in order to teach any subject teachers must pass a test and then be retested every five years to be certified to teach that subject. The Ukraine has a three-tiered educational system. First there is the "inferior" state run schools, which at least two-thirds of the students avoid, then there are private licensed Lyceums for college bound students and the Gymnasium schools for vocational education. Both of the private systems receive some support from the state and then are certified and monitored by the state. The private schools seem similar to the charter school system active in US Education.

Teachers in Ukraine must overcome many obstacles, making our own problems seem trivial. With a command-economy educational background, a limited number of available market-economy textbooks (according to Irina Parkhomenko, a choice of only seven approved by the Ministry of Education), poorly-heated classrooms, few computers, a paltry supply of paper and teaching materials, and worn-slick blackboards are some of the many obstacles faced by teachers in the Ukrqaine. The teachers of Ukraine, who we had the distinct pleasure to observe, enthusiastically conducted market-oriented economics activities with their students. After completing a full day in the classroom, it is likely that most of these teachers, in need of supplementing their meager salaries of 250 to 500 Ukrainian Currency a month (about $50 to $100), either walked in the cold or rode a crowded old bus to a second job. Next morning, perhaps lucky enough to get a cold shower, they returned to school to guide their students once again – aiming to win the next Economics Olympiad. The

educational reform process in Ukraine is well underway, but with what results? Is there any evidence to suggest that the active learning approach is generating the desired improvement in intellectual freedom and innovative problem solving? Are students conquering the rigors of the economic discipline and gain survival skills in the world of business? It was the purpose of this study to examine the effectiveness of the Ukrainian effort when compared to that of the United States.

RESEARCH DESIGN

In this study I compared six independent treatment groups The performance of these treatment groups were first tested using the Chi-square test of significance then correlated using the dependent variable of a final score on the High School Test of Economic Literacy developed by the National Council on Economic Educations and tested in a variety of different sized schools across the United States with 4,235 students participating. Most of the students completed the test as an exit exam at the end of their senior year in school in both the United States and the Ukraine. Pretest were not administered in the Ukraine so that data is not available and was not included in either the US or Ukrainian portions of the study. The data from the American schools included: group 1-3 United States population; Group 1 [Y] national data accumulated in the process of norming the test in 1986 and available as a test bank from the National Council on Economic Education. Group 2 [x1] data from two Advanced Placement-Economics high schools [one in a medium sized town in Arkansas and one in Memphis, Tennessee]. These are schools that are teaching the AP course in advance Economics, this group included 293 subjects over a three-year period [2001-2003]. Group 3 [x2] a group of 326 students from a variety of randomly selected schools from all over the midsouth in Missouri, Tennessee, Mississippi and Arkansas.

The Ukraine groups included: Group 4 [x3] the exit exams from the population of 2,032 students in one large city school system run by the government in Kiev. Group 5 [x4] included results from the national Economic Olympiad, which include 1,793 of the brightest students who chose economics as one of their five areas in which they would be examined from all 22 states of the Ukraine Group 6 [x5] 231 students from two Lyceums or private academic high schools. Group 7 [x6] included 337 students from three vocational schools, called gymnasiums. These students are generally not going to attend college, but go directly into the world of work. An analysis of all equation variables is expressed in the functional relationship;

$$y = a + x1 + x2 + x3 + x4 + x5 + x6 + x7 + x8 + x9$$

Table 1: Explanation of the Equation	
Symbol	Independent Variable
y	Student's mean score on 1986 Data Bank
Characteristics	Dependent variables
X1	Group 2 USA Advanced Placement
X2	Group 3 Randomly selected MidSouth HS
X3	Group 4 Ukraine Kiev HS
X4	Group 5 Olympiad Results
X5	Group 6 Lyceum
X6	Group 7 Gymnasium

CONCLUSIONS

Our study examined seven different groups of students in the US and Ukraine. Three of these groups included 4,854 American High School students near the end of their senior year. Four of the groups included 7,098 Ukrainian students in their senior year. These students were all given the Test of Economic Literacy, developed by the National Council; on Economic Education and nationally normed in 1986, as an exit exam. This exam was translated into Ukraine in 1999 for use as the exit exam in economics. The mean scores were tested using the Chi Square test of significance and a regression analysis using the two-tailed test at the .01 level of significance. Amazingly after only 12 years of independence from the Soviet Union the general Ukrainian student population was doing as well on a test of general economics (mean score 22.92 for students with a minimum of three hours of economics and 17.23 for students with no economics) as the American students (mean score 23.33 for students with a minimum of three hours of economics and 18.37 for students with no economics, who had never known any other system) based on the combined mean score on the test. The chi-square test determined that these means were not statistically significant from each other. Even though there was a slight difference of 1.87 on the means score between the two groups it was not significant at the .01 level of significance.

An examination of the subgroups was even more revealing. First there was no significant difference between the means of the groups tested in 2001 and 2002 so that data was combined. As would be expected the two groups that performed the best on the test were American students taking the Advanced Placement tests in economics after

completing a high school course in AP Economics that would count for college credit. Their mean score was 25.89 [2001] and 26.03 {2001], which were not significantly different from each other but were significant when compared to the other sub groups. Their mean score was 25.71 [2001] and 25.09 {2001], which were not significantly different from each other but were significant when compared to the other sub groups. There was no significant difference between the AP American group and the Ukrainians who were using the economics test as one of their Olympiad exams. Ukrainian Students have three basic tests, which everyone must take in Ukraine language and culture, math and History. The students must select up to 5 exams from a broad range of subjects, as their specialties to form an exit text series from High School if they pass the test they will be certified as scholars in that area, one of these tests is the Test of Economic Literacy, which has been translated into Ukraine. There was no significant difference between the performance of these top groups on the test, since both of these students groups had strong incentive and the class background required to be successful. These students mean score was at the 91st percentile among students taking the exam.

Table 2: Raw Data

	Male Female	Y Mean	X1 Mean	X2 Mean	X3 Mean	X4 Mean	X5 Mean	X6 Mean
2002	51.21% MALE	1986 N= 4,235 With/23.33 None/18.37	N=181 25.89	N=141 With/19.77 None/11.21	N=2,032 With/22.92 None/17.23	N= 899 25.71	N=331 With/20.71 None/15.27	N=437 With/18.92 None/12.21
2003	52.31% MALE		N=112 26.03 2-year Mean 25.94	N=185 With/19.38 None/11.88	N=1,877 With/23.01 None/15.88	N=894 25.09	N=329 With/19.92 None/14.73	N=299 With/18.22 None/13.73

Total number of test subjects in 1986 was 4,235: in 2001 was USA 322/Ukraine 3699:
in 2002 was 297 Ukraine 3,399.
Confirmed by f-test and t-test along with loglinear model.

Table 3: Regression Statistics

2002-2003 DATA	1986 MEAN DATA Y	X2	X3	X4	X5	X6
X1	X2=.OO89*	X2=.OO12*	X2= -.OOO9*	X2=.O32	X2=.OO04*	X2= -.OO6*
X2			X2=.OOO7*	X2= -.OO2*	X2= -.OO32*	X2=.O4
X3				X2= -.OO13*	X2= -.OOO1*	X2= -.OO11
X4					X2= -.OO29*	X2= -.OO38*
X5						X2=.OOO5*

These top groups were followed closely by the college bound Lyceum students who also performed significantly better on the test than any of the other groups, with a mean score of 20.71 [2001] and 19.92 [2002]. There was however a significant difference between the top groups and the Lyceum group who had no formal training in economics, with a mean score of 15.27 in 2001 and 14.73 in 2002. Since 73% of the College bound students had at least a three credit hour course in business and economics during their high school experience they were then performing well in economics relative to the specialized students. These groups performed at the 61 percentile among students taking the exam.

The vocational oriented Gymnasium students were well behind the brighter groups (mean score with economics 18.92 without 12.21 performing as a group at the 51 percentile and the 15th percentile respectively.) This group still performed significantly better than the Midsouth High Schools students, from Arkansas, Tennessee, Missouri and Mississippi (with a mean score with economics of 19.77 and without economics of 11.21 performing as a group at the 56 percentile and the 10th percentile respectively.) Clearly students who took economic, which was less than 20% of the total tested in the US, performed as well as their counterparts in the Ukraine. None of the Midsouth schools required economics for graduation. The national graduates, regardless of whether or not they had taken any economics or business courses in High School, had a mean equal to that of the Ukraine students who had no economics but both were statistically significant predictors of lack of success on the test. Also it should be noted that the data from the national forming test bank demonstrates that students did significantly better in 1986, when the tests were first administered, than the current student groups. This may however represent a regional difference, since the more recent data came from a specific region of the country, where as the 1986 data reflected the national experience. No more recent national data was available to the researcher. Nor was their any data to test if there was a regional difference back in 1986. However there was no significant difference between the regional AP group and the nationally AP group, on the test, indicating that bright students do equally well in both countries. I do not believe that difference reflects a regional difference, but that students are receiving less information about economics today than they were in 1986. Some additional schools from other parts of the country need to be included to discover if this difference is a regional difference or if today's students are less informed about business and economics. Overall it is sad to note that Nation that perfected the market economy has students that perform only as well as a nation of students that have only had 13 years of experience with a market economy in transition. One explanation may be that the newness factor has a halo effect on the

Ukrainian students enhancing their interest in market economics and thus their performance, similar to the effect that computer tutorials had on American students when they were exciting and new in the 1980's. An exit survey of 352 randomly selected from the US and Ukraine students did indicate an abnormally high interest in the subject by Ukrainians, 87%, as compared to American students, 23%. This study clearly demonstrates two important findings. First the Ukraine educational system with all of its problems has done a miraculous job of improving both interest in and more economically informed students, particularly among the elite group of learners. This may also relate to the greater discipline found in schools in the Ukraine as much as the perfected teaching methods, their was no way to test for that difference since it varied from school to school.

A second important finding is that both countries have some need for improvement in the process of teaching and learning business and economics into their curriculum in Pre college education if they are to reach the majority of students in either country, since most will not attend College or post secondary education. The United States, in particular, is at risk graduating with little or no interest or knowledge of basic market, as reported in the research paper "A Nation at Risk" conducted and published by the National Council on Economic Education in 2000. The Ukraine educational systems, with all of its problems, is improving business education thanks to the dedication of a few prominent educators in the government and the private sector, as well as an army of better trained educators. It should be noted that these train inning programs are due in large part to the efforts of the National Council on Economic Education through a massive infusion of funds, from government and private sources, into economic literacy programs in the Ukraine. Such an effort could produce even better results in the US.

A regression analysis of the groups pointed tot eh same differences noted from the Chi square test and both were confirmed by the t-test and f-test statistics. The Ukraine educational systems, with all of its problems, is improving business education thanks to the dedication of a few prominent educators in the government and the private sector. American students may eventual lose ground to these more motivated scholars in the Ukraine with potentially drastic results in the future. American needs to improve its educational system with respect to economic literacy if it is to remain competitive with the emerging democracies in the market system.

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